Draft Final








# COMPREHENSIVE
## Floodplain Management Plan

TETRA TECH

March 2021

# Los Angeles County Comprehensive Floodplain Management Plan

March 2021

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# LIST OF ACRONYMS

ADA—Americans with Disabilities Act

BLS—(U.S.) Bureau of Labor Statistics

CEO OEM—(Los Angles County) Chief Executive Office/Office of Emergency Management

CEQ—Council on Environmental Quality

CEQA— California Environmental Quality Act

CFR—Code of Federal Regulations

CRA—Coastal Resource Area

CRS—Community Rating System

DMA—Disaster Mitigation Act

EDD—(California) Employment Development Department

EMA—(California) Emergency Management Agency

EPA—(California) Environmental Protection Agency

ERP— Emergency Response Plan

ESA—Endangered Species Act

FEMA—Federal Emergency Management Agency

FIRM—Flood Insurance Rate Map

GIS—Geographic Information System

Hazus—Hazards, United States-Multi Hazard

HUC—Hydrologic unit code

IBA—Important bird area

IPCC—Intergovernmental Panel on Climate Change

IRWM—Integrated Regional Water Management

LACDA— Los Angeles County Drainage Area (Study)

LACFCD—Los Angeles County Flood Control District

LCP—Local Coastal Program

LiMWA—Limit of moderate wave action

MS4—Municipal separate storm sewer system

NFIP—National Flood Insurance Program

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

NRCS—Natural Resources Conservation Service

NWS—National Weather Service

PPI—Program for Public Information

SEA—Significant Ecological Area

SFHA—Special Flood Hazard Area

USGCRP—U.S. Global Change Research Program

WRCC—Western Regional Climate Center

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# EXECUTIVE SUMMARY

## WHY PLAN FOR FLOODING?

Despite the repeated drought conditions that impact Southern California on a regular basis, the potential for flooding that results in personal and economic losses remains an issue in Los Angeles County. Since 1969, communities in Los Angeles County have been affected by 14 flood-related events for which federal disaster declarations were issued, and others that caused damage though no federal declarations were made, such as the following recent occurrences:

- In the summer of 2017, heavy rain and thunderstorms fed by monsoonal moisture pounded the community of Acton. More than 1.5 inches of rain fell in just 30 minutes, as temperatures dropped from 93 ºF to 69 ºF and wind gusts exceeded 55 miles per hour. Sudden flash flooding left drivers stranded in their cars on roadways inundated with mud and debris. A County Fire Department rescue helicopter team hoisted one stranded driver to safety. Metrolink trains were prevented from making their way to Acton due to flooded tracks, leaving commuters scrambling to find alternative transportation. Crown Valley Road and Soledad Canyon Road were also closed.
- Torrential rains in October 2015 brought flooding and debris flows to the Antelope Valley areas of Lake Hughes, Elizabeth Lake, Leona Valley and Quartz Hill. Three inches of rain fell in Leona Valley in just 30 minutes—a greater than 500-year rainfall event. Los Angeles County Public Works crews estimated 300,000 cubic yards of debris were removed from the region. Five structures were heavily damaged; three structures were flooded; and one modular home was destroyed. One of the damaged houses belonged to an older disabled couple. Debris closed a 40-mile stretch of Interstate 5 at the Grapevine. Along State Route 58, stretches were covered in mud and debris up to 6 feet deep, stranding 200 vehicles. The Los Angeles County Board of Supervisors declared a local state of emergency.
- In 2014, Hurricane Marie brought one of the largest hurricane-related surf events in decades to Southern California, leading to overall losses of $20 million. Hurricane Marie is the seventh most-intense Pacific hurricane on record.
- In the summer of 2013, 1.16 inches of rainfall in one hour was recorded in the Antelope Valley, resulting in flash flooding that caused road closures.

Los Angeles County has implemented many mitigation and flood control projects and plans but is constantly seeking additional ways to mitigate flood impacts on the community of unincorporated Los Angeles County. This update of the *Los Angeles County Comprehensive Floodplain Management Plan* reviews existing programs and recommends enhancements to them. This is the fourth iteration of the County's floodplain management plan and the second that comprehensively addresses all unincorporated areas.

The floodplain management plan is an important component of the County's participation, on behalf of the unincorporated areas, in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS), which are administered by the Federal Emergency Management Agency (FEMA). Developing a floodplain management plan is among the activities that earn CRS credit toward reduced flood insurance rates in unincorporated Los Angeles County. The CRS program sets forth requirements that floodplain management plans be updated on a five-year cycle and that progress on meeting plan objectives be reviewed annually.

## WHAT IS A FLOODPLAIN MANAGEMENT PLAN?

Hazard mitigation is defined as "sustained action taken to reduce or eliminate long-term risk to life and property." It involves planning, policy changes, programs, projects, and other activities that can mitigate the impacts of hazards on a defined planning area. A floodplain management plan is "an overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs." The responsibility for flood hazard mitigation lies with many, including private property owners, business, industry, and local, state and federal government. Recognizing that there is no one solution for mitigating flood hazards, planning provides a mechanism to identify the best alternatives within the capabilities of a jurisdiction. A floodplain management plan achieves the following in order to set the course for reducing the risk associated with flooding:

- Ensuring that all possible floodplain management activities are reviewed and implemented so that local problems are addressed by the most appropriate and efficient solutions.
- Ensuring that floodplain management activities are coordinated with one another and with other community goals and activities, preventing conflicts and reducing the cost of implementing each individual activity.
- Coordinating local floodplain management activities with federal, state and regional programs.
- Educating residents on the flooding hazard, loss reduction measures, and the natural and beneficial functions of floodplains.
- Building public and political support for mitigation projects.
- Fulfilling planning requirements for obtaining state or federal assistance.
- Facilitating the implementation of floodplain management and mitigation activities through an action plan that has specific tasks, staff assignments and deadlines.

The 2020 *Los Angeles County Comprehensive Floodplain Management Plan* identifies and prioritizes 37 mitigation actions, chosen through a facilitated process that focused on meeting these objectives. A companion document prepared in conjunction with this plan, the *Los Angeles County Repetitive Loss Area Analysis*, provides a detailed assessment of areas in unincorporated Los Angeles County that have experienced repeated flood damage in the past, with recommended actions to mitigate flooding at each specific repetitive loss area. The Plan also includes an enhanced strategy for communicating flood risk to the citizens of Los Angeles County referred to as a "Program for Public Involvement."

An updated Program for Public Involvement is included in the 2020 Floodplain Management Plan. An updated Repetitive Loss Area Analysis is incorporated as a functional annex to the plan.

## THE COMMUNITY RATING SYSTEM

The Community Rating System is a voluntary program within the National Flood Insurance Program that encourages floodplain management activities that exceed the minimum NFIP requirements. The CRS outlines 18 creditable activities that fulfill the program goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance. The activities are in four categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

Flood insurance premiums in participating communities are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals. Table ES-1 shows the discounts offered for the range of CRS community classifications, and the credits required for each classification.

Los Angeles County has participated in the CRS program since 1990. The County has a Class 7 rating. As a result, unincorporated area residents and property owners who live in a 100-year floodplain can receive a 15-percent discount on flood insurance; outside the 100-year floodplain they receive a 5-percent discount. This equates to a savings ranging from $78 to $254 per policy, for a total countywide premium savings of over $214,000/year. The floodplain management plan will help the County maximize its credit potential under the CRS.

**Table ES-1.** CRS Classes, Credit Points and Premium Discounts

| CRS Class | Credit Points | Premium Reduction[c] | |
|---|---|---|---|
| | | In Special Flood Hazard Area[a] | Outside Special Flood Hazard Area[b] |
| 1 | 4,500+ | 45% | 10% |
| 2 | 4,000-4,499 | 40% | 10% |
| 3 | 3,500-3,999 | 35% | 10% |
| 4 | 3,000-3,499 | 30% | 10% |
| 5 | 2,500-2,999 | 25% | 10% |
| 6 | 2,000-2,499 | 20% | 10% |
| 7 | 1,500-1,999 | 15% | 5% |
| 8 | 1,000-1,499 | 10% | 5% |
| 9 | 500-999 | 5% | 5% |
| 10 | 0-499 | 0 | 0 |

a. Zones A, AE, A1–A30, V, V1–V30, AO, and AH
b. Zones X, B, C, A99, AR, and D. Preferred Risk Policies are not eligible for CRS premium discounts because they already have premiums lower than other policies. Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. Some minus-rated policies may not be eligible for CRS premium discounts.
c. Premium discounts are subject to change.
*Source*: CRS 2013 Coordinator's Manual

## PLAN DEVELOPMENT METHODOLOGY

The first priority for this plan is to benefit the residents and property owners of unincorporated Los Angeles County by providing protection against the hazard posed by potential flooding. In addition, the plan has been developed to follow the guidelines for flood planning presented by FEMA for the CRS program. To earn CRS credit for a floodplain management plan, the community's process for developing the plan must include at least one item from each of 10 steps. The organization of this document corresponds with these steps:

- **Part 1—Planning Process and Project Background:**
  - Step 1, Organize
  - Step 2, Involve the public
  - Step 3, Coordinate
- **Part 2—Risk Assessment:**
  - Step 4, Assess the hazard
  - Step 5, Assess the problem
- **Part 3—Mitigation Strategy:**
  - Step 6, Set goals
  - Step 7, Review possible activities
  - Step 8, Draft an action plan

- **Part 4—Plan Maintenance:**
  - Step 9, Adopt the plan

    Step 10, Implement, evaluate and revise.

The following sections provide summaries of the planning process and recommendations of the 2020 *Los Angeles County Comprehensive Floodplain Management Plan* corresponding with the document organization presented above.

## PLANNING PROCESS AND PROJECT BACKGROUND

An 18-member steering committee, consisting of County staff, residents and other stakeholders in the planning area of unincorporated Los Angeles County, was assembled to oversee the development of the plan. The Steering Committee met seven times from June 2019 through February 2020 to provide guidance and oversight to an 11-member planning team consisting of County staff and a technical consultant. The planning team was responsible for the development of the plan. Coordination with regional, state and federal agencies involved in flood hazard mitigation occurred throughout the plan's development. A comprehensive review was completed of existing plans and programs that can support flood hazard mitigation.

The Steering Committee developed a public involvement strategy that was implemented by the planning team and included; a website (https://www.dpw.lacounty.gov/WMD/NFIP/FMP2020/ ), hazard mitigation survey, public meetings, social media posts and multiple media releases.

In addition to the public involvement strategy implemented during the plan development, the planning team facilitated the development of a Program for Public Involvement following the framework that was included in the prior plan, according to CRS Activity 330 requirements. This framework sets the course for Los Angeles County to implement an annual public information program that will maximize credit potential under the CRS program.

## THE FLOOD HAZARD RISK ASSESSMENT

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards such as flooding. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The risk assessment for this plan used the best available data, science and technology, with tools that included Geographic Information System (GIS) and FEMA's risk assessment platform, Hazus-MH. Hazus-MH is an analysis program that includes extensive inventory data, such as demographics, building stock, critical facilities, transportation facilities and utilities. It uses multiple models to estimate potential losses from natural disasters. The program maps hazard areas and estimates damage and economic losses for buildings and infrastructure. Some key findings from the risk assessment of this plan are as follows:

- The risk assessment profiles five types of flood hazards in unincorporated Los Angeles County: flooding in FEMA-designated Special Flood Hazard Areas (SFHA), flash flooding, non-SFHA urban drainage flooding, non-SFHA coastal flooding (storm surge, coastal erosion and tsunami), and dam and levee failures.
- There have been since 1969 14 flood events in Los Angeles County that caused sufficient damage to trigger a presidential disaster declaration. This equates to a significant flood event occurring on average every 3.9 years over the past 50 years.
- Unincorporated Los Angeles County includes over 88,000 acres of mapped 100-year (1 percent annual chance) floodplain, which encompasses over 1,700 structures, most of which (76 percent) are residential.

- The analysis estimated $3.94 billion of building-and-contents exposure to the 100-year flood, representing 2 percent of the total replacement cost of the planning area, and $16.78 billion of building-and-contents exposure to the 500-year (0.2 percent annual chance) flood, representing 4.4 percent of the total replacement cost value of the planning area.
- The analysis identified the following exposure of critical facilities and infrastructure:
  - Seventy-five critical facilities exposed to floods up to the 100-year event.
  - Over 190 critical facilities exposed to floods up to the 500-year event.
- An estimated 28.6 percent of the people within the households in the census blocks that intersect the 100-year floodplain are economically disadvantaged, defined as having household incomes of $20,000 or less.
- A 100-year flood event in unincorporated Los Angeles County could displace up to 1,000 persons, with over 15 persons requiring short-term shelter.
- The analysis estimates that a 100-year flood event in unincorporated Los Angeles County could cause damage to over 1,470 structures, totaling over $769.7 million in property damage.
- A 100-year flood event in unincorporated Los Angeles County could generate over 19,500 tons of building-related debris.
- The average claim paid in the planning area ($7,298) represents about one percent of the 2019 average replacement cost value of structures in the floodplain. This correlates to a flood depth damage function of less than 1 foot for a 1-story structure with no basement using the U.S. Army Corps of Engineers' generic flood-depth/damage curves.

# MITIGATION STRATEGY

## Mitigation Mission Statement, Goals and Objectives

The Steering Committee identified a mission statement, goals and objectives.

- **Mission statement**—Protect life, property, the economy and the environment of unincorporated Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards and thus enhance community resilience.
- Goals:
  - Enhance community resilience to the impacts of flood hazards
  - Protect life, safety, property and economy.
  - Communicate to residents and stakeholders what the flood risk are, based on best available data and science.
  - Increase resilience of infrastructure and critical facilities from flood hazards.
  - Account for flood risk in land use and planning.
  - Preserve, enhance or restore the natural environment's floodplain functions.
  - Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.
- Objectives:
  1. Work cooperatively with public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.

2. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
3. Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
4. Create a public outreach strategy.
5. Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.
6. Consider open space land uses within known flood hazard areas.
7. Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.
8. Retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
9. Provide flood protection by maintaining flood control systems.
10. Sustain reliable local emergency operations and facilities during and after a flood event.
11. Consider climate change implications in planning for flood and inundation hazards.
12. Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.

These planning components all directly support one another. Goals were selected that support the mission statement, and objectives were identified that fulfill multiple goals. Mitigation initiatives were identified that achieve multiple objectives.

## Mitigation Initiatives

The action plan is a key element of the floodplain management plan. It is through the implementation of the action plan that unincorporated areas in the County of Los Angeles can strive to become flood disaster resilient. The action plan includes an assessment of the capabilities of the County to implement hazard mitigation initiatives, a review of alternatives, and a mitigation strategy matrix and prioritization matrix that identify the following:

- Description of the action
- Objectives addressed
- Lead implementation agency (or agencies)
- Estimated benefits
- Estimated costs
- Timeline for implementation
- Funding sources
- Prioritization

For the purposes of this document, mitigation initiatives are defined as activities designed to reduce or eliminate losses resulting from the impacts of flooding.

Although one of the driving influences for preparing this plan is CRS, this plan does not focus solely on CRS credits. It was important to the County and the Steering Committee to examine initiatives that would work through all phases of emergency management. Some of the initiatives outlined in this plan fall outside CRS credit criteria, and CRS creditability was not the focus of their selection. Rather, the focus was on the initiatives' effectiveness in achieving the goals of the plan and whether they are within the County's capabilities. Table ES-2 presents a summary of the hazard mitigation initiatives identified in the action plan.

**Table ES-2.** Summary of Hazard Mitigation Initiatives

| Initiative # | Description | Priority |
|---|---|---|
| 1 | Promote awareness of flood hazards to residents in flood hazard areas. | High |
| 2 | Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. | High |
| 3 | Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. | High |
| 4 | Investigate repetitive loss properties identified by FEMA and update the repetitive loss property and high-risk property list. Conduct the following flood control activities for these properties:<br>• Annually notify owners regarding local flood hazards and proper protection activities<br>• Provide technical advice regarding flood protection and flood preparedness<br>• Distribute a revised questionnaire to new repetitive loss properties. | High |
| 5 | Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. | High |
| 6 | Provide public education about maintaining the stormwater system free of debris. | High |
| 7 | Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. | High |
| 8 | Implement the Program for Public Information protocol identified in this plan including appropriate messaging for compliance with ADA. | High |
| 9 | Provide emergency preparedness and flood protection information to the general public. | High |
| 10 | Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. | High |
| 11 | Develop and maintain a list of priority maintenance-related problem sites. | High |
| 12 | Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. | High |
| 13 | Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. | High |
| 14 | Evaluate storm drain, open channel, and flood retention basin facilities for future improvements. | High |
| 15 | Pursue appropriate flood hazard mitigation grant funding. | High |
| 16 | Consider the conversion of high-risk properties into open space. | Medium |
| 17 | Refine the plan check system to track properties in the flood zone and address drainage. | Medium |
| 18 | Flag repetitive loss properties in the plan, and check database for review and approval of building permit applications. | High |
| 19 | Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. | High |
| 20 | Evaluate opportunities for incorporating watershed ecosystem restoration into projects. | High |
| 21 | Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. | Medium |
| 22 | Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. | High |
| 23 | Maintain the Operational Area Emergency Response Plan. | High |
| 24 | Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. | High |
| 25 | Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. | High |
| 26 | Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. | High |
| 27 | Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the safety element of the County's general plan. | High |

| Initiative # | Description | Priority |
|---|---|---|
| 28 | Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. | High |
| 29 | Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. | High |
| 30 | Identify flood-warning systems for properties where such systems can be beneficially employed. | Medium |
| 31 | Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. | High |
| 32 | Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. | High |
| 33 | Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. | High |
| 34 | Continue to maintain and update the Hazus-MH model constructed to support the development of this plan, in order to make flood risk information available to property owners. | High |
| 35 | Continue County coordination with other agencies and stakeholders on issues of flood control. | Medium |
| 36 | Continue to identify and assess drainage needs. | High |
| 37 | Once FEMA establishes its Building Resilient Infrastructure and Communities (BRIC) program, consider updating this plan accordingly to meet the BRIC program guidelines. | Medium |

## PLAN MAINTENANCE

After the plan has been adopted by the Los Angeles County Board of Supervisors and reviewed by the Insurance Services Office FEMA's contractor for the CRS, plan implementation and maintenance will begin. This plan includes a plan implementation and maintenance section that details the formal process for ensuring that the plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the plan's progress annually and producing a plan revision every five years. Plan implementation and maintenance includes continued public involvement and incorporation of the recommendations of this plan into other planning mechanisms of the County, such as its General Plan, capital improvement program, and Hazard Mitigation Plan.

Full implementation of the recommendations of this plan will require time and resources. This plan reflects an adaptive management approach in that specific recommendations and plan review protocols are provided to evaluate changes in vulnerability and action plan prioritization after the plan is adopted. The true measure of the plan's success will be its ability to adapt to the ever-changing needs of hazard mitigation. Funding resources are always evolving, as are programs based on state or federal mandates.

Los Angeles County has a long-standing tradition of proactive response to issues that may impact its residents. The County's commitment to proactive floodplain management is evidenced by its participation in the CRS program and the development of this plan. Its well-established programs and policies have strived to maintain the flood risk at a steady level without increase. The framework established by this plan will help maintain this tradition in that it identifies a strategy that maximizes the potential for implementation based on available and potential resources. It commits the County to pursue initiatives when the benefits of a project exceed its costs. Most important, the County developed this plan with extensive public input. These techniques will set the stage for successful implementation of the recommendations in this plan. The Los Angeles County Board of Supervisors will assume responsibility for adopting the recommendations of this plan and committing County resources toward its implementation.

# PART 1—PLANNING PROCESS AND PROJECT BACKGROUND

# 1. INTRODUCTION

## 1.1 BACKGROUND

Prior to the late 1960s, the typical approach to flooding in the U.S. focused on constructing flood-control works, such as dams, levees and seawalls, and providing disaster relief to victims when flooding occurred. This approach did little to discourage unwise development near waterways and may actually have encouraged such development in some instances. At the same time, due to the high risk and seasonal nature of flooding, insurance companies were unable to provide flood insurance that was affordable to most Americans. Under these circumstances, government expenditures on flood disaster relief rose steadily over the years.

In 1968, the U.S. addressed the escalating cost of flood disaster relief by creating the National Flood Insurance Program (NFIP). The NFIP establishes an agreement between local communities and the federal government—if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks, then the federal government will make flood insurance available within the community as a financial protection against flood losses. The NFIP is administered by the Federal Emergency Management Agency (FEMA). All communities that participate in the NFIP must adopt and enforce minimum standards for managing construction and development in designated "special flood hazard areas." Communities that achieve a higher level of safety and protection than provided by the minimum standards can participate in the NFIP's Community Rating System (CRS) to obtain discounts on flood insurance premiums.

## 1.2 WHY PREPARE THIS PLAN?

Los Angeles County participates in both the NFIP and the CRS on behalf of the community of unincorporated Los Angeles County. The 2020 *Los Angeles County Comprehensive Floodplain Management Plan* is an important part of the County's participation in those programs. Developing a comprehensive floodplain management plan is among the activities that earn CRS credits toward reduced flood insurance rates. This floodplain management plan was developed to meet the following objectives:

- Comply with local, state and federal requirements for floodplain management planning.
- Meet requirements allowing Los Angeles County to enhance its CRS classification for unincorporated Los Angeles County.
- Coordinate existing plans and programs so that high-priority actions and projects to mitigate possible disaster impacts are funded and implemented.
- Create a linkage between the floodplain management plan and established plans of Los Angeles County so that they can work together in achieving successful mitigation.

This plan describes the flood hazard in unincorporated areas of Los Angeles County and presents measures to mitigate those hazards. The purpose of these measures is to reduce or alleviate the loss of life, personal injury, and property damage that can result from flooding. They involve long- and short-term strategies such as planning, policy changes, programs, projects, and other activities to mitigate the impacts of floods. It is not the intent of this plan to meet planning requirements of other state or federal programs, although it notes those plans and programs and identifies ways to support them.

## 1.3 PREVIOUS FLOODPLAIN MANAGEMENT PLANS

On March 31, 1992, the Los Angeles County Board of Supervisors adopted the *Repetitive Loss Plan for the National Flood Insurance Program CRS for Los Angeles County*. The plan was approved by FEMA. A subsequent floodplain management plan for the repetitive loss properties was later prepared, and FEMA approved it on March 8, 2002. FEMA requires that such plans be updated every five years, and the County prepared a complete update in 2007. The 2007 floodplain management plan update was adopted by the Board of Supervisors on May 11, 2010.

The County's floodplain management plans through 2010 did not address all of unincorporated Los Angeles County, but only properties that had been identified by FEMA as "repetitive loss properties"—properties for which two or more claims of $1,000 or more had been paid by the NFIP within any rolling 10-year period since 1978. The 2010 plan identified 19 such properties in the Malibou Lake area, 7 elsewhere in the Santa Monica Mountains, 1 in Lancaster, 1 in Rowland Heights, 3 in the San Gabriel Mountains and 3 in Quartz Hill.

On September 6, 2016, the Los Angeles County Board of Supervisors adopted two documents to update the floodplain management plan:

- The *Los Angeles County Comprehensive Floodplain Management Plan* provided up-to-date tools for flood preparedness and flood hazard mitigation. It expanded the previous efforts by addressing all of unincorporated Los Angeles County rather than the repetitive loss areas alone. It also addressed many changes in local development and other conditions since the previous plans were prepared, as well as evolving local, state and federal regulations and programs. Elements and strategies in the 2016 plan were selected because they meet various state or federal program requirements as well as the needs of Los Angeles County and the people who live and work in its unincorporated areas.
- A companion document, the *Los Angeles County Repetitive Loss Area Analysis*, provided a detailed assessment of areas in unincorporated Los Angeles County that had experienced repeated flood damage in the past, with recommended actions to mitigate flooding at each specific repetitive loss area.

This 2020 *Los Angeles County Comprehensive Floodplain Management Plan* and accompanying *Repetitive Loss Area Analysis* represent the 5-year update to the 2016 documents, as required under Activity 510 of the CRS program.

## 1.4 CRS STEPS FOR FLOODPLAIN MANAGEMENT PLANNING

The first priority for this plan is to benefit the people who live and work in unincorporated Los Angeles County by providing protection against potential flooding. The plan follows the guidelines for flood planning presented by FEMA for the CRS program. To earn CRS credit for a floodplain management plan, the community's process for developing the plan must include at least one item from each of 10 steps (see Appendix A for details):

- Planning process steps:
  - Step 1, Organize
  - Step 2, Involve the public
  - Step 3, Coordinate
- Risk assessment steps:
  - Step 4, Assess the hazard
  - Step 5, Assess the problem

- Mitigation strategy steps:
  - Step 6, Set goals
  - Step 7, Review possible activities
  - Step 8, Draft an action plan
- Plan maintenance steps:
  - Step 9, Adopt the plan
  - Step 10, Implement, evaluate and revise.

## 1.5 HOW TO USE THIS PLAN

This floodplain management plan is organized into the following primary parts, which follow the organization of the CRS steps for floodplain planning:

- Part 1—Planning Process and Project Background
- Part 2—Risk Assessment
- Part 3—Mitigation Strategy
- Part 4—Plan Maintenance

Each part includes elements identified in the CRS's 10 steps. Appendices at the end of the plan include information to support the main content of the plan:

- Appendix A—Description of CRS planning requirements
- Appendix B—Steering committee ground rules
- Appendix C—Public outreach information, including the survey and summary and documentation of public meetings
- Appendix D—Locations of critical facilities and critical infrastructure by watershed
- Appendix E—Summary of related federal and state regulations and programs
- Appendix F—Mapped FEMA flood zones by watershed
- Appendix G—Template for progress reports to be completed as this plan is implemented
- Appendix H—Maps of Los Angeles County's capital floodplains and floodways
- Appendix I—An analysis of repetitive loss areas in unincorporated Los Angeles County

# 2. PLAN DEVELOPMENT METHODOLOGY

The process followed to develop the 2020 *Los Angeles County Comprehensive Floodplain Management Plan* had the following primary objectives:

- Form a planning team
- Define the planning area
- Establish a steering committee
- Coordinate with other agencies
- Review existing programs
- Engage the public in development of the floodplain management plan.

This chapter describes how each of these objectives was achieved in development of this plan.

## 2.1 FORMATION OF THE PLANNING TEAM

This planning project was initiated and overseen by Los Angeles County Public Works Stormwater Engineering Division. Los Angeles County hired Tetra Tech, Inc. to assist with development and implementation of the plan. The Tetra Tech project manager reported directly to the Los Angeles County project manager. A planning team was formed to lead the planning effort (CRS Step 1), made up of the following members:

- Larry Tran, PE, Associate Civil Engineer (Project Manager)
- Iraj Nasseri, PE, PhD, Principal Engineer and Chief Hydrologist
- Patricia Wood, PE, Senior Civil Engineer
- Eduardo Escobar, PE, Civil Engineer
- Michael Chen, Principal Civil Engineering Assistant
- Thu Win, Principal Civil Engineering Assistant
- Ira Artz, PE, Tetra Tech Project Manager
- Rob Flaner, Tetra Tech Hazard Mitigation Program Manager
- Steve Parker, Tetra Tech GIS Manager and Hydrology and Hydraulics Analyst
- Carol Baumann, Tetra Tech Senior GIS Analyst
- Melissa Schloss, Tetra Tech Planner

## 2.2 DEFINING THE PLANNING AREA

The planning area was defined as all unincorporated areas of Los Angeles County. Some background information that was analyzed for the plan is available only at a countywide level, without breakdowns for incorporated and unincorporated areas. This information is identified as such where it is presented in the plan. Information that is specific to unincorporated areas—such as flood hazard modeling results and areas addressed by proposed mitigation actions—is generally indicated as applying to "the planning area."

## 2.3 THE STEERING COMMITTEE

A steering committee was formed to oversee all phases of the planning effort. The members of this committee included key Los Angeles County staff, residents, and other stakeholders from within the planning area. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. Table 2-1 lists the 18-member Steering Committee organized for this plan update effort.

**Table 2-1.** Steering Committee

| Name | Department/Agency | Governmental[a] | Non-Governmental[b] |
|---|---|---|---|
| **Patricia Wood** | Public Works Stormwater Engineering - CRS Coordinator | X | |
| **Loni Eazell** | Public Works Disaster Services Group | X | |
| **Lisa Naslund** | Public Works Building & Safety | X | |
| **Ron Lacayo** | Public Works Stormwater Maintenance | X | |
| **Gina Natoli** | Los Angeles County Regional Planning | X | |
| **Scott Gardner** | Los Angeles County Fire Department | X | |
| **Jolene Guerrero** | Public Works Community Government Relations Group | X | |
| **Cung Nguyen** | Public Works Stormwater Planning | X | |
| **Martin Araiza** | Public Works Stormwater Engineering – Hydrology & Hydraulics | X | |
| **Susan Shu** | City of Los Angeles Bureau of Engineering | | X |
| **Jessica Duboff** | Los Angeles Chamber of Commerce | | X |
| **Okorie Ezieme** | Altadena Town Council | | X |
| **Shannon Ggem** | Malibou Lake Mountain Club | | X |
| **John Blalock** | Antelope Valley Resident | | X |
| **Joselito Garcia-Ruiz** | Red Cross of Greater Los Angeles | | X |
| **Salomon Miranda** | California Department of Water Resources | | X |
| **Dr. Andre Ellis** | Cal State Los Angeles Geosciences & Environment | | X |
| **Debbie Sharpton** | Environmental Restoration Group | | X |

The makeup of this committee strove for equitable distribution of governmental and non-governmental representation, defined as follows:

a. "Governmental" refers to representatives of Los Angeles County government associated with County permit authority, who are responsible for the development and enforcement of County plans, programs, codes and standards.

b. "Non-governmental" refers to any stakeholder not affiliated with the permit authority of Los Angeles County who could have a stake in the outcome and directives of this plan.

Among governmental representatives on the Steering Committee, the County strove for representation across the categories of mitigation defined by the CRS program: preventive measures, property protection, natural resource protection, emergency services, structural flood control projects and public information. Table 2-2 shows the Steering Committee governmental members' representation by these categories.

Leadership roles and ground rules were established during the Steering Committee's initial meeting on June 25, 2019. Appendix B includes the ground rules established by the Steering Committee and a full list of members, including designated alternates. The Steering Committee agreed to meet monthly as needed throughout the course of the plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on an established work plan. The Steering Committee met seven times from June 2019 through February 2020. Meeting agendas, notes and attendance logs are provided in Appendix C. All Steering Committee meetings were open to the public and advertised as such on Public Works' Floodplain Management Plan website. Agendas and meeting notes were posted on the website.

**Table 2-2.** Category Representation of Governmental Steering Committee Members

| Name | Preventive Measures | Property Protection | Natural Resource Protection | Emergency Services | Structural Flood Control Projects | Public Information |
|---|---|---|---|---|---|---|
| Patricia Wood | X | | | | X | |
| Loni Eazell | | | | X | | |
| Lisa Naslund | X | X | | | | |
| Ron Lacayo | X | | | | X | |
| Gina Natoli | X | | X | | | |
| Scott Gardner | | | | X | | |
| Jolene Guerrero | | | | | | X |
| Cung Nguyen | X | | | | X | |
| Martin Araiza | | | | | X | |

## 2.4 COORDINATION WITH OTHER AGENCIES

Opportunities for involvement in the planning process were provided as described below to neighboring communities, local and regional agencies involved in floodplain management, agencies with authority to regulate development, businesses, academia, and other private and nonprofit interests (CRS Step 3). All documentation for agency coordination during this plan update process has been provided in Appendix C.

### 2.4.1 Agency Participants

The following agencies, as direct stakeholders within the planning area, were invited to participate in the plan development. Whether they participated or not, they were kept apprised of plan development milestones:

- California State Department of Water Resources
- California Office of Emergency Services
- FEMA Region IX
- Environmental Restorations Group
- Floodplain Management Association
- Los Angeles County Department of Regional Planning
- Los Angeles County Public Works:
  - Building & Safety Division
  - Stormwater Planning Division
  - Community Government Relations Group
  - Stormwater Maintenance Division
  - Disaster Services Group
  - Stormwater Engineering Division
- County of Los Angeles Chief Executive Office, Office of Emergency Management
- Los Angeles County Fire Department
- Los Angeles County Community Emergency Response Team
- Los Angeles Chamber of Commerce
- California State University, Los Angeles
- Altadena Town Council
- Mountains Restoration Trust
- Malibou Lake Mountain Club
- City of Los Angeles Bureau of Engineering
- Red Cross of Greater Los Angeles
- U.S. Army Corps of Engineers, Los Angeles District

### 2.4.2 Agency Notifications

As adjacent local jurisdictions or state jurisdictions in addition to those participants listed above, the following agencies were also kept apprised of the floodplain management plan update process via e-mailed meeting announcements, meeting agendas, and meeting minutes:

- Acton Town Council
- Ana Verde Hills Town Council
- Antelope Acres Town Council
- Association of Rural Town Councils
- Castaic Town Council
- City of Agoura Hills
- City of Arcadia
- City of Bradbury
- City of Calabasas
- City of Claremont
- City of Compton
- City of Glendale
- City of Glendora
- City of Hidden Hills
- City of La Canada Flintridge
- City of La Verne
- City of Lancaster
- City of Long Beach
- City of Malibu
- City of Monrovia
- City of Palmdale
- City of Pasadena
- City of San Dimas
- City of Santa Clarita
- City of Sierra Madre
- City of Westlake Village
- Crescenta Valley Town Council
- Fairmont Town Council
- Green Valley Town Council
- Insurance Services Office (ISO)-ISO/CRS Specialist
- Juniper Hills Town Council
- Kern County
- Lake Los Angeles Town Council
- Lakes Town Council
- Leona Valley Town Council
- Littlerock Town Council
- Orange County Public Works
- Oso Town Council
- Quartz Hill Town Council
- Roosevelt Town Council
- San Bernardino County Flood Control District
- San Gabriel Council of Governments
- Southern California Association of Governments
- Sun Village Town Council
- Three Points-Liebre Mountain Town Council
- Ventura County Watershed Protection District

### 2.4.3 Pre-Adoption Review

All the agencies listed above were provided an opportunity to review and comment on this plan, primarily through the floodplain management plan website. All agencies were sent an e-mail message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to the Insurance Services Office, FEMA's CRS contractor, for a pre-adoption review to ensure CRS program compliance.

## 2.5 REVIEW OF EXISTING PROGRAMS

The planning effort included review and incorporation as appropriate of existing plans, studies, reports and technical information. Chapter 4 of this plan provides a review of laws and ordinances in effect that can affect mitigation actions, including an assessment of all Los Angeles County regulatory, technical and financial capabilities to implement flood hazard mitigation actions. In addition, the following programs can affect flood hazard mitigation in Los Angeles County:

- Los Angeles County 2035 General Plan
- Los Angeles County Operational Area Emergency Response Plan (prepared by the Los Angeles County Chief Executive Office, Office of Emergency Management)
- Los Angeles County All-Hazard Mitigation Plan
- Los Angeles County Capital Improvement Programs.

As part of this step, Steering Committee members were asked to provide feedback to the planning team on their opinion of the strength and weaknesses of the County's current capabilities in managing floodplains. At its November 13, 2019, meeting, the Steering Committee reviewed a catalog of 30 core capability statements (see Figure 2-1 and Figure 2-2). Members placed green dots by statements they felt represented County strengths, and red dots by statement they felt represented weaknesses. The results were used to enhance the catalog of alternatives the County considered for mitigation actions in the plan (see Chapter 11). A summary of the results of this exercise can be found in Appendix C.

**Poster 3 - Capability Exercise**

= Weakness
= Strength

| ID# | Statement | Place Dots Here |
|---|---|---|
| 21 | Coordinated public outreach regarding risk from flood hazards convey clear, consistent messaging to the public. | |
| 22 | The Planning Partnership's flood risk management programs are fair and equitable. | |
| 23 | Information on flood insurance is readily available within the County. | |
| 24 | There is political support for flood risk management within the County | |
| 25 | All relevant stakeholders are engaged in the County's flood risk management efforts. | |
| 26 | The County's development regulations for new development within identified flood hazard zones are cleat and adequate to address flood risk. | |
| 27 | There is a coordinated program to maintain drainage systems free of debris. | |
| 28 | The enforcement of current codes and standards within the planning area is strong | |
| 29 | The Citizens of LA County have the access to information necessary for them to be prepared to respond, recover and mitigation the impacts for flood hazards within the County. | |
| 30 | Real Estate professionals adequately disclose risk exposure from natural hazards at the time of sale of real property | |

**Figure 2-1.** Example Core Capability Statements



**Figure 2-2.** Steering Committee Dot Exercise

## 2.6 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about local needs are considered and addressed. CRS credits are available for providing opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval, as well as for optional public involvement activities (CRS Step 2).

### 2.6.1 Strategy

The strategy for involving the public in this plan emphasized the following elements:

- Include members of the public on the Steering Committee.
- Attempt to reach as many residents as possible using multiple media.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders
- Integrate the County's Program for Public Information.
- Conduct public meetings to invite the public's input.

#### Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the recommendations of this plan. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. Stakeholders targeted for this process included:

- Community representatives
- Los Angeles County agencies responsible for activities relevant to floodplain management
- Environmental advocacy groups
- Local disaster preparedness and response entities
- Owners and operators of businesses within the floodplain
- Repetitive loss area representatives.

CRS Step 2 awards credit for a planning process conducted through a committee that includes members of the public and/or non-governmental stakeholders. The 18-member Steering Committee includes nine non-governmental stakeholders (50 percent).

## Floodplain Management Plan Website

At the beginning of the development of the current plan, a plan floodplain management plan page was developed on Los Angeles County Public Work's website to keep the public informed about planning activities and to solicit input (see Figure 2-3). The site's address (https://www.dpw.lacounty.gov/WMD/NFIP/FMP2020/) was publicized in all social media releases, mailings and public meetings. The site provided the public with information on the plan development process, the Steering Committee, a project survey, and drafts of the plan. Los Angeles County Public Works will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates. The website was advertised to the public via social media (see Figure 2-4 and Figure 2-5)

## Survey

A survey (see Figure 2-6) was developed by the planning team with guidance from the Steering Committee. The survey was used to gauge household preparedness for the flood hazard and the level of knowledge of tools and techniques that assist in reducing risk and loss from flooding. This survey was designed to help identify areas vulnerable to floods. The answers to its questions helped guide the Steering Committee in affirming the goals and objectives identified during the planning process and in selecting mitigation actions.

Multiple methods were used to solicit survey responses:

- A web-based version of the survey was made available on the plan website.
- Mailings to residents and property owners notifying them of public meetings included links to the online survey (see Figure 2-7).
- All attendees at public meetings were asked to complete a survey, using the web site or hard copies of the survey form available at the meetings.
- A flyer was prepared advertising the survey.
- E-mail was sent from Public Works to several of the town councils.
- Individual Steering Committee members contacted organizations to request that they publicize the link to the online survey.

The complete survey and a summary of its findings can be found in Appendix C.

## Open House Public Meetings

Meaningful public participation was essential for the planning process. The concept of mitigation was introduced to the public at public meetings. These gave the Steering Committee and planning team feedback that was used in developing components of the plan. Public meetings were scheduled as summarized in Table 2-3 to disseminate information and to solicit input from community members.

**Table 2-3.** Floodplain Management Plan Open House Public Meetings

| When | Where |
|---|---|
| **October 7, 2019, 5:30 to 8:00PM** | Agoura: Malibou Lake Mountain Club<br>29033 Lake Vista Drive, Agoura, CA 91301 |
| **March 11, 2020, 6:00 PM to 8:00 PM** | Antelope Valley: Lancaster Library<br>601 West Lancaster Boulevard, Lancaster, CA 93534 |
| **March 12, 2020, 6:00 PM to 8:00 PM** | Agoura: Malibou Lake Mountain Club<br>29033 Lake Vista Drive, Agoura, CA 91301 |

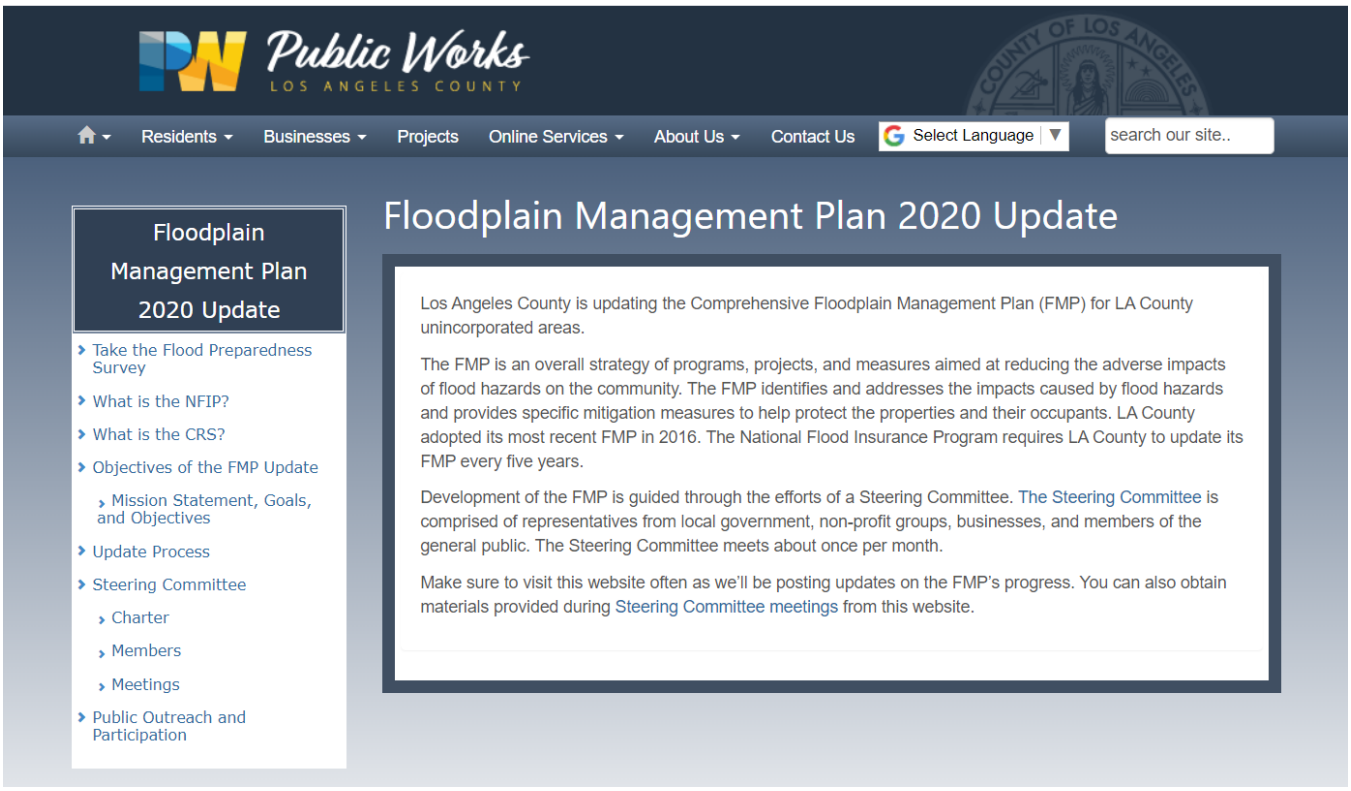


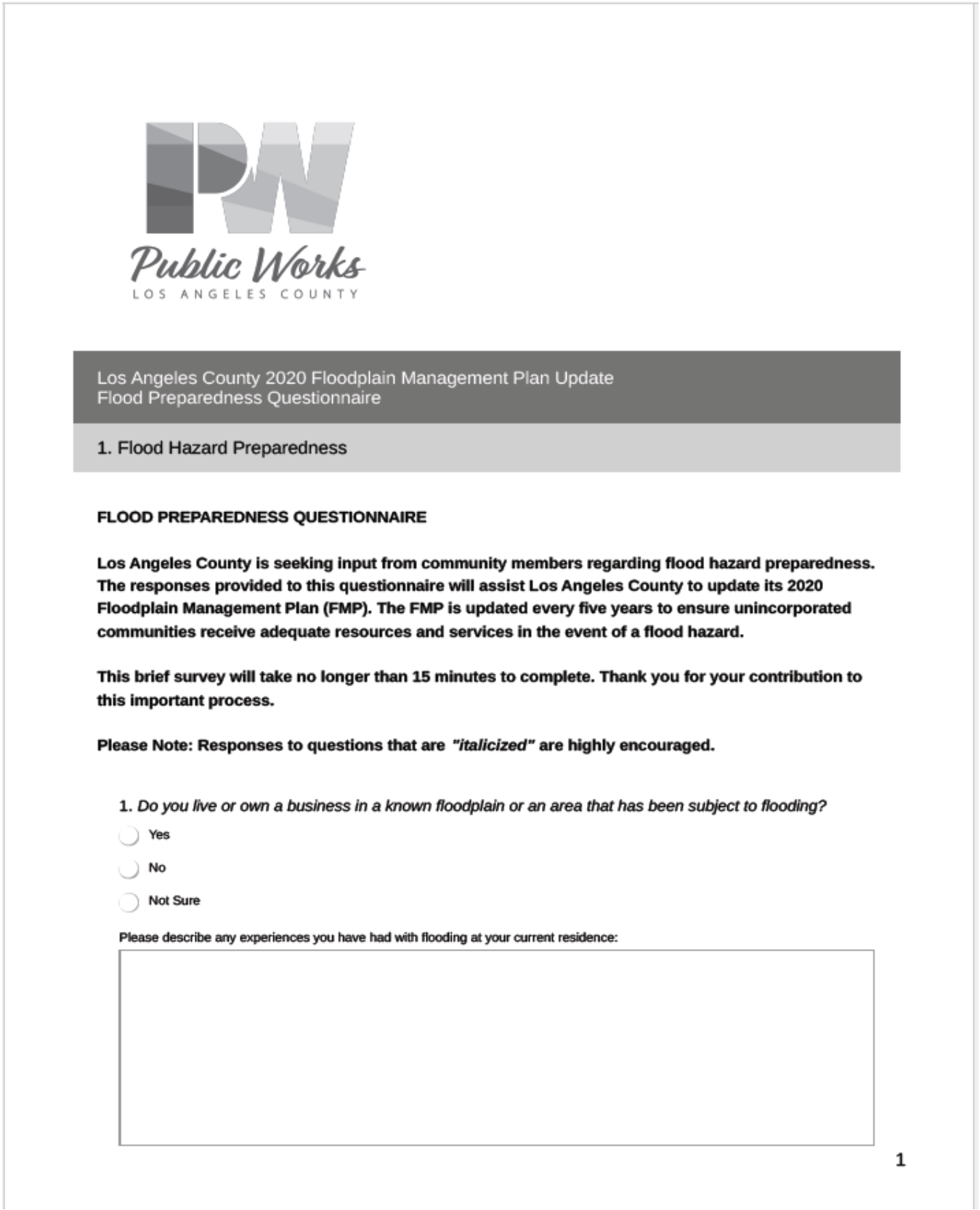

**Figure 2-3.** Sample Page from Floodplain Management Plan Web Site




**Figure 2-4.** Twitter Post




**Figure 2-5.** Facebook Post



Public Works
LOS ANGELES COUNTY

Los Angeles County 2020 Floodplain Management Plan Update
Flood Preparedness Questionnaire

1. Flood Hazard Preparedness

**FLOOD PREPAREDNESS QUESTIONNAIRE**

**Los Angeles County is seeking input from community members regarding flood hazard preparedness. The responses provided to this questionnaire will assist Los Angeles County to update its 2020 Floodplain Management Plan (FMP). The FMP is updated every five years to ensure unincorporated communities receive adequate resources and services in the event of a flood hazard.**

**This brief survey will take no longer than 15 minutes to complete. Thank you for your contribution to this important process.**

**Please Note: Responses to questions that are *"italicized"* are highly encouraged.**

1. *Do you live or own a business in a known floodplain or an area that has been subject to flooding?*

- Yes
- No
- Not Sure

Please describe any experiences you have had with flooding at your current residence:

1

**Figure 2-6.** Sample Page from Survey Distributed to the Public

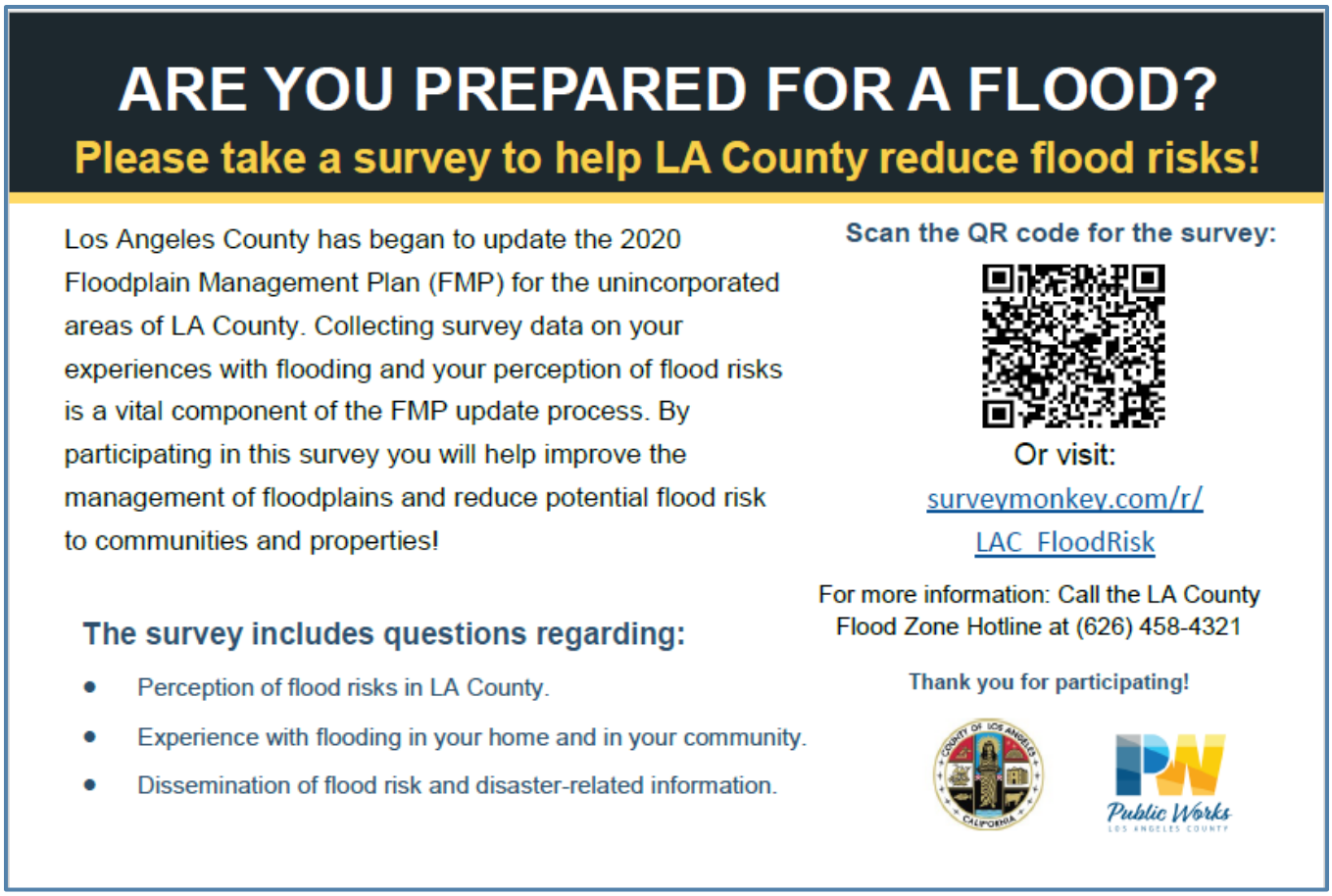



**Figure 2-7.** Post Card Mailing Advertising the Survey

### *Open House Meeting Notification*

Multiple means were used to provide broad public notice of the open house public meetings:

- Notice of all public meetings was posted on the floodplain management plan website.
- Flyers were developed and distributed throughout the communities (see Figure 2-8).

Postcards were mailed to properties located in floodplains near the meeting locations (see Figure 2-9). Over the course of the planning process, 2,472 postcards were distributed.

### *Open House Meeting Format*

The public meeting (open house) format allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with attendees via a PowerPoint presentation. Computer mapping workstations loaded with output from the Hazus modeling allowed attendees to see information on their property, including exposure and damage estimates for flood hazard events (see Figure 2-10). Participating property owners were provided printouts of this information for their properties. This tool was effective in illustrating risk to the public. Planning team members were present to answer questions. All open house attendees were asked to complete a survey, and each was given an opportunity to provide written comments to the Steering Committee. Example meeting activities are shown in Figure 2-11 and Figure 2-12.

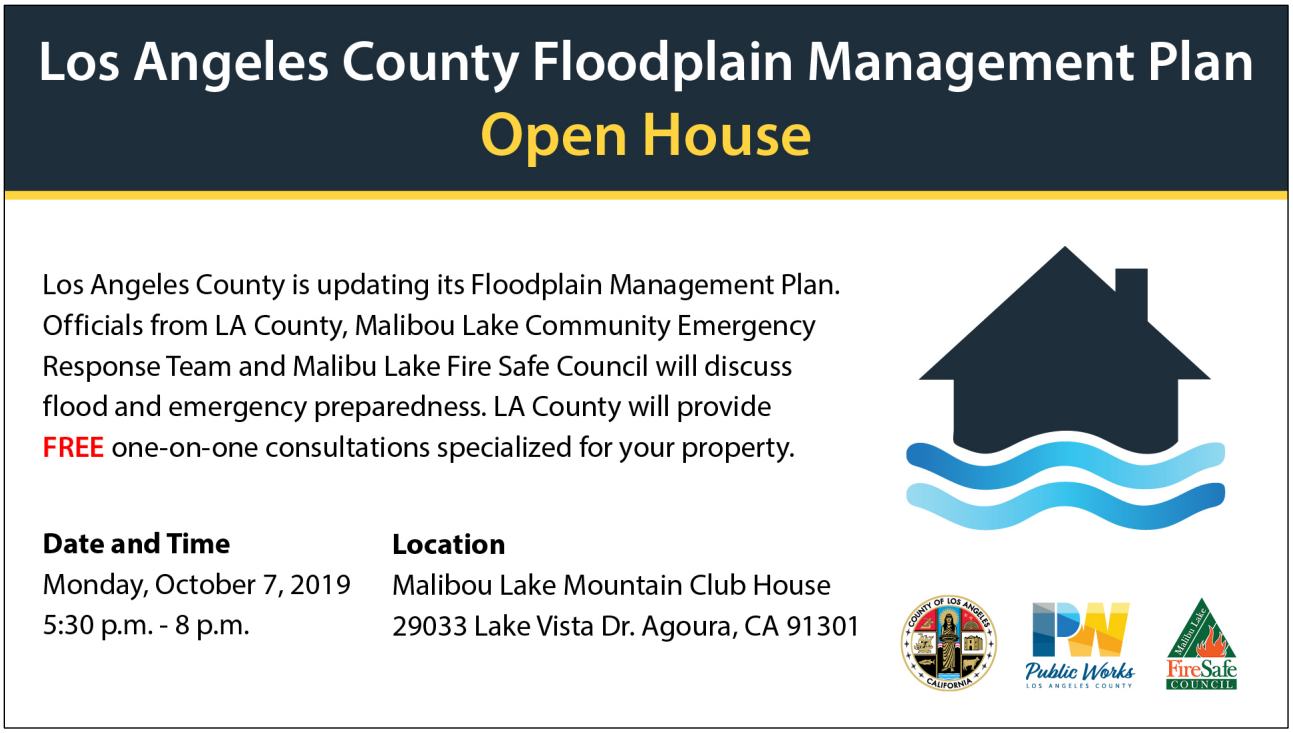
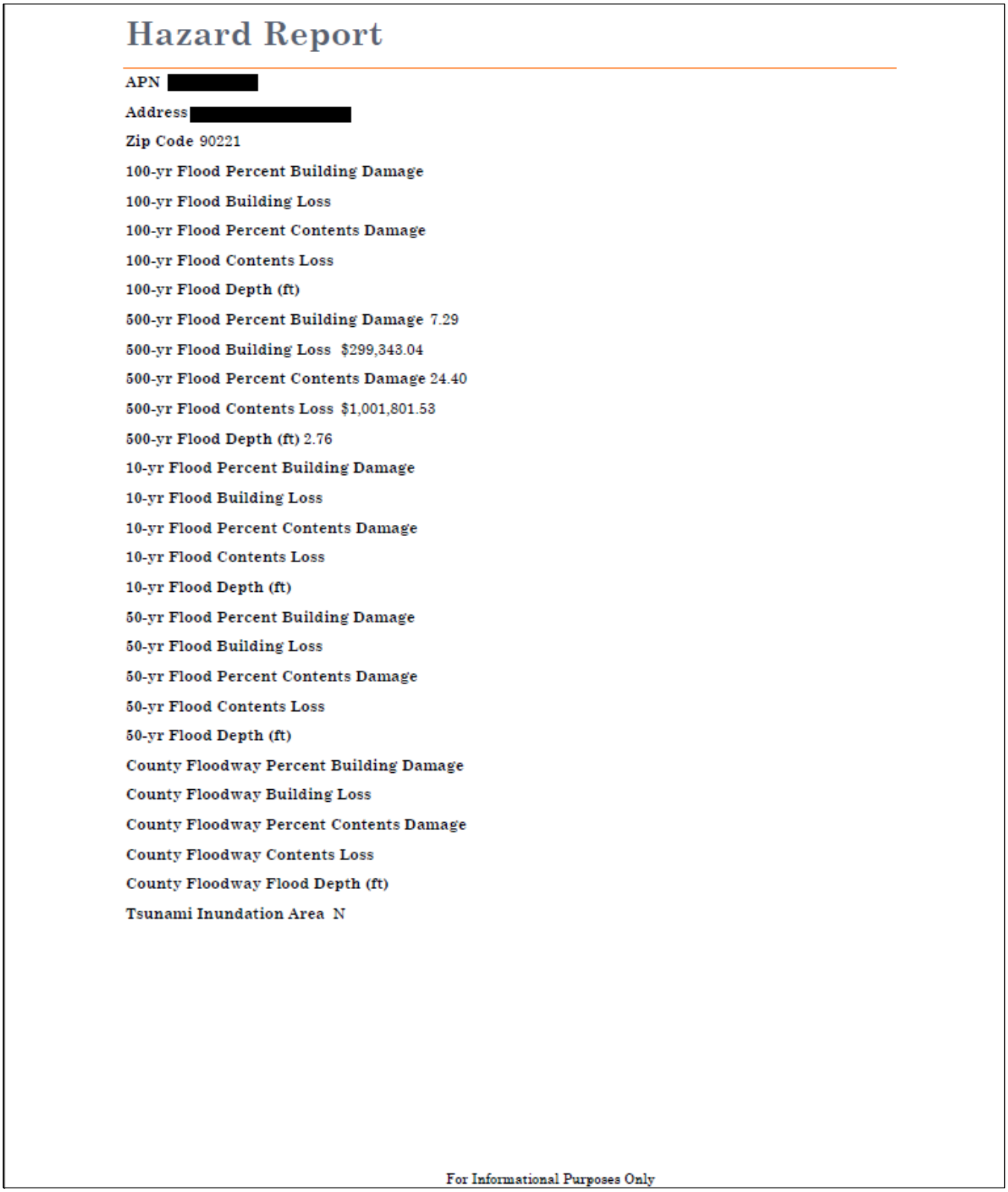



**Figure 2-8.** Flyer Announcing Phase 1 Open Hose for the Floodplain Management Plan




**Figure 2-9.** Postcard Announcing Phase 2 Open House for the Floodplain Management Plan



# Hazard Report

**APN** [redacted]

**Address** [redacted]

**Zip Code** 90221

**100-yr Flood Percent Building Damage**

**100-yr Flood Building Loss**

**100-yr Flood Percent Contents Damage**

**100-yr Flood Contents Loss**

**100-yr Flood Depth (ft)**

**500-yr Flood Percent Building Damage** 7.29

**500-yr Flood Building Loss** $299,343.04

**500-yr Flood Percent Contents Damage** 24.40

**500-yr Flood Contents Loss** $1,001,801.53

**500-yr Flood Depth (ft)** 2.76

**10-yr Flood Percent Building Damage**

**10-yr Flood Building Loss**

**10-yr Flood Percent Contents Damage**

**10-yr Flood Contents Loss**

**10-yr Flood Depth (ft)**

**50-yr Flood Percent Building Damage**

**50-yr Flood Building Loss**

**50-yr Flood Percent Contents Damage**

**50-yr Flood Contents Loss**

**50-yr Flood Depth (ft)**

**County Floodway Percent Building Damage**

**County Floodway Building Loss**

**County Floodway Percent Contents Damage**

**County Floodway Contents Loss**

**County Floodway Flood Depth (ft)**

**Tsunami Inundation Area** N

For Informational Purposes Only

**Figure 2-10.** Example Printout from Hazus Workstation



**Figure 2-11.** Hazus Workstation, Malibou Lake Mountain Club Meeting, October 7, 2019



**Figure 2-12.** Attendees Look at Hazard Maps at Malibou Lake Public Meeting

### Presentation of the Draft Plan

The outreach strategy was significantly impacted by the COVID-19 pandemic response by the State of California and the City of Los Angeles. "Shelter in place" and "social distancing" restrictions were in place that prohibited the County's abilities to hold public meetings during the latter phases of outreach. Following direction provided by the Insurance Services Office (ISO), FEMA's CRS program management contractor, the County decided to mitigate these impacts as follows:

- A three-week public comment period was run with normal notification by press release, website and social media to inform the public how to provide comment on the draft plan.
- A narrated PowerPoint presentation on the draft plan was posted to the floodplain management plan website.

The public comment period ran from March 9 – 31, 2020. The open house public meeting to present the draft plan in Lancaster on March 11 was held as scheduled, from 6 to 8 p.m. It was advertised via a flyer and social media distributed throughout the community, including through mailings to properties located in the floodplain. The public meeting scheduled for March 12 in Agoura was canceled due to escalation of the COVID-19 pandemic. The narrated video of the open house presentation was made available on the floodplain management plan website, and its availability was advertised through social media.

## 2.6.2 Public Involvement Results

### Survey Results

The City of Los Angeles was facilitating an update to its Comprehensive Flood Hazard Management Plan concurrent with the County's floodplain management plan update, and the City and County were active stakeholder participants in each other's efforts. Both planning efforts used surveys, and the two surveys were similar in the questions asked.

The number of survey responses for both planning efforts was considered to be insufficient for analysis: the County received 76 responses and the City received 174. The City and County decided to combine their survey results to provide an enhanced view of the public's perception of the flood risk. This was a reasonable choice, given the similarities in flooding issues in the two jurisdictions. Residents of the County work and recreate in the

City as residents of the City work and recreate in the County. Detailed results for the two surveys combined are provided in Appendix C. Key results are as follows:

- Nearly half of respondents said their home or business is not located in a floodplain or area subject to flooding; 24 percent said it is; 27 percent said they are not sure.
- Nearly two-thirds of respondents said they do not have flood insurance; just over 20 percent said they do; 9 percent said they are not sure.
- The main reasons given by those without flood insurance for not having it are that they do not need it because their property has never flooded (28 percent), that they do not need it because their property is on high ground (25 percent) or that they did not know about it (17 percent).
- Two-thirds of respondents said that the presence of a flood hazard at their current home was not disclosed to them by a real estate agent, seller, or landlord. More than half said such disclosure would have influenced their decision to buy or rent a home.
- The following flood hazards were identified as greatest issues of concern based on a scale of 1 (not concerned) to 5 (extremely concerned):

  - Stormwater flooding/urban flooding/drainage issues (weighted score of 2.86)
  - Climate change impacts (weighted score of 2.81)
  - Post-fire mud/debris flow (weighted score of 2.62)
  - Infrastructure failure (pipes, tanks) (weighted score of 2.49)
  - Mud-flow hazards (weighted score of 2.49)
  - Coastal Flooding (weighted score of 2.14)
  - Groundwater flooding (weighted score of 2.14)

- Slightly more than half of respondents said they are at least adequately prepared for a flood event; 29 percent indicated feeling not at all prepared.
- About 45 percent of residents neither agree nor disagree that flood hazard and risk information is easy to find; remaining respondents are evenly split between those who somewhat or strongly agree and those who somewhat or strongly disagree.
- Respondents rated the following as the most effective means for providing general flood hazard and disaster information:

  - Internet (62 percent
  - TV news (48 percent)
  - Public awareness campaign, e.g., flood awareness week (37 percent)
  - Social media, such as Twitter or Facebook (34 percent).
  - Radio news (30 percent)
  - Newspapers (26 percent)
  - Public meetings (20 percent)

- Respondents' top preferred methods for receiving emergency notifications are as follows:

  - Text message (73 percent)
  - Cell phones (49 percent)
  - Email (39 percent)

The following results were from questions that were asked only on the County's survey:

- 74 percent of respondents agree or strongly agree that local, state and federal government should provide programs promoting resident action to reduce exposure to flood risks.

- Respondents ranked government-sponsored flood damage reduction projects in the following order of preference:

  - Retrofitting infrastructure (improving culverts, bridges, and local drainage)
  - Capital projects (dams, levees, flood walls, and drainage improvements)
  - Providing better flood risk information to the public
  - Assisting vulnerable property owners with securing mitigation funding
  - Mitigating future flood impacts caused by climate change
  - Strengthening codes and regulations to higher regulatory standards
  - Acquiring vulnerable properties and maintaining them as open space

- 86 percent of respondents support the preservation of natural land containing a flood hazard, although 29 percent of them support it only for properties other than their own.

### Open House Public Meeting Attendance

Table 2-4 summarizes participation in the public meetings that were held during the outreach effort.

**Table 2-4.** Summary of Public Meetings

| Date | Location | Number of Attendees | Number of Surveys or Comments Received |
|---|---|---|---|
| **October 7, 2019** | Malibou Lake Mountain Club | 32 | 5 |
| **March 11, 2020** | Lancaster Library | 3 | 3 |
| **March 12, 2020** | Malibou Lake Mountain Club | Cancelled due to COVID-19 Response | |
| **Total** | | **35** | **8** |

## 2.7 PROGRAM FOR PUBLIC INFORMATION

The public involvement strategy described in the previous section ensured that the public was informed about the development of this floodplain management plan and had opportunities to provide input. In a separate, parallel effort, a public involvement strategy called a Program for Public Information (PPI) was developed to be used for ongoing public involvement as the recommendations of the floodplain management plan are being implemented. The PPI will provide a means to enhance the public outreach components of floodplain management and to identify specific outreach activities to meet local needs. A PPI is an ongoing effort to identify, prepare, implement and monitor public information activities tailored to local needs.

A committee of non-governmental and governmental stakeholders was formed to oversee development of the PPI. The steering committee for the floodplain management plan was kept informed of the progress of the PPI committee. The results of the risk assessment and public outreach efforts from the development of the floodplain management plan were used to inform the development of the PPI. The County used the CRS seven-step planning process for development of the PPI:

- Establish a PPI committee
- Assess the community's public information needs
- Formulate messages
- Identify outreach projects to convey the messages
- Examine other public information initiatives
- Prepare the PPI document
- Implement, monitor and evaluate the PPI.
- These steps are described in detail in Chapter 14 of this plan.

## 2.8 FLOODPLAIN MANAGEMENT PLAN DEVELOPMENT - CHRONOLOGY/MILESTONES

Table 2-5 summarizes important milestones in the development of the plan.

**Table 2-5.** Plan Development Milestones

| Date | Event | Description | Attendance |
|---|---|---|---|
| **2019** | | | |
| **6/25** | Steering Committee Meeting #1 | • Project overview<br>• Organize steering committee<br>• Establish steering committee ground rules<br>• Prior plan review<br>• Public outreach strategy | 27 |
| **8/14** | Steering Committee Meeting #2 | • Plan review homework—report out<br>• Goal setting—mission and goals<br>• Public outreach strategy—Phase 1 | 39 |
| **9/11** | Steering Committee Meeting #3 | • Goal setting—objectives<br>• Define critical facilities/infrastructure<br>• Public outreach strategy—Phase1, survey | 24 |
| **10/1** | Public Outreach Strategy | • Flood hazard survey deployed | N/A |
| **10/7** | Public Outreach Strategy | • Phase 1 public meeting—Malibou lake mountain club house | 32 |
| **10/9** | Steering Committee Meeting #4 | • Risk assessment update—general building stock results<br>• How to define "resilience" in objectives<br>• Finalize critical facilities/infrastructure definition<br>• Public outreach strategy—Phase 1<br>  ○ Finalize survey<br>  ○ Malibu public meeting debrief | 26 |
| **11/13** | Steering Committee Meeting #5 | • Risk assessment update—critical facility results<br>• Core capability exercise<br>• Public outreach strategy—initial survey results | 23 |
| **2020** | | | |
| **1/8** | Steering Committee Meeting #6 | • Risk assessment update<br>  ○ Repetitive loss area analysis<br>  ○ General building stock Hazus summary<br>• Core capability exercise results<br>• Relevant plans/program review<br>• Agency coordination contact list<br>• Public outreach strategy update | 30 |
| **2/12** | Steering Committee Meeting #7 | • Risk assessment update<br>  ○ Updated general building stock results<br>  ○ Repetitive Loss Area Analysis update<br>  ○ Critical facility results<br>  ○ Confirmation of identified issues<br>• Draft Plan-internal review draft<br>• Confirmation of mitigation action plan<br>Phase 2 outreach strategy | 28 |
| **3/9** | Public Outreach Strategy | • Initiation of 3-week Public Comment Period for the Draft Plan | N/A |
| **3/11** | Public Outreach Strategy | • Phase 2 Public Outreach Strategy-Lancaster Library | 3 |
| **3/12** | Public Outreach Strategy | • Phase 2 Public Outreach Strategy-Malibou Lake Mountain Club | Canceled due to COVID-19 |
| **3/31** | Public Outreach Strategy | • Closure of the 3-week Public Comment Period for the Draft Plan | N/A |
| **10/9** | Plan Review | • Draft Plan sent to the Insurance Services Office (ISO) for pre-adoption review and approval | N/A |

| Date | Event | Description | Attendance |
|---|---|---|---|
| **2021** | | | |
| **3/10** | Plan Review | Pre-adoption review and scoring of the plan provided by ISO | N/A |
| **TBD** | Adoption | Board of Supervisors adopts plan during public hearing. | N/A |

# 3. LOS ANGELES COUNTY PROFILE

Los Angeles County, on the southwest coast of California, is the most populous county in California and the United States, with a 2019 estimated population of 10.25 million (25.6 percent of the total population of California and 3.1 percent of the total population of the United States). It is the state's 12th largest county by area, at 4,084 square miles. There are 88 cities in the county; the City of Los Angeles is the largest and is the county seat. The unincorporated portion of the County, which is the planning area for this floodplain management plan, covers 2,638 square miles and is home to over 1 million people in nearly 200 unincorporated communities. Figure 3-1 shows the county location and main features.

## 3.1 HISTORICAL OVERVIEW

The following history is summarized from historical information provided on the Los Angeles County website (Los Angeles County, 2019a).

### 3.1.1 Foundation and Growth

Los Angeles County was one of California's original 27 counties established in 1850. Originally it was 4,340 square miles along the coast between Santa Barbara and San Diego. The county later grew to 34,520 square miles, extending east to the Colorado River. The County was subsequently divided up three times: Kern County received a large slice in 1851; San Bernardino County split off in 1853; and Orange County was established in 1889. Today, with 4,084 square miles, it is slightly smaller than its original size.

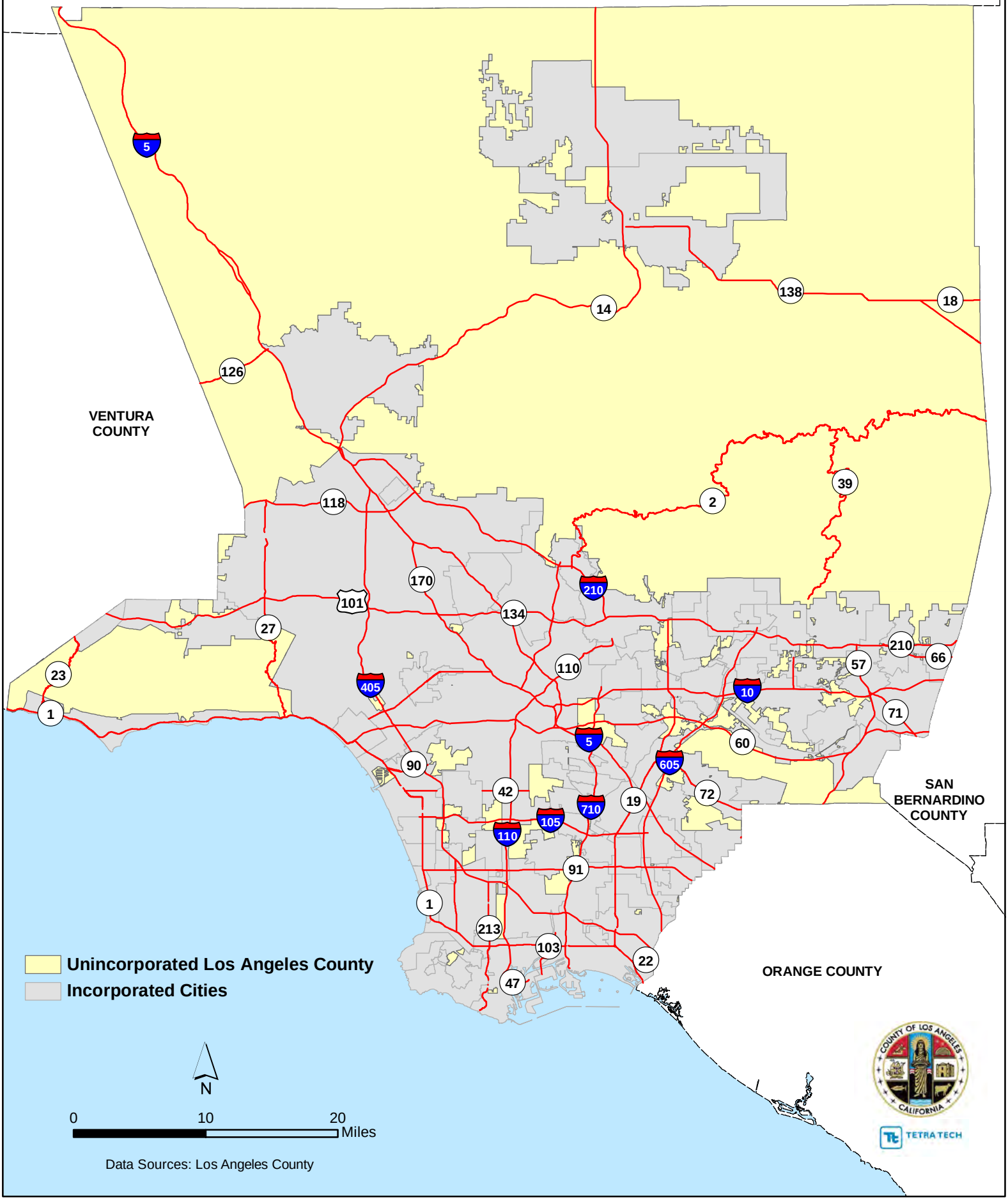
The area covered by present-day Los Angeles County was settled by Native Americans for centuries before the first European contact in 1769. In the 1780s, a group of families from Mexico established a new settlement named El Pueblo de la Reyna de Los Angeles (The Town of the Queen of the Angels). Over time, the area became known as the Ciudad de Los Angeles (City of Angels), which was the largest town in Southern California by the 1840s, when the area came under U.S. control through treaties with Mexico. On February 18, 1850, the County of Los Angeles was established, and the City of Los Angeles was named the county seat.

After the Civil War, there was a large immigration into the Los Angeles area from Europe, Asia, and Central and South America, as well as the eastern United States. The Southern Pacific Railroad completed its Los Angeles route in 1880, followed by the Santa Fe Railroad six years later. The railroads set forth a long-term plan for growth. Southern California citrus farming, tourism and the building of towns were promoted to attract investors, and to increase the value of railroad shipments. The Los Angeles County population increased from about 33,000 in 1880 to about 101,000 in 1890 (Los Angeles Almanac, 2020).

Los Angeles became a center of oil production in the early 20th Century. Drilling activity in the county reached new heights in the 1920s when major finds were made in Whittier, Montebello, Compton, Torrance, Inglewood, Huntington Beach, Santa Fe Springs and Signal Hill.

**Figure 3-1.**
**Planning Area**

**Los Angeles County Floodplain Management Plan**



In the early 1900s, growth in the City of Los Angeles necessitated the annexation of the large San Fernando Valley. By the 1920s, fruit—especially citrus—cultivation was San Fernando's biggest industry. Olives also flourished in the Mediterranean-like climate. Other crops grown in the County included alfalfa, apricots, asparagus, barley, hay, beans, beets, cabbage, citrus, corn, lettuce, melons, peaches, potatoes, pumpkins, squash, tomatoes, and walnuts. From 1910 to 1955, Los Angeles County was the top agricultural area in the United States (KCET, 2011).

Los Angeles County's population mushroomed in the aftermath of World War I, going from almost 940,000 people in 1920 to over 2.2 million by 1930 (Los Angeles Almanac, 2020).

World War II ushered in another boom in Los Angeles County's population and economy. The area's excellent weather made it an ideal location for aircraft testing and construction, and hundreds of other industries. The County became a large metropolis. Its population swelled from almost 2.8 million people in 1940 to over 4.1 million by 1950, and to almost 6.1 million in 68 cities and the unincorporated areas by 1960 (over 38 percent of the State's population) (Los Angeles Almanac, 2020; Los Angeles County, 2012a).

Along with that of the State, Los Angeles County's population continued to grow, especially in the Santa Clara River watershed and the Antelope Valley. The County's population reached 7 million by 1970, 8.9 million by 1990, and 10.25 million in 2019 (Los Angeles Almanac, 2020; California Department of Finance, 2019).

**Water Supply**

The only local sources of water in Los Angeles County in the early 1900s were the intermittent Los Angeles, San Gabriel and Santa Clara Rivers and their tributaries, and numerous groundwater basins replenished by the area's minimal rain. About 250 miles northeast of Los Angeles in Inyo County, a desert region known as the Owens Valley had the Owens River, a permanent stream of fresh water fed by the melted snows of the eastern Sierra Nevada mountains. In 1905, the people of the City of Los Angeles voted for $22.5 million worth of bonds to build an aqueduct from the Owens River.

The aqueduct opened November 5, 1913. However, the remaining cities and unincorporated areas in Los Angeles County were left with water supplies that were dwindling due to excessive groundwater pumping and dropping aquifer levels, and no way to fund additional sources. A few local water supply entities replenished aquifers at the mouth of San Gabriel Canyon using long ditches for percolation, and constructed shallow spreading basins in San Antonio Canyon at the San Bernardino County border. The City of Pasadena diverted water from the Arroyo Seco into its water supply system and constructed spreading grounds to replenish the aquifer under the City.

Later major water projects included the U.S. Bureau of Reclamation's construction of Hoover Dam and the Metropolitan Water District's construction of the Colorado Aqueduct in the 1930s and 1940s. In the 1960s and 1970s, the California Department of Water Resources oversaw the construction of the State Water Project, which constructed several dams and the California Aqueduct, which provide water from northern California to southern California, including Los Angeles County.

## 3.1.2 Flooding and Response

In February 1914 a devastating flood hit Los Angeles County, which by that time had a population of almost 800,000 people in 31 cities and the unincorporated areas (Los Angeles County, 2012a). In the aftermath of the flood, the region's residents demanded action, and the Los Angeles County Board of Supervisors formed a Board of Engineers for Flood Control. Based on legislation drafted by that board, the California Legislature in 1915 created the Los Angeles County Flood Control District, the first regional flood control district in the state. The District was given a dual mission of flood control and conservation of flood waters for water supply. By 1917, the District completed a plan for flood control (Bigger, 1959).

The flood control plan consisted of check dams and major dams in the mountains; one major dam in the flatlands; channel straightening and selective bank protection; instream percolation into the aquifers; and protection of the Los Angeles and Long Beach Harbors. Projects were proposed in all major watersheds in the District, including Ballona Creek, what is now known as Dominguez Channel, Los Angeles River, San Gabriel River, and Santa Clara River (Reagan, 1917).

In the 1920s and 1930s, the Los Angeles County Flood Control District constructed 15 dams in the San Gabriel Mountains with a dual function of flood control and stormwater capture. At the same time, the District prepared an updated comprehensive plan for flood control and water conservation, which included additional flood control channels and retention facilities, debris basins, and large-scale spreading grounds for aquifer recharge (LACFCD, 1931). This plan has served as the basic blueprint for both District and federal major stormwater and debris management projects in Los Angeles County.

In January 1934, a flood descended on the Crescenta Valley, devastating buildings, citrus groves, vineyards, villages, and highways. This flood event resulted in the federal Emergency Relief Appropriations Act of April 1935, providing funds for channel, storm drain and debris basin construction by the U.S. Army Corps of Engineers. The Corps and the Los Angeles County Flood Control District worked with the federal Works Progress Administration to modify the District's Comprehensive Plan to provide more detailed plans and layouts. As a result of this effort, when Congress passed the Flood Control Act of June 1936, Los Angeles County garnered $70 million of appropriations (about 25 percent of the legislation's total appropriation for the country) for the Corps to partner with the District and construct flood control projects in the Los Angeles and San Gabriel River systems.

The 1936 Act was amended to add Ballona Creek to the Corps' scope of projects. The Flood Control Act of June 1938 directed the Corps to prepare a flood control plan for the entire Los Angeles Basin and named the project the Los Angeles County Drainage Area (LACDA) Project; it also authorized further work by the U.S. Forest Service and the Soil Conservation Service to reduce soil erosion. Subsequent federal Flood Control Acts provided funding to carry the LACDA Project to its completion in the 1960s.

In parallel with its partnership with the Army Corps of Engineers on the LACDA Project, the County continued with additional stormwater management facilities of its own. From the 1930s through the 1960s, the Flood Control District constructed spreading grounds in the San Fernando and San Gabriel Valleys and at the Dominguez Gap in the lower Los Angeles River to replenish aquifers. In the aftermath of major storm disasters in the 1950s and in 1969, the District constructed additional channels, major storm drain systems, and many of the region's debris basins.

The District partnered with the U.S. Forest Service in the 1960s and 1970s to construct numerous crib dams in the San Gabriel Mountains to stabilize streams and mitigate the effects of erosion on the communities below. During this period, the Los Angeles County Flood Control District also pioneered the use of freshwater injection wells in the County's coastal areas to form barriers to protect coastal aquifers from seawater intrusion resulting from groundwater pumping.

## 3.2 PHYSICAL SETTING

### 3.2.1 Topography

Topography in Los Angeles County consists of a coastal plain extending in from the southern coast, hills in the central county across the north end of the urbanized area, the Santa Monica Mountains to the west, the San Gabriel Mountains crossing the north-central portion of the county, and a high, flat portion of the Mojave desert in the county's northeastern corner. Offshore, the county also includes Santa Catalina Island, about 30 miles south of Long Beach, and San Clemente Island, about 60 miles south of Long Beach.

The Santa Monica Mountains, in western Los Angeles County and southeastern Ventura County, cover 250 square miles, rising out of the Pacific Ocean to a height over 3,000 feet. The mountain range was driven up from the sea over 10 million years ago. Weathering has created rugged landscapes of canyons up to 2,000 feet deep with unique rock formations (Los Angeles County, 2009a).

The San Gabriel Mountains and the surrounding Angeles National Forest encompass nearly 700,000 acres of wilderness on the northern edge of the Los Angeles metropolis. The San Gabriel Mountains have several peaks over 9,000 feet, the highest being Mount San Antonio (locally know as Mount Baldy) at 10,064 feet. The foothills (starting at 1,300 feet) are grassy but otherwise barren; the land becomes rockier and forested with oak, pine and cedar at higher elevations. There are clear mountain streams and reservoirs, small lakes, waterfalls, old mines and steep canyons (Los Angeles County, 2009a).

Antelope Valley is the western tip of the Mojave Desert extending into Los Angeles County. It is a high, flat valley surrounded by mountain ranges. The San Gabriel Mountain Range to the south separates the valley from the Los Angeles Basin, and the Tehachapi Mountain Range to the north separates it from Bakersfield and the San Joaquin Valley. Lancaster, one of the cities in the Antelope Valley, has an elevation of 2,500 feet above sea level (Los Angeles County, 2009a).

## 3.2.2 Geology and Soils

The 1903 soil survey of Los Angeles (Mesmer, 1903) identifies 17 soil types in the area, as summarized in Table 3-1.

**Table 3-1.** Identified Soil Types in the Los Angeles Area

| Soil | % of Total Area | Soil | % of Total Area | Soil | % of Total Area |
|---|---|---|---|---|---|
| **Placentia sandy loam** | 18.1 | Oxnard loam | 5.4 | Maricopa gravelly loam | 1.6 |
| **Fresno sand** | 15.9 | Fresno fine sand | 4.4 | Galveston clay | 1.3 |
| **Santiago silt loam** | 10.8 | Maricopa sandy loam | 3.8 | Dune sand | 0.9 |
| **Fresno fine sandy loam** | 10.6 | Los Angeles sandy loam | 2.5 | River wash | 0.5 |
| **San Joaquin black adobe** | 10.3 | Fullerton sandy adobe | 1.9 | Peat | 0.3 |
| **Oxnard sand** | 9.8 | Sierra adobe | 1.9 | | |

Source: Mesmer, 1903

The soil survey described the characteristics of the most common soils in the area as follows:

- Placentia sandy loam—The surface soil of Placentia sandy loam is composed of a light- brown or brown loam with a medium to fine texture. Ordinarily it is comparatively loose and easily cultivated, except in certain localities where it has a tendency to bake or pack. It is underlain by a more compact subsoil that is lighter in color, with a slight reddish cast. In certain places the underlying material packs harder than in others, and is locally known as hardpan. Where the subsoil is exposed in cuts, in the upper 2 or more feet it cracks in irregular lines like adobe. Beneath this stratum the material grades into sand or into a material much like the surface soil.
- Fresno sand—Fresno sand is a light to medium gray sand that is coarse to medium in texture. It is generally loose and in very few instances shows any tendency to clod in cultivation. The soil is generally 6 feet or more in depth. In many cases, however, it is found overlying material of the Fresno fine sandy loam and occasionally, in the lower areas, a silty material.
- Santiago silt loam—Santiago silt loam is light to dark gray silt loam, varying from loose, easily cultivated soil to a heavy texture and a tendency to pack, bake, and crack when dry. The texture generally varies with the color: the light is friable; the dark is heavy. The depth varies from a foot to more than 6 feet, and the surface soil grades into layers of sand, fine sandy loam or silt.
- Fresno fine sandy loam—The surface soil of the Fresno fine sandy loam consists of light to dark gray fine sandy loam, ranging in texture from medium to fine. The soil has an average depth of about 3 feet and is

generally underlain by sand, though layers of silt and fine sandy loam constitute the subsoil in places, particularly in lower areas.

- San Joaquin black adobe—The surface soil of the San Joaquin black adobe consists of a black or dark-brown loam or a clay loam that is very adhesive when wet and baking and cracking in irregular checks when dry. As the soil becomes drier, the cracks in places attain the width of an inch or more and extend to a depth of 2 or 3 feet. The soil is easiest to cultivate when first moistened after it has been thoroughly dried. Later it is more plastic and difficult to till. The soil varies in depth from 2 to 4 or more feet and is underlain by a brown-colored phase of the same or a sandier material, by decomposing shale, or, in a few instances, by sand.
- Oxnard sand—Oxnard sand is yellowish-gray, dark-gray, or grayish-brown sand of medium to fine texture. It is of a loose, open character, in places being shifted by the winds. The material extends to a depth of 6 feet and grades into a sand of much the same texture as the soil.

Figure 3-2 shows subsurface geology of the area, mapped rock types and seismic faults and folds.

### 3.2.3 Drainage and Watersheds

The Natural Resources Conservation Service (NRCS) designates major watersheds with an eight-digit hydrologic unit code (HUC-8) and subdivides them into smaller watersheds designated with a 10-digit hydrologic unit code (HUC-10). The major and smaller watersheds that lie all or partly within Los Angeles County are listed in Table 3-2 and shown on Figure 3-3 and Figure 3-4. Analysis of the planning area for this floodplain management plan was performed at the smaller watershed scale. Detailed descriptions of these watersheds can be found in Section 6.2 of this document.

### 3.2.4 Climate

In the areas along the California coast, climate is subject to wide variations within short distances as a result of the influence of topography on the circulation of marine air. The Los Angeles Basin offers many varieties of climate within a few miles. Santa Monica Pier, in the Los Angeles area, has a normal July maximum of around 75ºF, but the average increases to 95ºF at Canoga Park in the San Fernando Valley just 15 miles to the north (WRCC, 2019). Table 3-3 summarizes key climate data for the county at three locations: Los Angeles International Airport on the coast, downtown Los Angeles in the central county, and Lancaster in the Mojave Desert.

Although the basic air flow above the area is from the west or northwest during most of the year, mountain chains deflect these winds so that, except for the immediate coast, wind direction is more a product of local terrain than of the prevailing circulation. Strong and sometimes damaging winds from the east or southeast occur when there is a strong high-pressure area to the east and an intense low-pressure area approaching from the west. In southern California these winds are called “Santa Ana Winds.” Their air is typically dry, and the winds are strong and gusty, sometimes exceeding 100 mph, particularly near the mouth of canyons oriented along the direction of airflow. These conditions occasionally lead to serious fire suppression problems and often result in the temporary closing of highways to campers, trucks, and light cars.

The Los Angeles Basin is almost completely enclosed by mountains on the north and east. A vertical temperature structure (inversion) in the air along most of coastal California tends to prevent vertical mixing of the air. The geographical configuration and southern location of the Los Angeles Basin permit a fairly regular daily reversal of wind direction—offshore at night and onshore during the day. (WRCC, 2019).

*Source: California Geological Survey, 2010*

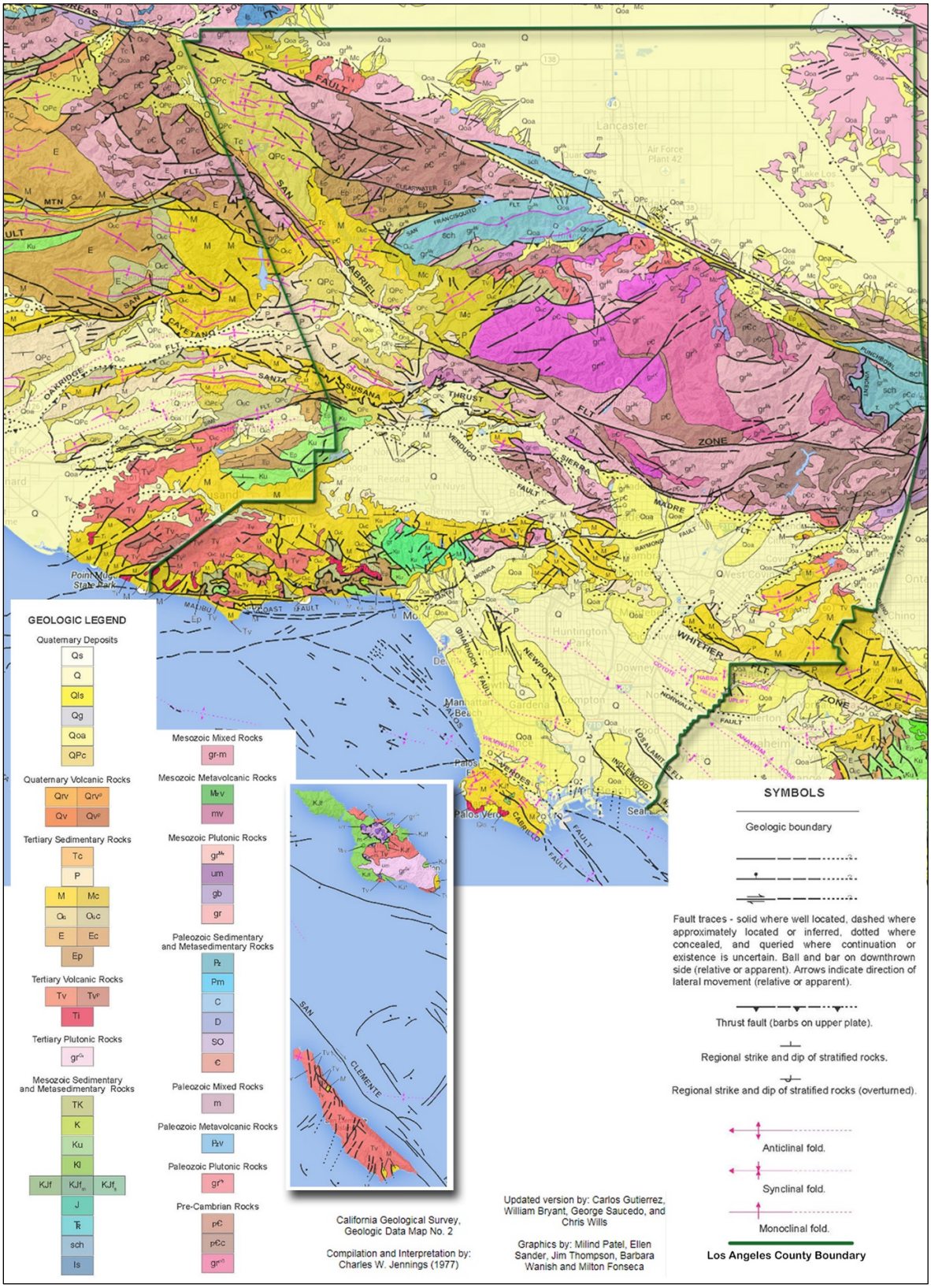



**Figure 3-2.** Los Angeles County Geologic Features

**Table 3-2.** NRCS Watersheds in Unincorporated Los Angeles County

| HUC-10 Code | Name | HUC-10 Code | Name |
|---|---|---|---|
| **HUC-8 Watershed: Middle Kern/Upper Tehachapi/Grapevine** | | **HUC-8 Watershed: San Gabriel River** | |
| 1803000307 | Grapevine Creek | 1807010601 | West Fork San Gabriel River |
| **HUC-8 Watershed: Santa Clara River** | | 1807010602 | Upper San Gabriel River |
| 1807010201 | Headwaters Santa Clara River | 1807010603 | Dalton Wash |
| 1807010202 | Bouquet Canyon | 1807010604 | San Jose Creek |
| 1807010203 | Castaic Creek | 1807010605 | Lower San Gabriel River |
| 1807010204 | Upper Santa Clara River | 1807010606 | Colorado Lagoon-Frontal Alamitos Bay |
| 1807010205 | Upper Piru Creek | **HUC-8 Watershed: San Pedro/Channel Islands** | |
| 1807010206 | Lower Piru Creek | 1807010700 | San Nicholas Island/Santa Catalina Island |
| **HUC-8 Watershed: Calleguas** | | **HUC-8 Watershed: Santa Ana** | |
| 1807010301 | Calleguas Creek | 1807020307 | Chino Creek |
| **HUC-8 Watershed: Santa Monica Bay** | | **HUC-8 Watershed: Antelope-Fremont Valleys** | |
| 1807010401 | Malibu Creek | 1809020609 | Le Montaine Creek-Eller Slough |
| 1807010402 | Ballona Creek | 1809020610 | Big Rock Creek-Big Rock Wash |
| 1807010403 | Dominguez Channel | 1809020611 | Little Rock Wash |
| 1807010404 | Big Sycamore Canyon-Frontal Santa Monica Bay | 1809020613 | Sacatara Creek-Kings Canyon |
| 1807010405 | Garapito Creek-Frontal Santa Monica Bay | 1809020614 | Amargosa Creek |
| 1807010406 | Frontal Santa Monica Bay-San Pedro Bay | 1809020615 | Lake Palmdale-Piute Ponds |
| | | 1809020616 | Town of Pearblossom |
| | | 1809020618 | Cottonwood Creek-Tylerhorse Canyon |
| **HUC-8 Watershed: Los Angeles River** | | 1809020619 | Mescal Creek-Rocky Buttes |
| 1807010501 | Big Tujunga Creek | 1809020622 | Rogers Lake |
| 1807010502 | Upper Los Angeles River | 1809020623 | Rock Creek-Buckhorn Lake |
| 1807010503 | Rio Hondo | 1809020624 | Rosamond Lake |
| 1807010504 | Lower Los Angeles River | **HUC-8 Watershed: Mojave** | |
| | | 1809020804 | Sheep Creek-El Mirage Lake |

Notes:
1. HUC-8 watershed names shown are those defined by the NRCS. Alternative names are established in the 2006 Los Angeles County Public Works Hydrology Manual, as described in Section 6.2.
2. HUC-8 Watershed San Pedro/Channel Islands and HUC-10 Watershed San Nicholas Island/Santa Catalina Island are not shown on Figure 3-3 and Figure 3-4 as they are outside the mapped extent of those figures.

**Table 3-3.** Average Los Angeles County Climate Data

| | Los Angeles International Airport | Downtown Los Angeles | Lancaster |
|---|---|---|---|
| **Average Annual Minimum Temperature** | 55.ºF | 55.8ºF | 44.6ºF |
| **Average Annual Maximum Temperature** | 70.1ºF | 74.0ºF | 77.1ºF |
| **Average Annual Mean Temperature** | 63.3ºF | 66.2ºF | 60.8ºF |
| **Average Annual Precipitation (inches)** | 12.02 | 14.77 | 5.1 |

Source: WRCC, 2019.

**Figure 3-3.**
**Major (HUC-8) Watersheds Lying Partly or Completely Within Los Angeles County**

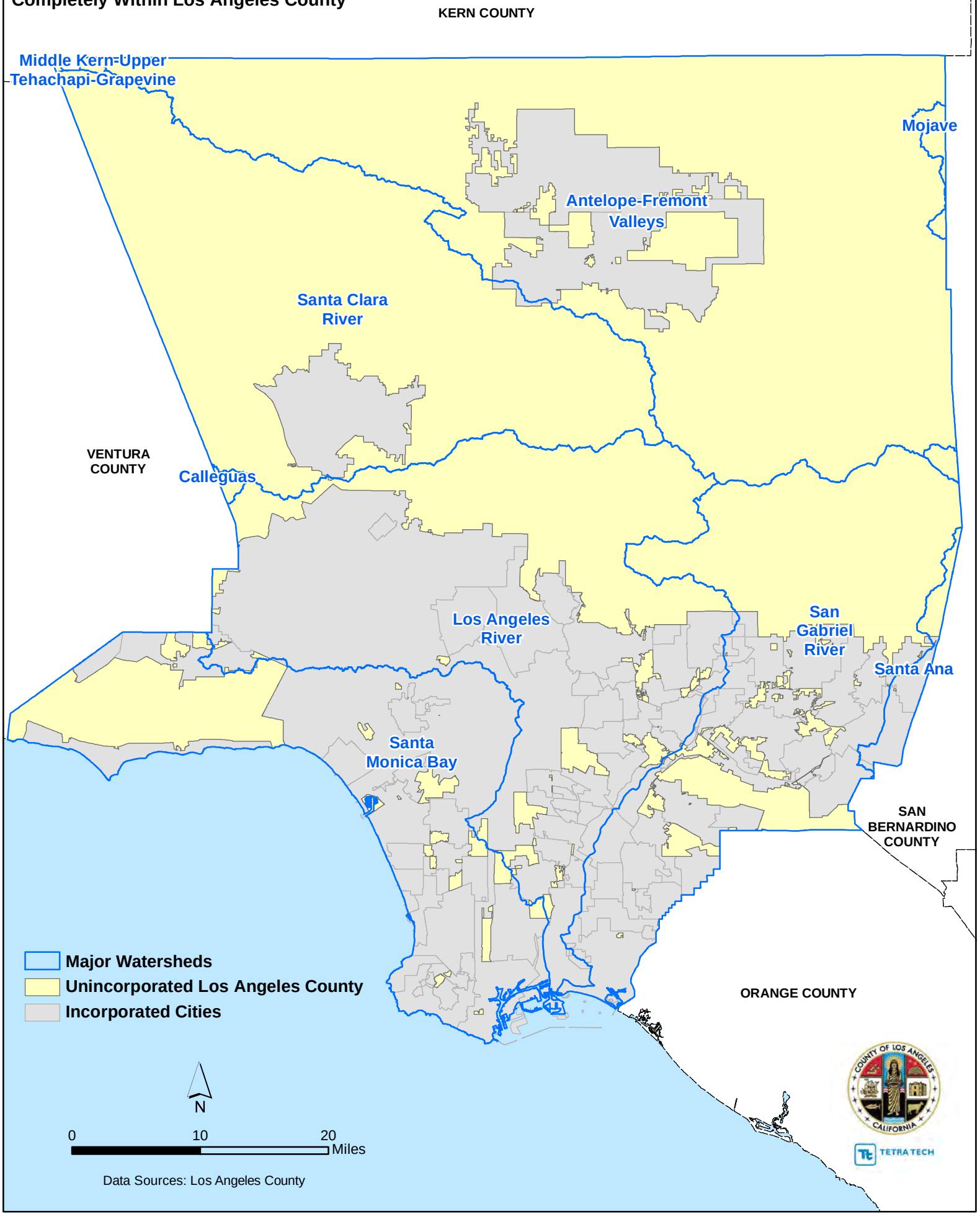


**Figure 3-4.**
**Smaller (HUC-10) Watersheds Within Los Angeles County**



# 3.3 DEVELOPMENT FEATURES

## 3.3.1 Land Use

Los Angeles County is highly urbanized, but it includes large, sparsely developed areas in the Mojave Desert, the Angeles and Los Padres National Forests in the San Gabriel Mountains (which also contain the San Gabriel Mountains National Monument), and the Santa Monica Mountains (which contain the Santa Monica National Recreation Area and the Malibu Creek and Topanga State Parks). Over half of the unincorporated areas in the County are considered natural resources, and 39 percent are designated as rural. The County's land use patterns are greatly influenced and shaped by the surrounding natural features, which include valleys, waterways, coastland mountains, forestland, and desert (Los Angeles County Department of Regional Planning, 2019b).

A network of high-capacity transportation systems traverses Los Angeles County. In the unincorporated areas, these systems include California State Route (SR) 14, SR 138, SR 39, SR 1, Interstate 5, Interstate 110, U.S. Route 2, and SR 23. Due to the accessibility that the transportation network provides, along with County unincorporated areas' proximity to major population centers in the cities of Los Angeles and Malibu, the County projects significant growth in population and employment for the unincorporated areas over the next 20 years (Los Angeles County Department of Regional Planning, 2015b).

To help ensure that regionally unique characteristics are considered in long-term development, the County has specific plans for local unincorporated areas, including the Canyon Park, La Viña, Santa Catalina Island, Marina Del Ray, Northlake, Newhall Ranch, and Universal Studios areas. The County also regulates development in special management areas to prevent loss of life and property and to protect important resources, such as agricultural resources, airport areas, coastal zones, flood zones, historic resources, mineral resources, and military operations (Los Angeles County Department of Regional Planning, 2015b).

The County promotes infill development, sustainable development, and transit-oriented development to preserve land and resources while reducing the costs of public infrastructure and other services. This focus reduces residential exposure to natural hazards, such as wildfires and flooding, through the siting and design of open spaces. The County has noted the locations of higher hazard areas near population centers and growth areas, and it plans to use this information to ensure planning and development processes continue to consider these factors (Los Angeles County Department of Regional Planning, 2015b).

Land use distribution in unincorporated Los Angeles County is summarized in Table 3-4.

**Table 3-4.** Land Use Distribution in Unincorporated Los Angeles County

| Land Use Designation | Area (acres) | Percent of Total |
|---|---|---|
| **Residential** | 51,480 | 3.13 |
| **Rural** | 641,321 | 39 |
| **Commercial** | 5,268 | 0.04 |
| **Industrial** | 7,304 | 0.05 |
| **Natural Resources** | 844,224 | 51.34 |
| **Public and Semi-Public** | 79,920 | 4.86 |
| **Mixed Use** | 291 | 0.03 |
| **Specific Plan** | 13,556 | 0.82 |
| **Other** | 1,080 | 0.08 |
| **Total** | **1,644,444** | **100** |

## 3.3.2 Critical Facilities and Infrastructure

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after a flood or other hazard event. The CRS defines a critical facility as follows:

> A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include health and safety facilities, utilities, government facilities, and hazardous materials facilities.

Through a facilitated process, the Steering Committee established a definition of critical facilities for this floodplain management plan as follows:

> A structure or other improvement that, because of its function, size, service area, or uniqueness, provides indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security.

For the purposes of this floodplain management plan, the following categories of lifelines are defined as critical facilities:

- **Safety and Security**—Law enforcement/security, search and rescue, fire services, government service, responder safety, and imminent hazard mitigation
- **Food, Water and Sheltering**—Evacuations, schools, food/potable water, shelter, durable goods, water infrastructure and agriculture
- **Health and Medical**—Medical care (hospitals), patient movement, public health, fatality management, health care and supply chain
- **Energy**—Power (grid), temporary power and fuel
- **Communications**—Infrastructure, alerts, warnings, messages, 911 and dispatch, responder communications and financial services
- **Transportation—**Highway/roadway, mass transit, railway, aviation, maritime and pipeline
- **Hazardous Materials**—Facilities, hazardous debris, pollutants and contaminants

Three sources were used to develop an inventory of facilities meeting these definitions:

- Location management system GIS data from Los Angeles County's GIS data portal
- GIS data downloaded from the U.S. Environmental Protection Agency's website for facilities in the EPA's Toxic Release Inventory (a listing of hazardous material facilities)
- Default entries contained in the Comprehensive Data Management System that is part of FEMA's Hazus software (Hazus version 2.1; used as source for electric power and oil facilities, and for light rail and rail bridges).

Due to the sensitivity of this information, a detailed list is not provided in this plan; the list is on file with the County. Table 3-5 summarizes the general types of critical facilities and infrastructure in the planning area. General locations are shown on maps provided in Appendix D. The numbers of critical facilities and infrastructure located within mapped floodplains of the planning area are given in Section 7.3.

**Table 3-5.** County of Los Angeles Critical Facilities

| Watershed | Safety & Security | Food, Water & Sheltering | Health & Medical | Energy | Communications | Transportation | Haz Mat | Total |
|---|---|---|---|---|---|---|---|---|
| Amargosa Creek | 3 | 28 | 0 | 0 | 2 | 38 | 0 | 71 |
| Ballona Creek | 3 | 18 | 2 | 1 | 1 | 22 | 0 | 47 |
| Big Rock Creek-Big Rock Wash | 0 | 4 | 0 | 0 | 0 | 6 | 0 | 10 |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 1 | 9 | 0 | 0 | 2 | 9 | 0 | 21 |
| Big Tujunga Creek | 1 | 3 | 0 | 0 | 0 | 18 | 0 | 22 |
| Bouquet Canyon | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 3 |
| Calleguas Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Castaic Creek | 6 | 25 | 0 | 1 | 0 | 42 | 8 | 82 |
| Chino Creek | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 8 |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood Creek-Tylerhorse Canyon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dalton Wash | 0 | 27 | 0 | 0 | 0 | 19 | 0 | 46 |
| Dominguez Channel | 5 | 63 | 1 | 2 | 2 | 84 | 46 | 203 |
| Frontal Santa Monica Bay-San Pedro Bay | 1 | 6 | 2 | 0 | 0 | 18 | 8 | 35 |
| Garapito Creek-Frontal Santa Monica Bay | 4 | 25 | 0 | 0 | 1 | 18 | 0 | 48 |
| Grapevine Creek | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Headwaters Santa Clara River | 2 | 24 | 0 | 0 | 6 | 64 | 2 | 98 |
| Lake Palmdale-Piute Ponds | 0 | 3 | 0 | 0 | 0 | 36 | 0 | 39 |
| Le Montaine Creek-Eller Slough | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Little Rock Wash | 1 | 8 | 1 | 0 | 0 | 11 | 1 | 22 |
| Lower Los Angeles River | 14 | 179 | 12 | 1 | 0 | 181 | 34 | 421 |
| Lower Piru Creek | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 5 |
| Lower San Gabriel River | 4 | 84 | 0 | 2 | 0 | 74 | 7 | 171 |
| Malibu Creek | 2 | 8 | 0 | 0 | 0 | 28 | 0 | 38 |
| Mescal Creek-Rocky Buttes | 1 | 14 | 1 | 0 | 1 | 12 | 0 | 29 |
| Rio Hondo | 3 | 36 | 2 | 0 | 18 | 31 | 1 | 91 |
| Rock Creek-Buckhorn Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rogers Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rosamond Lake | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 4 |
| Sacatara Creek-Kings Canyon | 0 | 1 | 0 | 1 | 2 | 5 | 1 | 10 |
| San Jose Creek | 2 | 90 | 0 | 0 | 0 | 35 | 7 | 134 |
| San Nicholas Island-Santa Catalina Island | 1 | 2 | 0 | 0 | 6 | 5 | 0 | 14 |
| Sheep Creek-El Mirage Lake | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 3 |
| Town of Pearblossom | 1 | 14 | 0 | 0 | 2 | 7 | 0 | 24 |
| Upper Los Angeles River | 6 | 16 | 0 | 0 | 1 | 85 | 1 | 109 |
| Upper Piru Creek | 1 | 3 | 0 | 1 | 1 | 43 | 0 | 49 |
| Upper San Gabriel River | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| Upper Santa Clara River | 4 | 19 | 1 | 3 | 0 | 36 | 0 | 63 |
| West Fork San Gabriel River | 0 | 1 | 0 | 0 | 16 | 11 | 0 | 28 |
| **Total** | **66** | **715** | **22** | **12** | **67** | **961** | **116** | **1,959** |

Note: Facility counts shown are for the entire planning area. Counts within mapped floodplains are listed in Table 7-6 and Table 7-7. See Table 5-1 for data sources.

## 3.4 DEMOGRAPHICS

Some populations are at greater risk from hazard events such as floods because of decreased resources or physical abilities. Older adults, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, seniors (especially older single men), people with disabilities, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a flood event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would help to extend focused public outreach and education to these most vulnerable residents.

### 3.4.1 Population Characteristics

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. The California Department of Finance estimated Los Angeles County's population at 10,253,716 as of January 1, 2019: 1,046,858 in unincorporated areas and 9,206,858 in incorporated areas (California Department of Finance, 2019).

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. Figure 3-5 shows annual population changes from 1991 to 2014 for unincorporated Los Angeles County, the County as a whole, and the State of California (California Department of Finance, 2007, 2012, 2014, 2019).

*Source: California Department of Finance, 2019*

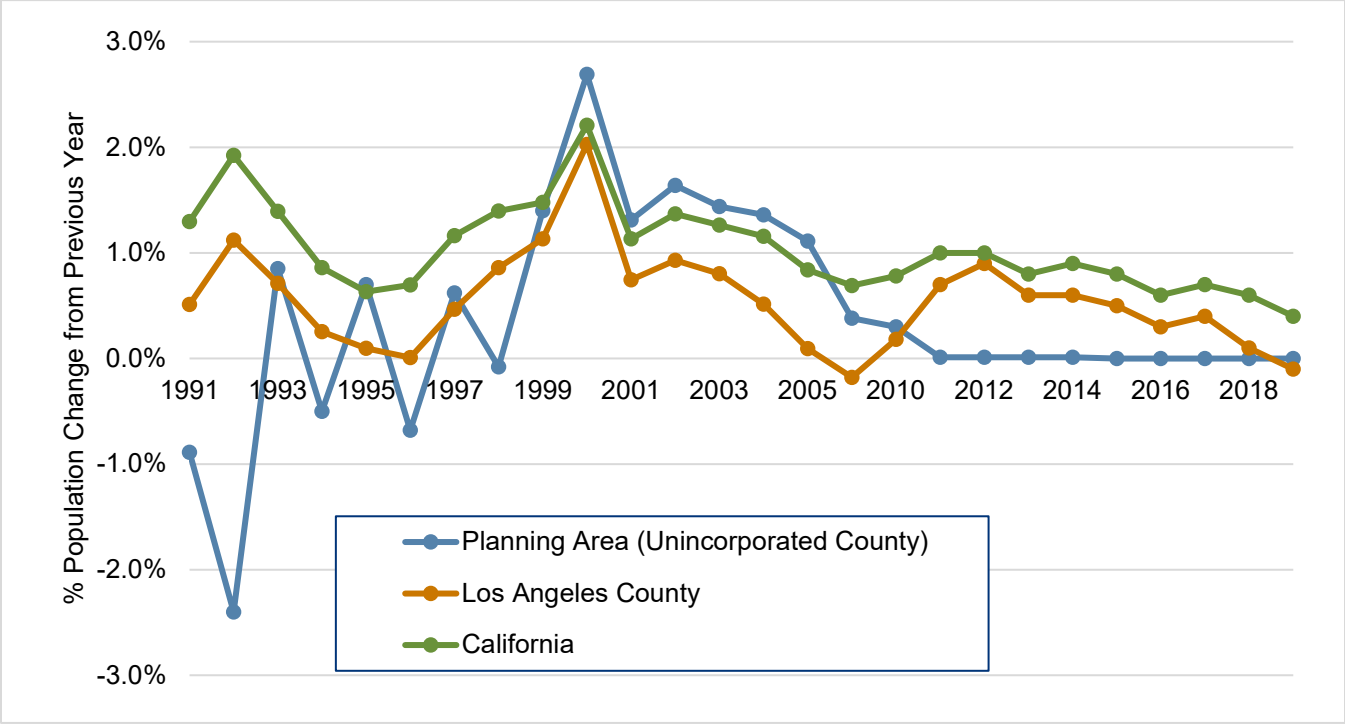



**Figure 3-5.** California and Los Angeles County Population Growth

The population of the unincorporated area drops in years when annexations move population from unincorporated to incorporated areas; however, in years when such declines did not occur, the population growth rate in the unincorporated county was generally higher than the countywide and statewide growth rates through the mid-2000s. Unincorporated area growth has been lower than the state and countywide rates in more recent years.

The Los Angeles County General Plan (Los Angeles County, 2019) forecasts that, by 2035, total County population will increase to 11,353,000 and unincorporated-area population will increase to 1,399,500—increases of 11 and 34 percent, respectively, over 2019.

## 3.4.2 Age Distribution

As a group, older adults are more apt to lack the physical and economic resources necessary for response to hazard events such as floods and are more likely to suffer health-related consequences. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, older adults are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Older adults living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for older adults is an important consideration given the current aging of the American population.

Children are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from the flood hazard.

The overall age distribution for Los Angeles County is illustrated in Figure 3-6. Based on the most recent 3-year estimates from the U.S. Census Bureau's American Community Survey (2014 – 2017), 13.3 percent of the County's population is 65 or older. According to the Census data, 9.9 percent of the over-65 population has disabilities of some kind and 17 percent have incomes below the poverty line. The county's population includes 18.6 percent who are 14 or younger. Among children under 18, 24 percent are below the poverty line. (U.S. Census, 2019a, 2019b and 2019c)

## 3.4.3 Race, Ethnicity and Language

The United States has a racially and ethnically diverse population. At the federal level, race and ethnicity are categorized separately. The most recent U.S. Census officially recognized six racial categories: White American, Black or African American, Native Americans and Alaska Native, Asian American, Native Hawaiian and Other Pacific Islander, and "two or more races." In completing the census form, each person is asked to choose from among these racial categories, so all Americans are included in the numbers reported for those categories.

Separately, the Census Bureau classifies respondents as "Hispanic or Latino" or "Not Hispanic or Latino," identifying Hispanic and Latino, the largest minority group in the nation, as an ethnicity not a race. Hispanic and Latino Americans have ethnic origins in a Spanish-speaking country or Brazil. Latin American countries are, like the United States, racially diverse. Consequently, no separate racial category exists for Hispanic and Latino Americans, as they do not constitute a race or a national group. However, the U.S. Supreme Court has unanimously held that, in law, the term "race" is not limited to Census designations but extends to all ethnicities, which may include Jewish, Arab, Italian, Hungarian, Laotian, Zulu, etc.

*Source: U.S. Census, 2019c*

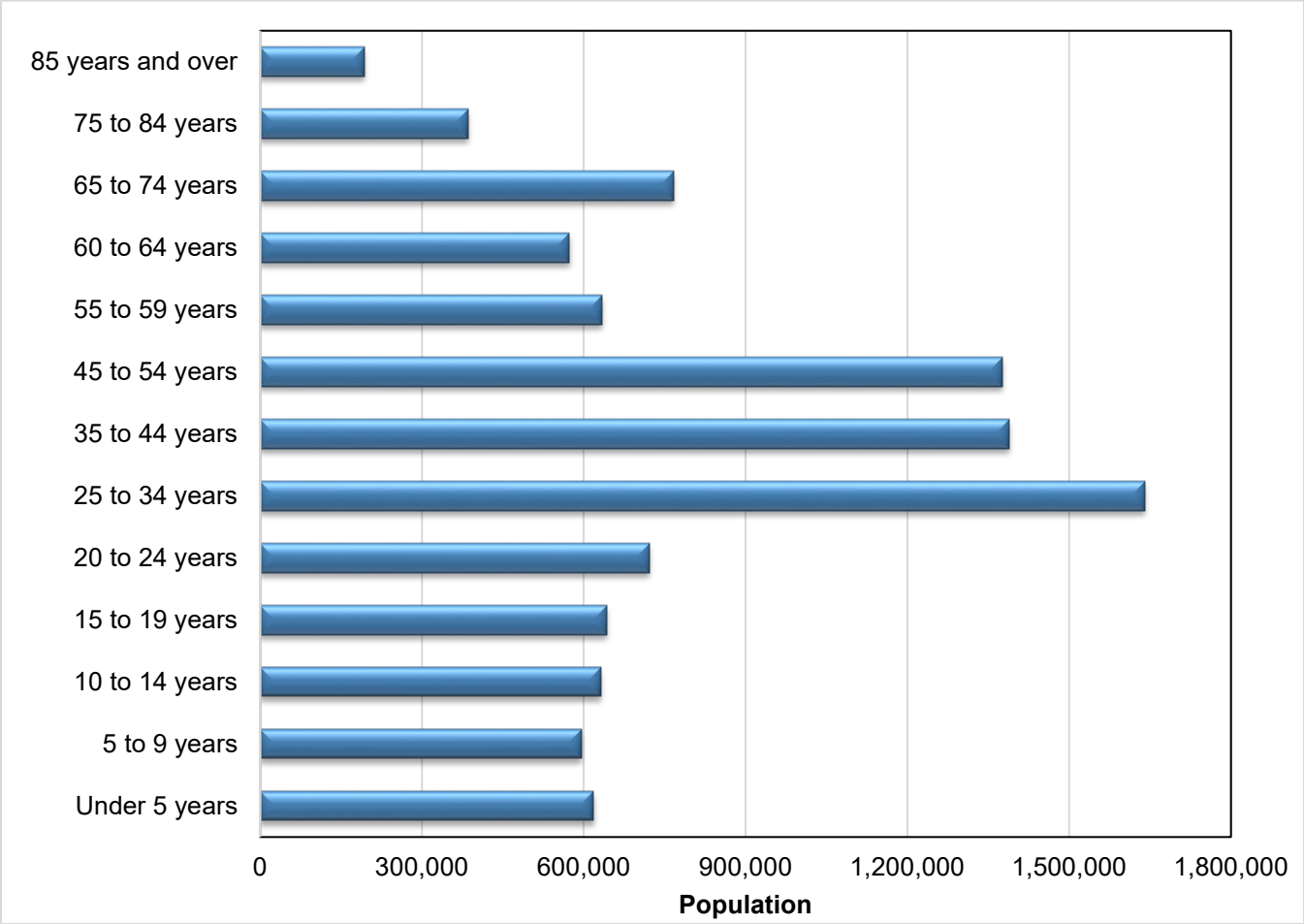



**Figure 3-6.** Los Angeles County Age Distribution

Any racial category may contain people of Hispanic or Latino ethnicity. For example: the White or European-American race category contains Non-Hispanic Whites and Hispanic Whites; the Black or African-American category contains Non-Hispanic Blacks and Hispanic Blacks; the Asian-American category contains Non-Hispanic Asians and Hispanic Asians.

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability.

According to the most recent 3-year estimates from the U.S. Census Bureau's American Community Survey (2015 – 2018), the racial composition of Los Angeles County is 51.7 percent white. The County's next largest identified ethnic population is Asian at 14.45 percent. Other identified populations are Black or African American at 8.2 percent; 20.79 percent of the population identifies as "some other race." Figure 3-7 shows the racial distribution in the County. (U.S. Census, 2019c).

The census ethnicity breakdown shows that 48.5 percent of the Los Angeles County population is Hispanic or Latino ethnicity, compared to 17.8 percent nationwide. Figure 3-8 shows the ethnic distribution in the County (U.S. Census, 2019c).

*Source: U.S. Census, 2019c*

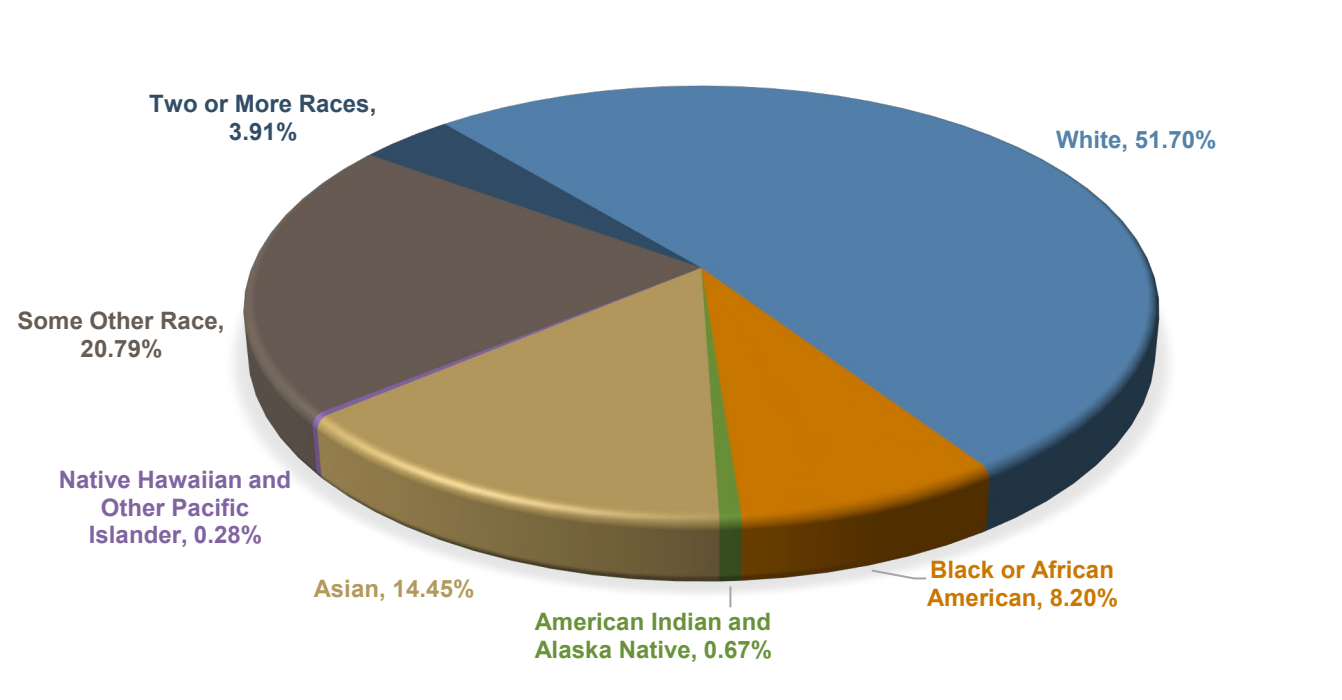



**Figure 3-7.** Los Angeles County Race Distribution

*Source: U.S. Census, 2019c*

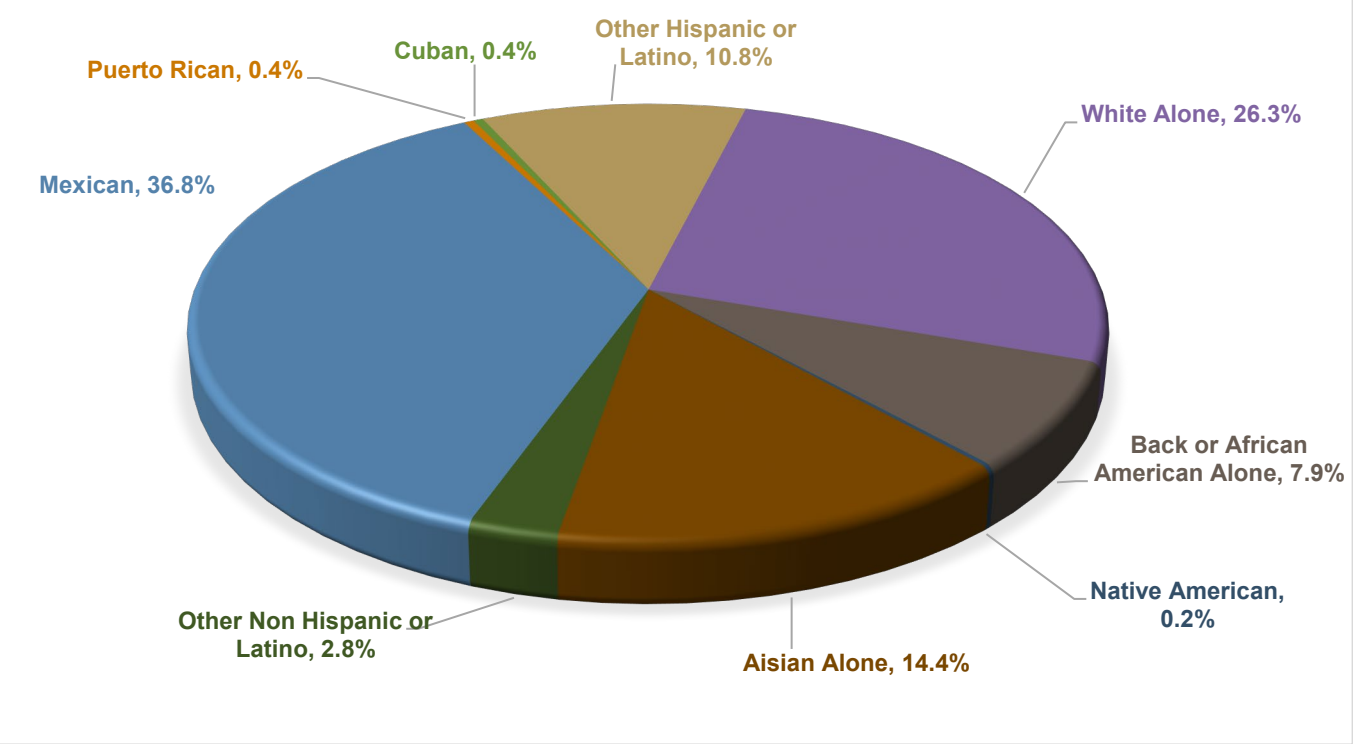



**Figure 3-8.** Los Angeles County Ethnicity Distribution

Los Angeles County has a 34.4-percent foreign-born population. Census data indicate that more than half of the population—56.9 percent—speak a language other than English at home, including 39.4 percent of the total population who speak Spanish at home; another 10.8 percent speak an Asian or Pacific Islander language at home. The census estimates that 24.5 percent of the residents speak English "less than very well." (U.S. Census, 2019a).

## 3.5 ECONOMY

### 3.5.1 Income

In the United States, individual households are expected to use private resources to prepare for, respond to and recover from disasters to some extent. This means that households living in poverty are disadvantaged when confronting hazards such as flooding. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in floods than other types of housing. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people's decisions on evacuation. Individuals who cannot afford gas for their cars will likely decide not to evacuate.

In the most recent 3-year estimates (2014 – 2017) from the U.S. Census Bureau's American Community Survey, per capita income in Los Angeles County was $30,798 and the median household income was $64,006. It is estimated that 15.3 percent of households receive an income between $100,000 and $149,999 per year and 16.5 percent of household incomes are above $150,000 annually. The Census Bureau estimates that 17.0 percent of the population in the County lives below the poverty level (U.S. Census, 2019b).

### 3.5.2 Industry, Businesses and Institutions

Los Angeles County's economy is strongly based in the education/health care/social service industry (21 percent of employment), followed by professional/scientific/management/administrative (12 percent) and retail trade (11 percent). Natural resource industries (<1 percent), and public administration (3 percent) are the industries making up the smallest sources of the local economy. Figure 3-9 shows the breakdown of industry types in the County. (U.S. Census, 2019b)

Available online data sources identify the following large employers in Los Angeles County (EDD, 2019a; Los Angeles Almanac, 2019; Statisticbrain.com, 2019):

- Government organizations are among the largest individual employers: Los Angeles County, Los Angeles Unified Schools, the City of Los Angeles, the federal government and the State of California.
- Several universities are major employers, including the University of California Los Angeles, the University of Southern California and the California Institute of Technology.
- Large health-care providers include Kaiser Permanente, Cedars-Sinai Medical Center, Providence Health and Services and Adventist Health.
- Large defense contractors with many employees in the County include Northrup Grumman Corporation, the Boeing Company, Raytheon Company and Lockheed Martin Corporation.
- Major employers in retail include Kroger, Target, Home Depot, Vons and Costco.
- Banks with many employees in the County include Bank of America and Wells Fargo
- Walt Disney Company, Warner Bros. Entertainment Inc., Sony Pictures Entertainment, and NBC Universal are significant employers in the entertainment industry.

*Source: U.S. Census, 2013b*

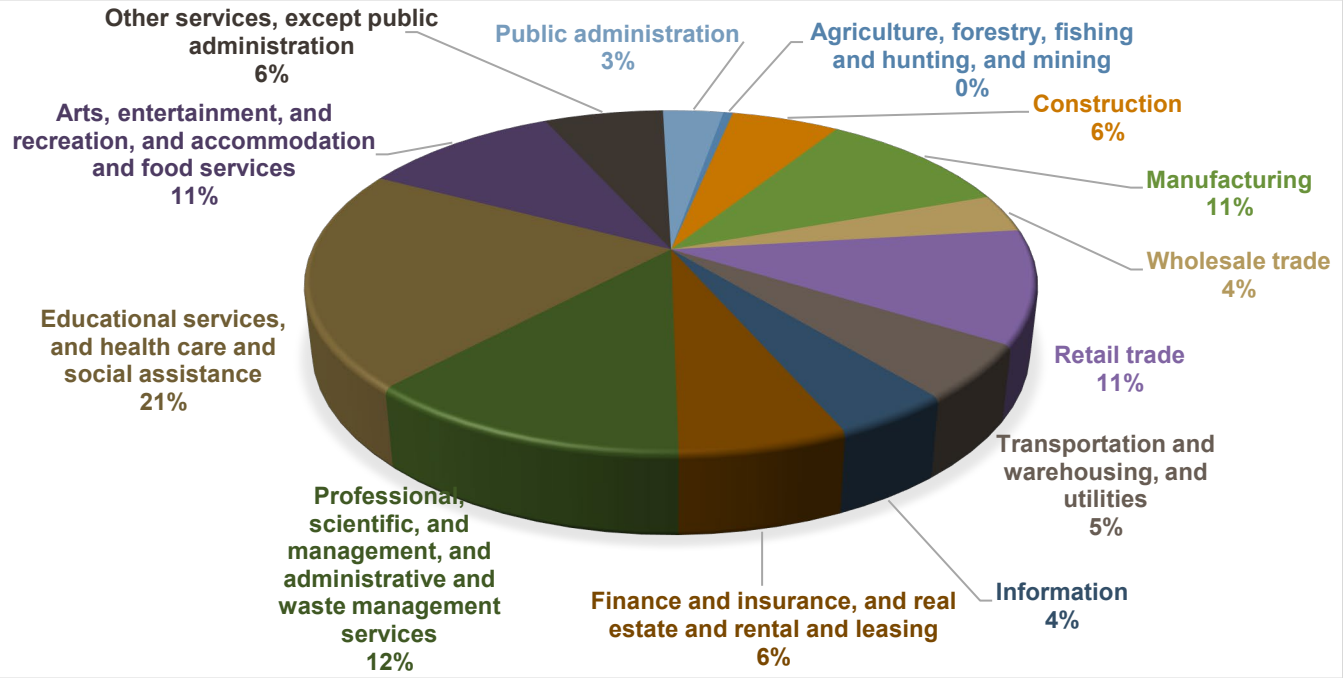



**Figure 3-9.** Industry in Los Angeles County

## 3.5.3 Employment Trends and Occupations

According to the 2014 – 2017 American Community Survey, 64.6 percent of the Los Angeles County population 16 years old or older is in the labor force, including 57.8 percent of women in that age range and 71.7 percent of men (U.S. Census, 2014b).

Figure 3-10 compares California's and Los Angeles County's unemployment trends from 1990 through 2016, based on data from the U.S. Bureau of Labor Statistics (BLS, 2019) and the California Employment Development Department (EDD, 2019b). From a low of 4.8 percent in 2006, Los Angeles County's unemployment rate rose to a peak of 12.6 percent in 2010, and has declined since then, reaching a new low of 4.3 percent in 2016.

Figure 3-11 shows Census Bureau estimates of employment distribution by occupation category (U.S. Census, 2019b). Management, business, science and arts occupations make up 35 percent of the jobs in the County. Sales and office occupations make up 25 percent of the local working population. The U.S. Census estimates that 72.6 percent of workers in the County commute alone (by car, truck or van) to work, and mean travel time to work is 29.7 minutes (U.S. Census, 2013b).

*Sources: BLS, 2019 and EDD, 2019b*

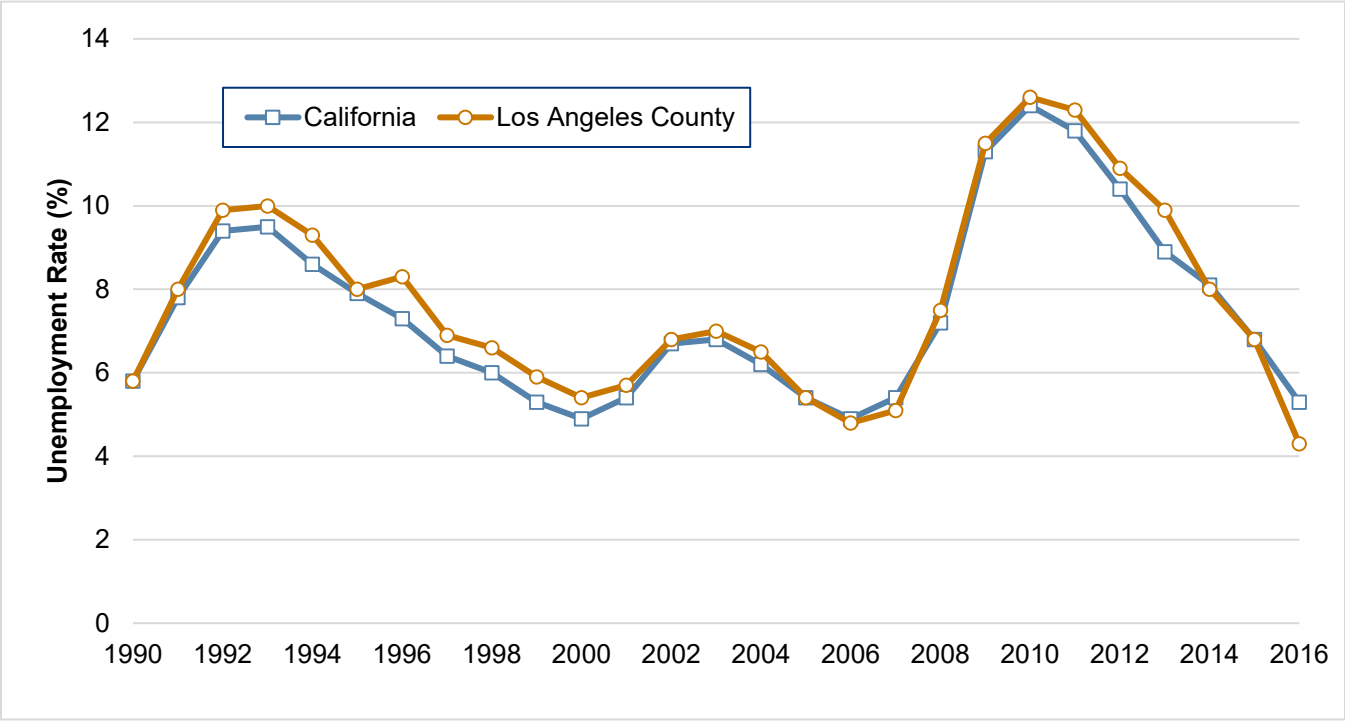



**Figure 3-10.** California and Los Angeles County Unemployment Rate

*Source: U.S. Census, 2019b*

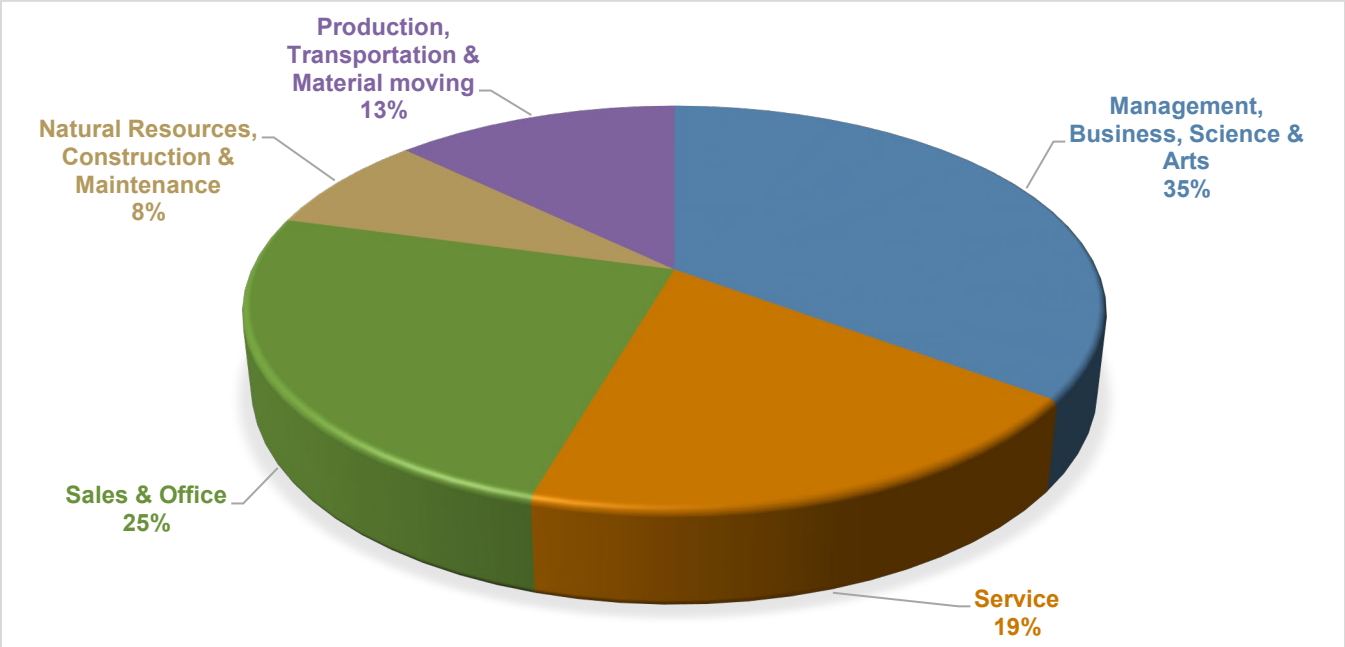



**Figure 3-11.** Occupations in Los Angeles County

# 4. RELEVANT PROGRAMS AND REGULATIONS

The CRS 10-step planning process provides credit for a planning process that includes a review of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area (Step 3a). The review needs to cover community needs and goals, past flood studies, disaster damage reports, natural area plans, and other documents that will provide information for the planning process.

Federal, state, and local agencies share and coordinate responsibilities for flood protection in Los Angeles County. The two main federal agencies are the U.S. Army Corps of Engineers, which implements federal flood protection policies, and FEMA. The California Department of Water Resources is responsible for managing the state's waterways. Los Angeles County Public Works and the Los Angeles County Flood Control District work to reduce flood risk in Los Angeles County.

Development of this plan included a review and incorporation, as appropriate, of existing plans, studies, and technical information. This chapter identifies existing laws, ordinances and plans at the federal, state and local level that can support or impact mitigation actions identified in this plan (Chapter 11). These are ongoing programs for promoting flood resiliency in the planning area (the unincorporated areas of Los Angeles County).

## 4.1 FEDERAL AND STATE

Federal and state regulations and programs that need to be considered in floodplain management are constantly evolving. For this plan, a review was performed to determine which regulations and programs are currently most relevant to local comprehensive floodplain management. The findings are summarized in Table 4-1 and Table 4-2. Short descriptions of each program are provided in Appendix E.

## 4.2 LOCAL

### 4.2.1 General Plan

The Los Angeles County 2035 General Plan, adopted in October 2015, is the latest update to the County of Los Angeles general plan. It provides a policy framework for how and where the unincorporated County will grow through 2035. It accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the broader region. The General Plan includes the following elements (Los Angeles County Department of Regional Planning, 2015b):

- Land Use Element
- Mobility Element
- Air Quality Element
- Conservation and Natural Resources Element
- Parks and Recreation Element
- Noise Element
- Safety Element
- Public Services and Facilities Element
- Economic Development Element
- Housing Element.

**Table 4-1.** Summary of Relevant Federal Agencies, Programs and Regulations

| Agency, Program or Regulation | Local Relevance and Response |
|---|---|
| **National Flood Insurance Program** | The NFIP provides flood insurance against potential losses from flooding for participating property owners. Los Angeles County participates in the NFIP and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1980, and the first Los Angeles County FIRM was issued December 2, 1980. The index date for the current FIRM is December 21, 2018. Los Angeles County is currently in good standing with the provisions of the NFIP as monitored by FEMA Region IX and the California Department of Water Resources. Table 4-7 (at the end of this chapter) summarizes the NFIP capability of Los Angeles County. |
| **Community Rating System** | Los Angeles County has participated in the CRS program since 1990. The County has a Class 7 rating (out of 10), so residents who live in a 100-year floodplain in unincorporated areas of the county can receive up to a 15 percent discount on flood insurance; outside the 100-year floodplain they receive a 5-percent discount. This equates to a savings of $78 to $254 per policy, for a total countywide premium savings of almost $214,926 (Insurance Services Office, 2019). To maintain or improve its rating, the County goes through an annual recertification and re-verification every five years. This plan is developed to help the County maintain or enhance its CRS classification. |
| **Disaster Mitigation Act of 2000** | Los Angeles County, in conjunction with its many emergency services partners, has prepared a local all-hazards mitigation plan that sets strategies for coping with the natural and man-made hazards. The scope of this plan is for the unincorporated County areas only. The plan correlates information from County departments with known and projected hazards that face Southern California. It was formally adopted by the Los Angeles County Board of Supervisors for use in the development of specific cost-effective hazard mitigation proposals. The plan complies with requirements of FEMA and the Governor's Office of Emergency Services and was approved by both agencies in 2014. It has a 5-year performance period through 2019. The County is currently updating this All-Hazard Mitigation Plan; it is anticipated to be approved in 2020. |
| **Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014** | The Biggert-Waters Flood Insurance Reform Act of 2012 required flood insurance premiums to reflect real flood risk, leading to increased premiums for homeowners. The Homeowner Flood Insurance Affordability Act for 2014 delayed the increases in premiums. |
| **Endangered Species Act** | In some parts of the United States, court rulings have found that floodplain management measures can be in conflict with the goals of the Endangered Species Act. Those rulings have required FEMA and local governments to engage in a consultation process with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects. No such rulings currently affect the Los Angeles area, but floodplain managers should be aware of any potential activities that could fall under the ESA. |
| **Clean Water Act** | The Clean Water Act provides regulatory and nonregulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff in order to support propagation of wildlife and recreation in and on the water. |
| **National Incident Management System** | Los Angeles County adopted the *County of Los Angeles Operational Area Emergency Response Plan* in March 2012. The Governor's Office of Emergency Services approved it on August 31, 2011, as fully compliant with the National Incident Management System (NIMS). |
| **Americans with Disabilities Act** | The ADA intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may implement a special-needs registry to identify the home addresses, contact information, and needs of residents who require more assistance for emergency management purposes. |
| **Public Law 8499, Flood Control and Coastal Emergencies (33 U.S.C. 701n) (69 Stat. 186)** | This law gives the Corps the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods. It authorizes the Chief of Engineers to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water in the event of drought or contaminated source. |

**Table 4-2.** Summary of Relevant State Agencies, Programs and Regulations

| Agency, Program or Regulation | Local Relevance and Response |
|---|---|
| **California General Planning Law** | The *Los Angeles County 2035 General Plan* provides a policy framework for how and where the unincorporated County will grow through 2035, while recognizing the County's diversity of cultures, abundant natural resources, and status as an international economic center. The *Los Angeles County 2035 General Plan* accommodates new housing and jobs in unincorporated areas in anticipation of population growth in the County and the region. |
| **California Environmental Quality Act** | This updated floodplain management plan does not require CEQA environmental review. It constitutes a feasibility and planning study for possible future actions, which the County has not approved, adopted or funded, and therefore is exempt from CEQA under Section 15262 of the CEQA Guidelines. However, future mitigation actions implemented as recommended by this plan may be subject to CEQA review. |
| **Porter-Cologne Act** | The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality. |
| **AB 162: Flood Planning, Chapter 369, Statutes of 2007** | Compliance with this law constitutes inclusion of certain General Plan elements. Los Angeles County's compliance with Chapter 369, Statutes of 2007 is described in Section 4.2.1. |
| **AB 2140: General Plans—Safety Element** | This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans. |
| **AB 747: General Plans—Safety Element** | The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies. |
| **AB 2800: Climate Change—Infrastructure Planning** | This act requires state agencies to take into account the impacts of climate change when developing state infrastructure. |
| **SB 92 and New Standards for Submitting Dam Inundation Maps** | This bill (SB 92, part of the 2017-18 budget package) makes significant legislative changes related to dam safety. It requires dam owners to prepare inundation maps and emergency action plans and provides for fees and enforcement. |
| **SB 379: Land Use, General Plan, Safety Element** | Los Angeles County's compliance with SB 379 is described in Section 4.2.1. |
| **California State Building Code** | Los Angeles County has adopted the State's Building Codes by reference, except where the County has made amendments or revisions to apply higher standards. The permitting process in Los Angeles County ensures compliance with the state building code. |
| **Standardized Emergency Management System** | Los Angeles County has adopted an emergency response plan that is fully NIMS compliant. The County adopted the County of Los Angeles Operational Area Emergency Response Plan in March 2012. The Governor's Office of Emergency Services approved it as NIMS compliant on August 31, 2011. |
| **California State Hazard Mitigation Plan** | The 2014 County of Los Angeles All Hazards Mitigation plan was determined to be consistent with the state plan by the Governor's Office of Emergency Services during its review and approval of the plan in 2013. The County is currently updating this All-Hazard Mitigation Plan and it is anticipated to be approved in 2020. |
| **Governor's Executive Order S-13-08** | This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects. Climate impact information developed under this executive order is used in the climate change evaluation of this comprehensive floodplain management plan. |
| **California Civil Code 1102** | The flood hazard disclosure requirements established under this code apply to all real estate transactions in Los Angeles County. |
| **Local Flood Protection Planning Act** | This statute provides guidance on what a flood mitigation plan should include. |
| **Water Code Division 5, Part 2, Chapter 4, Article 4** | This code provides floodplain regulations for public agencies within a floodplain or the planning area of a floodplain management plan. |
| **California Coastal Management Program** | This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard. |

General Plan elements that are particularly applicable to implementation of the floodplain management plan are the Conservation and Natural Resources Element, which guides the long-term conservation of natural resources and preservation of available open space areas, and the Safety Element, which reduces the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards. By inclusion of these elements, the Los Angeles County General Plan is in compliance with the First Validating Act of 2019.

## Conservation and Natural Resources Element

### *Watershed Management*

The Conservation and Natural Resources Element of the General Plan addresses watershed management, noting that it is an effective and comprehensive way to address water resource challenges. Watershed management integrates habitat enrichment and recreation availability with water supply, flood protection, and clean runoff (Los Angeles County, 2015).

Because a watershed encompasses many jurisdictions, water supply, water quality, flood protection and natural resource issues are best managed at a regional or multiple-agency level. The County works within its jurisdiction to improve the health of rivers, streams and lesser tributaries to enhance overall water resources, runoff quality and wildlife habitat. However, watershed integration requires the County to also participate with other stakeholders to manage the function and health of watersheds. Collaboration with local stakeholders and jurisdictions and with educational and professional institutions is needed to develop and implement watershed plans to protect and augment local water supplies, maintain flood protection standards, provide assistance in the event of flooding, encourage recreational opportunities, conserve habitats of native species, and improve the quality of water that flows to rivers, lakes, and the ocean.

### *Significant Ecological Areas and Coastal Resource Areas*

The Conservation and Natural Resources Element of the General Plan establishes the Significant Ecological Area (SEA) designation for land in unincorporated areas that contains irreplaceable biological resources (SEAs also have been identified in cities, but they function differently from those in unincorporated areas). Coastal Resource Areas (CRAs) are located within the coastal zone and include biological resources equal in significance to SEAs. The General Plan identifies 21 SEAs and 9 CRAs. Two CRAs are linked to SEAs that are not entirely within CRAs (the Santa Monica Mountains Coastal Zone and Palos Verde Coastline) (Los Angeles County, 2015):

- Significant Ecological Areas
  - Cruzan Mesa Vernal Pools
  - East San Gabriel Valley
  - Griffith Park
  - Harbor Lake Regional Park
  - Joshua Tree Woodlands
  - Madrona Marsh Preserve
  - Palos Verdes Peninsula and Coastline
  - Puente Hills
  - Rio Hondo College Wildlife Sanctuary
  - San Andreas
  - San Dimas Canyon / San Antonio Wash
  - San Gabriel Canyon
  - Santa Clara River
  - Santa Felicia
  - Santa Monica Mountains
  - Santa Susana Mountains and Simi Hills
  - Tujunga Valley and Hansen Dam
  - Valley Oaks Savannah
  - Verdugo Mountains
- Coastal Resource Areas
  - El Segundo Dunes
  - Malibu Coastline
  - Palos Verdes Coastline (ocean and shoreline portions)
  - Point Dume
  - Santa Catalina Island
  - Coastal Zone of the Santa Monica Mountains
  - Terminal Island (Pier 400)

The objective of the SEA program is to conserve genetic and physical diversity by designating biological resource areas that are capable of sustaining themselves into the future. However, SEAs are not wilderness preserves. Much of the land in SEAs is privately is held, used for public recreation, or abuts developed areas. The SEA program must therefore balance the overall objective of resource preservation against other critical public needs. The General Plan goals and policies are intended to ensure that privately held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs (Los Angeles County, 2015).

#### Safety Element

Flooding is among the natural hazards addressed in the Safety Element of the General Plan. The element presents goals and policies for uses in flood hazard zones, as well as tsunami hazard areas and potential dam failure inundation areas. The Safety Element of the County's General Plan is currently being updated and will be in compliance with the provisions of California's SB 379.

## 4.2.2 Community-Based Plans

The Los Angeles County General Plan (2015) serves as the foundation for community-based plans, such as area plans, community plans, and coastal land use plans. Area plans focus on land use and policy issues that are specific to the planning area. Community plans cover smaller geographic areas within the planning area and address neighborhood and/or community-level policy issues. Coastal land use plans are components of local coastal programs; they regulate land use and establish policies to guide development in the coastal zone. The following is a list of community-based plans in Los Angeles County:

- Altadena Community Plan
- Antelope Valley Area Plan
- East Los Angeles 3rd Street Plan
- East Los Angeles Community Plan
- Florence-Firestone Community Plan
- Hacienda Heights Community Plan
- Marina del Rey Land Use Plan
- Pepperdine Long Range Development Plan
- Rowland Heights Community Plan
- Santa Catalina Island Local Coastal Plan
- Santa Clarita Valley Area Plan
- Santa Monica Mountains Local Coastal Program
- Santa Monica Mountains North Area Plan
- Twin Lakes Community Plan
- Walnut Park Neighborhood Plan
- West Athens/Westmont Community Plan

## 4.2.3 Watershed Management Program

Municipalities and community stakeholders throughout Los Angeles County developed a total of 31 collaborative Watershed Management Programs and Enhanced Watershed Management Programs for the county's six watersheds—Dominguez Channel, Los Angeles River, Los Cerritos Channel, San Gabriel River, Santa Monica Bay and Upper Santa Clara River. Each Watershed Management Group meets regularly to implement its plan.

Each plan identifies programs and projects to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve aesthetics, and support public education. Each includes water quality priorities, watershed control measures, the scheduling of projects, and monitoring, assessment and adaptive management for projects. The plans rely heavily on three approaches:

- **Regional Multi-Benefit Projects**—Regional multi-benefit projects retain, divert or treat stormwater and non-stormwater from subwatershed areas, while also providing water conservation, flood, recreation, habitat and other benefits.
- **Green Street Projects**—Green street projects improve streets, sidewalks or other paved areas using permeable materials and drought-tolerant plants to capture, clean or infiltrate rainwater. Green

infrastructure projects help to clean surface water bodies, recharge groundwater, beautify neighborhoods, and cool communities by increasing the amount of vegetation.

- **Low Impact Development**—Low impact development consists of site design approaches and best management practices that address runoff and pollution at the source. These practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.

## 4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan

The 2017 Integrated Regional Water Management (IRWM) Plan Update defines the direction for collaborative planning to achieve sustainable management of water resources in the Greater Los Angeles County Region. The update meets the California Department of Water Resources' 2016 updated IRWM guideline requirements. The Plan identifies solutions to achieve the following objectives over the 25-year planning horizon:

- Reduce the region's reliance on imported water
- Comply with water quality regulations by improving the quality of urban runoff, stormwater and wastewater
- Protect, restore and enhance natural processes and habitats
- Increase watershed-friendly recreational space for all communities
- Reduce flood risk in flood-prone areas by increasing protection or decreasing needs using integrated flood management approaches
- Adapt to and mitigate against climate change vulnerabilities.

## 4.2.5 Los Angeles County Flood Control District

The Los Angeles County Flood Control Act was adopted by the State Legislature in 1915 after a regional flood took a heavy toll on lives and property. The act established the Los Angeles County Flood Control District and empowers it to provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries. Authority to address recreation and aesthetics was added via subsequent amendments. The County of Los Angeles Board of Supervisors is the ex-officio governing body for the Los Angeles County Flood Control District. In 1984, the Flood Control District entered into an operational agreement transferring administration, planning and operational activities to Los Angeles County Public Works.

Within the Greater Los Angeles County area, the Flood Control District and the U.S. Army Corps of Engineers share responsibilities for managing flood risk. The Flood Control District is the primary agency able to address large regional drainage needs. It uses available funds to operate and maintain flood control facilities and systems that cross various cities. In years of heavy rainfall, the flood control system has largely prevented serious flooding that affected the Los Angeles area many years ago.

The Flood Control District boundaries encompass more than 2,700 square miles, six major watersheds, 86 incorporated cities, and the unincorporated County areas. Its municipal flood protection and water conservation system is one of the largest in the world. It includes 14 major dams and reservoirs, 491 miles of open channels, 27 spreading grounds, 175 debris basins, operates 61 pump stations, 3,411 miles of underground storm drains, and an estimated 82,800 catch basins. Planning efforts to rehabilitate flood control facilities also consider other potential beneficial uses of those facilities, such as environmental restoration, enhancement of water quality, and recreation.

## 4.2.6 Antelope Valley Comprehensive Plan and Amendments

Los Angeles County prepared and adopted the Antelope Valley Areawide General Plan in 1986, a comprehensive plan for the unincorporated County area of Antelope Valley. The Plan was updated in June 2015, renamed the

Antelope Valley Area Plan. The Antelope Valley differs from other parts of the County because it lacks an ocean drainage outlet. It also lacks defined natural channels below the foothills, as well as an adequate flood control system, resulting in unpredictable and varying flood risk across the valley floor. The Plan explores flood control and water conservation measures to reduce the negative effects of regional private development and to better address local flood hazard needs. It seeks to provide a cohesive approach to drainage, stormwater management, and flood risk mitigation. The Plan evaluates the fee structures available to finance drainage solutions (Los Angeles County Public Works, 1987). Two amendments to the original plan update costs and drainage fees to continue implementing recommended improvements (Los Angeles County Public Works, 1991 and 2006). The most recent update to the plan in 2015 provided for zone changes, including residential, agricultural, commercial, industrial, special purpose, C-RU (rural commercial) and MXD-RU (rural mixed use) zones.

### 4.2.7 Antelope Valley Integrated Regional Water Management Plan and Salt and Nutrient Management Plan

The Antelope Valley Integrated Regional Water Management (IRWM) group developed a water resource management plan in 2007. The 2007 plan was updated in 2013 to reflect new state integrated planning requirements, include more detailed and updated content, and solicit future project funding opportunities. The 2013 Antelope Valley IRWM Plan explores key issues, including uncertain and variable water supply, water demand exceeding supply, water quality and flood management, environmental resources, water management and land use, and climate change. It identifies and prioritizes a series of projects to address key concerns in the region, particularly those related to water supply (Antelope Valley Integrated Regional Water Management Group, 2013).

The Antelope Valley Salt and Nutrient Management Plan of 2014 was developed to manage salts, nutrients, and other elements from various sources to ensure that water quality objectives of the State Water Resource Control Board's Recycled Water Policy are met and safeguarded. The State Water Resources Control Board requires a Salt and Nutrient Management Plan for any community to qualify for recycled water projects through the Lahontan Regional Water Quality Control Board.

### 4.2.8 Upper Santa Clara River Watershed IWRM

The Upper Santa Clara River Watershed Integrated Regional Water Management group updated its IRWM plan in 2018 to meet the 2016 IRWM Guidelines under Proposition 1 (the Water Quality, Supply, and Infrastructure Improvement Act of 2014). The 2018 Upper Santa Clara River Watershed IRWM Plan examines current and future water-related needs, identifies regional objectives for water-related resource management, develops strategies to address identified needs, and evaluates projects to meet the regional objectives. It integrates planning and implementation and facilitates regional cooperation, with the goals of reducing water demand, improving operational efficiency, increasing water supply, improving water quality, and promoting resource stewardship over the long term (Los Angeles County, 2019).

### 4.2.9 Sediment Management Strategic Plan

The Los Angeles County Flood Control District developed a Sediment Management Strategic Plan in response to challenges in managing sediment. These challenges included wildfires occurring in 2007 and 2009 that led to an increased inflow of sediment and debris and increased pressure on the capacity of sediment placement sites. This plan provides an overview of sediment management issues and evaluates various projects. The plan, designed to be effective from 2012 to 2032, is guided by the following objectives(Los Angeles County Public Works, 2019):

- Maintaining flood risk management and water conservation
- Recognizing opportunities for increased environmental stewardship
- Reducing social impacts related to sediment management
- Identifying ways to use sediment as a resource

- Ensuring that the Flood Control District is fiscally responsible in its decision-making.

## 4.2.10 Local Coastal Programs

Los Angeles County local coastal programs (LCPs) comply with the 1976 Coastal Act, enacted by the California Legislature, which requires coastal cities and counties to establish coastal resource conservation and development programs. The LCPs consist of planning and regulatory measures that manage development in the coastal zone. Each LCP includes a land use plan and implementation program. LCPs must consider the unique factors of the coastal community, as well as regional and state concerns. There are five coastal areas within the unincorporated Los Angeles County jurisdiction: the Santa Monica Mountains, Marina Del Rey, Santa Catalina Island, San Clemente Island and Ballona Wetlands Area A. Of these five areas, three have certified LCPs: Marina del Rey, Santa Catalina Island, and the Santa Monica Mountains. Certified LCPs are not required for San Clemente Island or Ballona Wetlands Area A.

## 4.2.11 Los Angeles County Low Impact Development Ordinance

In November 2012, the Los Angeles Regional Water Quality Control Board adopted a Municipal Separate Storm Sewer System (MS4) Permit to regulate stormwater and non-stormwater discharges in the Los Angeles region. The Permit included low impact development (LID) requirements for certain projects to reduce the discharge of stormwater and associated pollutants into receiving water bodies and to control hydromodification. In November 2013, Los Angeles County amended its LID Ordinance in response to the 2012 MS4 Permit. The LID Ordinance applies to certain new development and re-development projects and is intended to accomplish the following:

- Lessen adverse impacts of stormwater and urban runoff from development on natural drainage systems, receiving waters and other water bodies.
- Minimize pollutant loadings from impervious surfaces by requiring certain projects to incorporate appropriate best management practices and other LID strategies.
- Minimize erosion and other hydrologic impacts on natural drainage systems by requiring appropriate hydromodification controls.

In 2014 Los Angeles County created the *Low Impact Development Standards Manual* to comply with requirements of the National Pollutant Discharge Elimination System MS4 Permit for discharges within the coastal watersheds of Los Angeles County. The manual provides guidance in new development as well as redevelopments within unincorporated areas of Los Angeles County. Its intent is to improve water quality and mitigate potential water quality impacts from stormwater and non-stormwater discharges.

## 4.2.12 Los Angeles County Operational Area Emergency Response Plan

The Los Angeles County Operational Area Emergency Response Plan provides details for coordinated response to large-scale emergency situations in the County, whether natural, man-made, or technological. It focuses on potentially catastrophic disasters that require more than normal response measures. It reviews capabilities in prevention, protection, response, recovery, and mitigation. It describes continuity of government plans and provides annexes for specific situations, including tsunamis, oil spills, and terrorism (Los Angeles County, 2012).

## 4.2.13 Topanga Creek Watershed Management Plan

The Topanga Creek Watershed covers 18 square miles, has the greatest diversity of native plants and animals of all the watersheds in the Santa Monica Mountains, and is the third largest drainage into the Santa Monica Bay. In 2002, the Topanga Creek Watershed Committee updated its original 1996 Topanga Creek Watershed Management Study update with new preventive planning strategies and best management practices. These projects and practices were developed to maintain and enhance the watershed's current physical, chemical,

biological, economic, and social characteristics, including its diversity in land use (i.e., residential, business development, infrastructure, wilderness recreation, and biological habitat). The plan also seeks to protect life and property from vulnerability to natural hazards such as stormwater runoff, floods, earthquakes, and wildfires (Topanga Creek Watershed Committee, 2002).

### 4.2.14 Rio Hondo Watershed Management Plan

The 2018 Rio Hondo Watershed Management Plan provides goals and strategies to all affected municipalities and conservation organizations as a way to improve water quality, health, habitat and recreational opportunities for the Rio Hondo watershed. The Rio Hondo watershed is a sub-watershed of the Los Angeles River watershed and is linked to the San Gabriel River watershed as a result of both natural hydrologic processes and human intervention. The watershed contains both rural and urban areas, with the San Gabriel Mountains and Angeles National Forest defining the upper reaches and the more urban and developed San Gabriel Valley below the foothills. The watershed encompasses 22 cities and six unincorporated communities in Los Angeles County (San Gabriel Valley Council of Governments, 2018).

### 4.2.15 Gateway Watershed Management Program

The Gateway Watershed Management Authority is a coalition of 25 cities and government entities that manage regional water planning needs for the Gateway Cities region. The Gateway Watershed Management Authority developed an integrated regional water management plan in 2013. Although the plan primarily focuses on needs for cities in this region, it includes a few unincorporated County areas. Recommendations developed for this plan include coordinating regional water management efforts, continued maintenance of projects and grant opportunities, addressing MS4 permit watershed monitoring and reporting, and developing a funding and finance plan to implement projects (Gateway Management Authority, 2013).

### 4.2.16 Los Angeles River Master Plan and Corridor Highlights

The Los Angeles River is 51 miles long, and its watershed covers 834 square miles. It extends from the Santa Monica Mountains to the Simi Hills in the east and from the Santa Susana Mountains to the San Gabriel Mountains in the west. The Los Angeles River flows eastward from its headwaters in the mountains to the northern corner of Griffith Park, where the channel turns southward through the Glendale Narrows before it flows across the coastal plain and into San Pedro Bay near Long Beach. The river is a valuable resource for the County, as well as a major source of flooding.

The County developed the Los Angeles River Master Plan in 1996 to seek ways to utilize the natural assets of the Los Angeles basin for economic, recreational, and environmental benefits while maintaining the waterway as a flood protection resource. The plan highlights water conservation as a major concern, noting that 30 to 40 percent of the County's water supply comes from local sources. It also recommends multi-use and multi-benefit projects, which not only strengthen flood control measures but also educate residents, create environmental habitats, or increase recreational opportunities (Los Angeles County Public Works, 1996).

In 2005, the County released the Master Plan and Corridor Highlights document, which provides information about Master Plan projects implemented since the Master Plan's adoption and those planned for future construction. Many of the projects are structural but highlights also include natural resource preservation and education and outreach projects. Where sufficient data was available, the report documents specific benefits as well as implementation and location information (Los Angeles County Public Works, 2019). Los Angeles County is currently updating the 1996 Los Angeles River Master Plan.

## 4.2.17 Los Angeles County Annual Hydrologic Reports

Los Angeles County releases an annual report containing hydrologic data relevant to the County; the most recent report covers 2017 through 2018. The report is organized into eight major sections providing background and statistics on the following areas (Los Angeles County Public Works, 2018):

- **Los Angeles County—**County's topography, geology, and land use
- **Runoff**—Mean daily and peak annual runoff flow rates for active stream gaging stations
- **Flood Control District**—Flood events summaries
- **Reservoirs**—Summary of annual inflow, outflow, and storage data for County dams and reservoirs
- **Precipitation**—Daily and annual rainfall data from County rain gage stations
- **Erosion control**—Debris basin design data, production summary, and production history
- **Evaporation**—Data for the County's active evaporation stations
- **Water conservation**—Groundwater recharge facility data and historical well data

These reports are a resource for County personnel evaluating water management.

## 4.2.18 Los Angeles County Drainage Area

In 1915, the State Legislature created the Los Angeles County Flood Control District to control floods and conserve water. Early bond issues financed construction of 14 dams in the San Gabriel Mountains as well as flood channel modifications. District funding financed construction of debris basins to trap sediment. The federal Emergency Relief Appropriations Act of 1935 financed the construction of Eaton Wash Dam. The federal Flood Control Act of 1936 made the Army Corps of Engineers a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities. The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the Los Angeles County Drainage Area (LACDA) study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel and Ballona Creek. Flood control facilities in the LACDA system fall into four general categories: debris basins, flood control reservoirs, improved tributary channels, and improved main channels. In total, the system has over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 15 flood control and stormwater capture dams, and five flood control dams.

## 4.2.19 Trash Best Management Practices

The 2004 *Technical Report of Trash Best Management Practices* identifies necessary measures to meet trash total maximum daily load goals for the Los Angeles River and Ballona Creek. Recommendations include trash and runoff source-control best management practices as the top preference. Also recommended are structural projects for high-trash generation areas, such as drain system retrofits, channel-cleaning contracts, and replacement of impervious surfaces (Los Angeles County Public Works, 2004). Keeping flood control facilities, including catch basins, free from trash and debris helps prevent localized street flooding.

## 4.2.20 Los Angeles County Response to ADA

The Los Angeles County Operational Area Emergency Response Plan Access and Functional Needs Annex defines "individuals with disabilities and access and functional needs" as populations whose members may have additional needs before, during and after an incident in functional areas including but not limited to the following:

- Maintaining independence
- Communication

- Transportation
- Supervision
- Medical care.

These populations may include any of the following:

- Individuals with mobility and transportation impairments
- Individuals with vision, hearing and dual sensory impairment
- Individuals with health, behavioral and mental health needs
- Individuals with intellectual and developmental disabilities
- Individuals who live in institutionalized settings
- Seniors and children
- Culturally diverse populations
- Individuals with limited English proficiency or non-English speakers
- Individuals with socio-economic barriers, including the homeless population.

### Reasonable Accommodations Ordinance

The ordinance, which was adopted by the Board of Supervisors on November 28, 2011, creates an administrative procedure for persons with disabilities to request reasonable accommodation from land use and zoning standards or procedures, when those standards or procedures are a barrier to equal housing access, pursuant to state and federal Fair Housing laws. The ordinance applies to all the unincorporated areas of Los Angeles County.

### Plan Action Implementation

The ADA protocol will be applied when implementing any actions in this plan that could impact individuals with disabilities and access and functional needs. This will involve measures such as review by the Los Angeles County Inclusive Emergency Management Advisory Committee or whatever protocol has been established by the County at the time of project implementation.

## 4.2.21 Los Angeles County Repetitive Loss Area Analysis 2020

Los Angeles County prepared and adopted a repetitive loss areas analysis pursuant to Section 512.B of the *CRS Coordinators Manual* as part of the 2015 floodplain management planning effort. This document was developed as a companion document to the County's Floodplain Management Plan. A repetitive loss area analysis is a detailed mitigation plan for a repetitive loss area. It provides more specific guidance on how to reduce damage from repetitive flooding than a community-wide floodplain management or hazard mitigation plan. Before beginning the repetitive loss areas analysis process, the community must review its repetitive loss list to determine if any properties have been mitigated or incorrectly assigned to the community.

As part of this 2020 update to the Los Angeles County Floodplain Management, the repetitive loss areas analysis was reviewed and fully updated pursuant to CRS requirements and has been fully integrated into this plan as a functional appendix. The two plans were updated through one process and both plans' implementation and maintenance are merged for oversight by Los Angeles County Public Works.

## 4.3 CAPABILITY ASSESSMENT

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out.

Table 4-3 summarizes the legal and regulatory capability of Los Angeles County. This table describes the legal authorities available to the county and/or enabling legislation at the state level affecting planning and land management tools that can support floodplain management action items. Each of these capabilities represents an ongoing program that supports Los Angeles County's commitment to floodplain resilience. Any gap in capability identified in this table should be considered as an action by the County in the action plan component of this plan. The table identifies the following information for each program:

- **Local Authority**: Does the County have the authority to implement the identified capability through policy or formal adoption?
- **State of Federal Prohibitions**: Are there are any regulations that may impact the implementation of an identified capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)?
- **Other Regulatory Authority**: Are there are any regulations that may impact the implementation of a capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)? This can also be referred to as delegated authority.
- **State Mandated**—Do state laws or other requirements enable or require the listed item to be implemented at the local level?

**Table 4-3.** Los Angeles County Legal and Regulatory Capability

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Codes, Ordinances & Requirements** | | | | |
| **Building Code** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 26 – Building Code | | | | |
| **Zoning Code** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 22 – Planning and Zoning | | | | |
| **Subdivisions** | Yes | Yes | No | No |
| *Comment:* County of Los Angeles County Code, Title 21 – Subdivision Code. The California State Subdivision Map Act sets out how long a map approval can be valid, and the County cannot grant time longer than that. | | | | |
| **Post-Disaster Recovery** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code, Title 2 – Administration, Division 3 – Departments and Other Administrative Bodies, Chapter 2.68 – Emergency Services, Part 6 – Director of Recovery Operations | | | | |
| **Flood Damage Prevention Ordinance** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code:<br>Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites<br>Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations<br>Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard<br>Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation<br>Title 20, Division 5, Chapter 20.94 – Channels<br>Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control | | | | |
| **Low-Impact Development Standards** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.84 Low Impact Development Standards | | | | |

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Real Estate Disclosure** | Yes | No | No | Yes |
| *Comment:* State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1103.2) | | | | |
| **Growth Management** | No | No | Yes | Yes |
| *Comment:* County of Los Angeles County Code, Title 22 – Planning and Zoning, Chapter 22.46 – Specific Plans. Specific Plans are available for Santa Catalina Island, Marina Del Rey, Universal Studios, and East Los Angeles Third Street. | | | | |
| **Site Plan Review** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code, Title 22 and Title 26 – Building Code, Chapter 1 – Administration, Inspections. | | | | |
| **Special Purpose (flood management, critical areas)** | — | — | — | — |
| *Comment:* County of Los Angeles County Code, Title 11 – Health and Safety, Division 2 – General Hazards, Chapter 11.52 – Water Hazards.<br>County of Los Angeles County Code, Title 11 – Health and Safety, Division 3 – Miscellaneous Regulations, Chapter 11.60 – Floodways and Water Surface Elevations.<br>County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.80 – Stormwater and Runoff Pollution Control<br>County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.20 – Depositing Petroleum Products on Beaches or into Pacific Ocean<br>County of Los Angeles County Code, Title 20 – Utilities, Division 5 – Flood Control District Property and Facilities<br>County of Los Angeles County Code, Title 31 – County Green Building Standards Code<br>County of Los Angeles County Code, Flood Control District Code, Chapter 21 – Stormwater and Runoff Pollution Control | | | | |
| **Planning Documents** | | | | |
| **General Plan** | Yes | No | No | Yes |
| *Comment:* The *Los Angeles County 2035 General Plan,* adopted by the Los Angeles County Board of Supervisors on October 6, 2015, provides a policy framework for how and where the unincorporated County will grow through 2035. Comprising 2,650 square miles, unincorporated Los Angeles County is home to over one million people. The General Plan accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the region. | | | | |
| **Capital Improvement Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Public Works develops and implements capital projects, and manages projects implemented by consultants. The 2035 General Plan Implementation Program identifies a goal project of Public Works and the Department of Regional Planning jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas. Some current community plans have capital improvements listed, but level of detail varies based on community and plan age. | | | | |
| **Economic Development Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Strategic Plan for Economic Development, 2016<br>2035 General Plan, Chapter 14 – Economic Development Element. Available online | | | | |
| **Floodplain or Basin Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Floodplain Management Plan, 2015. Available online. | | | | |
| **Stormwater Plan** | Yes | No | Yes | Yes |
| *Comment:* Low Impact Development Standards Manual, February 2014 | | | | |
| **Watershed Management Plan** | Yes | No | Yes | No |
| *Comment:* Enhanced Watershed Management Programs in progress and to be submitted for approval to the Los Angeles Regional Water Quality Control Board by June 28, 2015. These plans will include the County's five watersheds: Ballona Creek, Dominguez Channel, Marina Del Ray, Santa Monica Bay, and Upper Los Angeles River. All available online.<br>Other unincorporated community watershed management plans: Topanga Creek, Upper Santa Clara River, Rio Hondo and Gateway Cities Region | | | | |
| **Habitat Conservation Plan** | Yes | No | Yes | No |
| *Comment:* 2035 General Plan, Chapter 9 – Conservation and Natural Resources Element, Significant Ecological Areas. Available online. The General Plan has policies related to habitat and resource conservation, but the Conservation and Natural resources Element is not the equivalent of a habitat conservation plan. Other regulatory authority lies with the California Department of Fish & Wildlife or the U.S. Fish & Wildlife Service, depending upon the species. | | | | |

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Shoreline Management Plan** | Yes | No | No | Yes |
| *Comment:* Los Angeles County Stormwater Monitoring Reports, Section 1.1.1.4 – Shoreline Monitoring (released annually and with most recent report of 2014-2015)<br>Local Coastal Programs (LCP)<br>• Santa Monica Mountains LCP, adopted on August 26, 2014, and certified on October 10, 2014<br>• Marina Del Rey LCP, adopted in 1996, and amended and certified in 2012<br>• Santa Catalina Island LCP, adopted on March 15, 1983, and certified on November 17, 1983<br>All available online | | | | |
| **Emergency Response Plan** | Yes | No | No | Yes |
| *Comment:* Los Angeles County Operational Area Emergency Response Plan (ERP), 2012. Available online | | | | |
| **Post-Disaster Recovery Plan** | Yes | No | No | No |
| *Comment:* Recovery Annex to the Emergency Response Plan<br>Emergency Response Plan, Section 2.7: Recovery Considerations also reviews County Recovery Procedures | | | | |
| **Sediment Management Plan** | Yes | No | No | No |
| *Comment:* Sediment Management Strategic Plan, 2012-2032. Available online | | | | |
| **Continuity of Operations Plan** | Yes | No | No | Yes |
| *Comment:* All Los Angeles County departments and/or divisions must develop, exercise, and maintain plans for business continuity functions and processing resources. Each department and/or division must develop a plan for its business operations that can sufficiently support the service requirements of other operations and functions involved in the incident. Plans must address the full range of resources including data processing, data communications links, personnel, personal computers, terminals, workspace, voice communication, and documents.<br>Additionally, Chapter 3 of the Emergency Response Plan includes Continuity of Government information. | | | | |
| **Water Resource Management Plan** | Yes | No | Yes | Yes |
| *Comment:* Greater Los Angeles County Region Integrated Regional Water Management Plan, 2013,<br>Antelope Valley Integrated Regional Water Management Plan, 2013,<br>Upper Santa Clara River Watershed Integrated Regional Water Management Plan, 2014 | | | | |
| **Best Management Practices** | — | — | — | — |
| *Comment:* Technical Report of Trash Best Management Practices, 2004<br>These best management practices were identified and evaluated to provide effective alternatives to meet the goals of the trash total maximum daily load for Los Angeles River and Ballona Creek. | | | | |

Table 4-4 summarizes the administrative and technical capability of Los Angeles County. This table inventories the staff resources available to Los Angeles County to help with flood hazard mitigation planning and the implementation of specific mitigation actions.

Table 4-5 summarizes fiscal capabilities of Los Angeles County. It identifies what financial resources (other than grants) are available to the County to support the implementation of floodplain management actions.

Table 4-6 summarizes community-based classification programs that rate facets of a community's floodplain management capability. The Community Rating System is described in Section 1.4 and Appendix A. The Building Code Effectiveness Grading Schedule assesses the building codes in effect in a community and how the community enforces them, with emphasis on mitigation of losses from natural hazards. The National Oceanic and Atmospheric Administration administers the StormReady and TsunamiReady programs. StormReady helps arm communities with communication and safety skills needed to save lives and property before, during and after an event. It helps community leaders and emergency managers strengthen local safety programs.

**Table 4-4.** Administrative and Technical Capability

| Staff/Personnel Resources | Available? | Department/Agency/Position |
|---|---|---|
| **Planners or engineers with knowledge of land development and land management practices** | Yes | Los Angeles County Public Works (Public Works) Land Development Division; Los Angeles County Department of Regional Planning |
| **Engineers or professionals trained in building or infrastructure construction practices** | Yes | Public Works Geotechnical and Materials Engineering Division; Public Works Building and Safety Division |
| **Planners or engineers with an understanding of flooding hazards** | Yes | Public Works Geotechnical and Materials Engineering Division; Public Works Stormwater Engineering Division and associated subdivisions |
| **Staff with training in benefit/cost analysis** | Yes | Public Works multiple divisions, including the Stormwater Planning Division |
| **Floodplain manager** | Yes | Public Works Stormwater Engineering Division |
| **Surveyors** | Yes | Public Works Survey/Mapping and Property Management (Land Records) Division |
| **Personnel skilled or trained in GIS applications** | Yes | Public Works Survey/Mapping and Property Management (Land Records) Division; Public Works Stormwater Engineering Division; and Public Works GIS Managers |
| **Scientists familiar with flooding hazards in local area** | Yes | Public Works Stormwater Engineering Division and associated subdivisions |
| **Emergency manager** | Yes | Public Works Disaster Services Group; Los Angeles County Office of Emergency Management |
| **Grant writers** | Yes | Public Works Stormwater Planning Division, Stormwater Engineering Division, and Transportation Planning and Programs Division; Los Angeles County Office of Emergency Management |

**Table 4-5.** Fiscal Capability

| Financial Resources | Accessible or Eligible to Use? |
|---|---|
| **Community Development Block Grants** | Yes |
| **Capital Improvements Project Funding (Flood Control District)** | Yes |
| **Authority to Levy Taxes for Specific Purposes** | Yes |
| **Incur Debt through General Obligation Bonds** | Yes |
| **Incur Debt through Special Tax Bonds** | Yes |
| **State Sponsored Grant Programs** | Yes |
| **Development Impact Fees for Homebuyers or Developers** | Yes |

**Table 4-6.** Community Classifications

| | Participating? | Classification | Date Classified |
|---|---|---|---|
| **Community Rating System** | Yes | 7 | / 11/05/2015 |
| **Building Code Effectiveness Grading Schedule** | Yes | 2/2 | 2015 |
| **StormReady** | No | N/A | N/A |
| **TsunamiReady** | No | N/A | N/A |

Table 4-7 summarizes the County's participation in national flood-related programs. These programs rank the County's capabilities to implement flood hazard reduction programs such as building code enforcement and flood warning and response activities.

**Table 4-7.** National Flood Insurance Program Compliance

| | |
|---|---|
| **What department is responsible for floodplain management in your community?** | Los Angeles County Public Works Stormwater Engineering Division |
| **Who is your community's floodplain administrator?** | Los Angeles County Public Works Stormwater Engineering Division |
| **Do you have any certified floodplain managers on staff in your community?** | No |
| **What is the date of adoption of your flood damage prevention ordinance?** | County of Los Angeles County Code:<br>• Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites, last amended by ordinance 2013-0048 § 2, effective 2013<br>• Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations, last amended by ordinance 2016-0062 § 2, effective 2016<br>• Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard, last amended by ordinance 11665 § 38, effective 1978<br>• Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation, last amended by ordinance 11665 § 39, effective 1978<br>• Title 20, Division 5, Chapter 20.94 – Channels, last amended by ordinance 86-0032 § 1, effective 1986; Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control, last amended by ordinance 1494 Ch. 7 Art. 5 § 705.1, effective 1927 |
| **When was the most recent Community Assistance Visit or Community Assistance Contact?** | Last Community Assistance Visit: December 19, 2019<br>Community Assistance Visit Report: Pending<br>Community Assistance Visit Closed: Pending<br>Issues: None |
| **To the best of your knowledge, does your community have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.** | No issues that would render Los Angeles County out of full compliance with the provisions of the NFIP were identified during the last Community Assistance Visit. |
| **Do your flood hazard maps adequately address the flood risk within your community?** | Flood hazard mapping has been identified as an issue that needs to be addressed by this planning process. See Section 6.14 lists mapping issues, which are addressed by Mitigation Action #33 (Chapter 11). |
| **Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?** | Los Angeles County Public Works Stormwater Engineering Division staff actively participate in programs of the Floodplain Management Association as well as other trainings offered by the state and FEMA where feasible. County staff welcomes opportunities for training on floodplain management programs and principles. |
| **Does your community participate in the CRS? If so, is your community seeking to improve its CRS Classification? If not, is your community interested in joining the CRS program?** | Los Angeles County has participated in the CRS since 10/1/1991 and is currently rated a CRS Class 7 |

# PART 2—RISK ASSESSMENT

# 5. RISK ASSESSMENT METHODOLOGY

## 5.1 PURPOSE OF RISK ASSESSMENT

This part of the floodplain management plan evaluates the risk of the flood hazard (CRS Step 5) in the planning area (the unincorporated areas of Los Angeles County). Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards such as flooding. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Exposure identification—Determine the extent of people, property, environment and economy exposed to the effects of the natural hazard.
- Vulnerability evaluation—Estimate potential damage from the natural hazard and associated costs.

The risk assessment describes the flooding hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk:

- Identify and profile the flooding hazard (CRS Step 4); the following information is given:
  - Principal sources of flooding in the planning area
  - Major past flood events
  - Geographic areas most affected by floods
  - Estimated flood event frequency
  - Estimates of flood severity
  - Warning time likely to be available for response
  - Existing flood protection programs and projects
  - Secondary hazards associated with the flood hazard
  - Potential impacts of climate change on flooding
  - Expected future trends that could affect the flood hazard
  - Scenario of potential worst-case flood event
  - Key issues related to floodplain management in the planning area.

- Determine exposure to the flood hazard—Exposure was determined by overlaying flood maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to flood events.
- Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each flood event and assessing structures, facilities, and systems that are exposed.
- Evaluate repetitive loss properties—The County prepared a separate Repetitive Loss Area Analysis in accordance with Section 512.b of the 2013 CRS Coordinators Manual. This document is provided as a functional appendix to this Comprehensive Floodplain Management Plan.

## 5.2 RISK ASSESSMENT APPROACH

### 5.2.1 FEMA's Hazus Software

In 1997, FEMA developed the Hazards U.S. model (Hazus) to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes and floods. The use of Hazus for flood hazard mitigation planning offers numerous advantages:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates FEMA review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a floodplain management plan throughout its implementation.

Hazus is a GIS-based software program that includes extensive inventory data, such as demographics, building stock, critical facilities, transportation facilities and utilities. It uses multiple models to estimate potential losses from natural disasters. The program maps hazard areas and estimates damage and economic losses for buildings and infrastructure.

To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data and known property replacement cost values, users can generate dollar-value estimates of damage that will result from any given flood event.

Hazus provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information:

- Level 1—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the modeled area.
- Level 2—More accurate estimates of losses require more detailed information about the modeled area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- Level 3—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the modeled area. Level 3 involves establishing new damage curves, which is not necessary for flood hazard analyses, because those damage functions are well established

To assess the flood hazard for this plan, a Level 2, user-defined analysis was performed for both general building stock and critical facilities. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. The Hazus default data was enhanced using local GIS data from local, state and federal sources.

## 5.2.2 Sources of Data Used in Hazus Modeling

Replacement cost values and detailed structure information derived from parcel and tax assessor data provided by Los Angeles County were loaded into Hazus. An updated inventory was used in place of the Hazus defaults for essential facilities, transportation and utilities in the floodplain.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in *RS Means Square Foot Costs* (RS Means, 2019). It is calculated using the RS Means square foot cost for a structure (based on its Hazus occupancy class; i.e., multi-family residential or commercial retail trade) multiplied by the square footage of the structure from the tax assessor data. The construction class and number of stories for single-family residential structures also factor into determining the square foot costs.

The effective Digital Flood Insurance Rate Map for Los Angeles County was used to delineate flood hazard areas and estimate potential losses from the 10-, 50-, 100- and 500-year floods. Floodway data from Los Angeles County Public Works was also used. Using the digital floodplain boundaries and the County's 3-foot digital elevation model data, flood depth grids were generated and integrated into the Hazus model.

Table 5-1 provides Hazus model data documentation for this project.

**Table 5-1.** Hazus Model Data Documentation

| Data | Source | Date | Format |
|---|---|---|---|
| **Property parcel data** | Los Angeles County Assessor | 2019 | Digital (GIS) format |
| **Building information such as use code, year built, square footage, and number of stories** | Los Angeles County Assessor | 2019 | Digital (tabular) format |
| **Building replacement cost** | RS Means | 2019 | Paper format. Updated RS Means values imported into Hazus |
| **Countywide building outlines** | Los Angeles County GIS Data Portal | 2014 | Digital (GIS) format |
| **Population data** | U.S. Census Bureau | 2010 | Digital (GIS and tabular) format |
| **Digital Flood Insurance Rate Map—Countywide study effective 12/21/2018; latest revision effective 6/13/2019** | FEMA | 2019 | Digital (GIS) format |
| **County Floodway** | Los Angeles County Public Works | 2019 | Digital (GIS) format |
| **Digital elevation model (DEM), 3-foot horizontal resolution** | Los Angeles County | 2018 | Digital (GIS) format |
| **Location Management System facilities data** | Los Angeles County GIS Data Portal | 2016 | Digital (GIS) format |
| **Facility Registry Service - Toxic Release Inventory facilities** | U.S. Environmental Protection Agency website | 2019 | Digital (GIS) format |

## 5.2.3 Flood Depth Grid Generation

An important input to Hazus for modeling flood damage is a flood depth grid, which defines the depth of floodwater at points covering the flooded area for any given flood event. For this plan, depth grids were prepared for multiple FEMA-mapped flood scenarios (10-, 50-, 100- and 500-year flood events) where mapping and detailed flood studies were available. The following methods were used to create the flood depth grid, depending on the floodplain mapping data available (see Section 6.3.1 for a description of the flood zones mentioned here):

- **HEC-GeoRAS**—The most detailed flood depth grids were generated in a model called HEC-GeoRAS. This modeling effort was typically used for FEMA-mapped "A" flood zones with discharge data available, and for misaligned or inaccurate "AE" flood zones (100-year flood zones determined by detailed methods) where discharge data was available from FEMA's Flood Insurance Study. Flood flow

paths and cross sections modeled in HEC-GeoRAS were exported to the HEC-RAS hydraulic software, which calculated water surface elevations relative to the ground surface. These water surfaces were exported back into HEC-GeoRAS and intersected with the existing ground to calculate flood depth grids. This technique was the most accurate of those available for the mapping effort.

- **Base Flood Elevation Reconstruction**—This technique used datasets that included floodway or floodplain elevations for the base flood (the 100-year flood), representing the detailed analysis used to generate effective FIRM maps. These could be FEMA AE flood zones or zones mapped by local districts (in this case, the County's floodway data). GIS tools were used to create a water surface based on the water surface value given for a specific base flood. This water surface was intersected with the existing ground surface to create output flood depth grids.
- **Flood Zone Direct Calculation**—This technique was used for flood zone datasets that provided only a water depth or water surface elevation. This includes AO, AH, VE, and similar FEMA flood map zones. If a depth was given for one of these zones, a depth grid was created directly out of that zone boundary. If a static water surface elevation was given, a water surface grid was created out of that zone and intersected with the ground surface to create flood depth grids.
- **Flood Zone Interpolation**—This technique was used for many unnumbered "A" flood zones with no additional data that could be used to perform flood zone direct calculation. Zone boundaries were intersected with the ground surface, with the assumption that the elevation along that boundary marked the water surface elevation edge. The boundary was interpolated to 3D and was converted to a water surface grid. This grid was then intersected with the ground surface within the boundary to create flood depth grids.
- **Unnumbered A Zones**—A discrepancy was identified in FEMA flood mapping of many Unnumbered A Zones (see flood zone interpolation above). The contour interpolation methodology recommended by FEMA for creating depth-grids (Publication #265) generated abnormally high flood depths in many of these zones, particularly outside of canyons, in wide floodplains associated with desert washes or in 500-year floodplains. It was determined that this was due to two factors: spatial alignment errors on FEMA mapping, and resolution differences between the water surface projection and the digital elevation model. These errors have been identified as an issue to be addressed by this plan. The results were often unacceptable. An alternative methodology was added for these Unnumbered A Zones. Because the minimum regulatory standard for new development in Unnumbered A Zones is at least 2 feet above highest adjacent grade (44 CFR Section 60.3), a 2-foot depth grid was assumed for these Unnumbered "A" Zones and 500-year "X" Zones. This may underestimate flood risk in some cases and overestimate it in others. However, this approach generates more credible results on average than the original methodology attempted for these zones. The regulatory basis for this approach further justifies its use.

## 5.2.4 Mapping

Maps of flood hazard areas are included in this plan as a general indication of unincorporated Los Angeles County areas exposed to the flood hazard. Mapping in this plan does not provide enough accuracy to assess the flood hazard risk to individual properties, but such detailed mapping has been developed and is maintained by Los Angeles County. FEMA flood zone and County floodway information can be accessed by property at https://pw.lacounty.gov/floodzone/.

## 5.2.5 Limitations

Loss estimates, exposure assessments and vulnerability evaluations rely on the best available data and methodologies. However, results are subject to uncertainties associated with the following factors:

- Incomplete scientific knowledge about flood hazards and their effects on the built environment
- Approximations and simplifications necessary to conduct a study

- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent and severity of the flood hazard
- Mitigation actions already employed
- The amount of advance notice residents have to prepare for a flood event

FEMA adheres to a protocol for map revision. Understanding that floodplains are dynamic and constantly changing, FEMA attempts to keep its maps current by adhering to this protocol. Los Angeles County floodway maps also are subject to revision as new information becomes available. It should be understood that at any point in time a current map may not reflect current conditions.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. The results do not predict precise results and should be used only to understand relative risk.

Results are particularly imprecise for modeling that used the flood zone interpolation technique. That technique assumed that FEMA flood boundaries for the affected zones are accurate, but subsequent assessments found that floodwater surface elevations at some boundaries are unrealistically high. The flood damage estimated using those elevations is therefore likely much greater than would actually occur.

# 6. Los Angeles County Flood Hazard Profile

## 6.1 GENERAL CONCEPTS

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon. When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain accumulations of sand, gravel, loam, silt, and/or clay extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. The water in such aquifers is thus filtered compared to the water in the stream.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

### 6.1.1 Measuring Floods and Floodplains

Flooding is measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge (sometimes called the base flood) has a 1-percent chance of being equaled or exceeded in any given year. The "annual flood" is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The 100-year flood has a 26 percent chance of occurring during the term of a 30-year mortgage. The 500-year flood has a 6 percent chance of occurring during that time. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with the 100-year flood is often used as a regulatory boundary. Also referred to as the special flood hazard area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the 100-year flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

### 6.1.2 Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

### 6.1.3 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in biological quantity and diversity. Wetting of the floodplain soil releases a surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders—particularly birds—move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains particularly valuable for agriculture.

Riparian zone species have significant differences from those that grow outside of floodplains. For instance, riparian trees tend to be very tolerant of root disturbance and tend to be very quick-growing compared to non-riparian trees.

## 6.2 WATERSHEDS

Of the 10 HUC-8 watersheds partly or completely within Los Angeles County (see Section 3.2.3) only five include significant area within the County (see Figure 3-3). Four of these drain to the ocean and the fifth drains to dry lakes in the desert. The following watershed descriptions are excerpts from the Los Angeles County Public Works January 2006 Hydrology Manual. The descriptions use the watershed names from the Hydrology Manual which differ slightly from the NRCS HUC-8 naming as indicated

### 6.2.1 Los Angeles River

#### Watershed Description

The Los Angeles River Watershed covers over 830 square miles. It includes the western portion of the San Gabriel Mountains, the San Rafael Hills, the Verdugo Hills, the Santa Susana Mountains, and the northern slope of the Santa Monica Mountains. The river flows from the headwaters in the western San Fernando Valley to San Pedro Bay near Long Beach. It crosses the San Fernando Valley and the central portion of the Los Angeles Basin. The watershed terrain consists of mountains, foothills, valleys, and the coastal plain.

The major tributaries of the Los Angeles River are Bell Creek, Chatsworth Creek, Calabasas Creek, Browns Creek, Aliso Creek, Caballero Creek, Bull Creek, Pacoima Wash, Tujunga Wash, Burbank Western Channel, and Verdugo Wash in the San Fernando Valley; and Arroyo Seco, Compton Creek, and Rio Hondo in the Los Angeles Basin.

Prior to development, the Los Angeles River system was typical of other streams in the southwest. Its channel was broad and often shifted location within the floodplain due to high sediment loads. The stream location within the coastal plain has varied greatly over the years. During a large flood in 1815, the river changed course completely. Breaking its banks in what is now downtown Los Angeles, the river followed the course of Ballona Creek. In 1825, another large flood changed the river's course from west to south toward Wilmington and the ocean (Guinn, 1890). Other major flood events occurred in 1938, 1969, 1978, 1983, 1998, and 2005.

The Los Angeles River watershed has a diverse land use pattern. The upper portions of the watershed are covered by Angeles National Forest and other rural areas. The remainder of the watershed is highly developed. The watershed has large areas of commercial, residential, and industrial development. Few parks or natural areas exist in the watershed of the river reaches below the Arroyo Seco confluence.

The parts of the San Gabriel Mountains tributary to the Los Angeles River contain some of the most prolific sediment-producing streams in the world. Intense rainfall, coupled with highly erodible sediment, produces damaging debris discharges.

## Flood Control Measures

The Los Angeles River and many of its tributaries have been the subject of extensive engineering work to reduce flooding impacts.

### *Dams*

Numerous dams were constructed in the early 20th century, as development began to take place on this wide floodplain:

- In the 1920s and 1930s, the Los Angeles County Flood Control District constructed three major dams in the upper Los Angeles River watershed (Big Tujunga, Devils Gate, and Pacoima Dams), and three dams in the Rio Hondo watershed (Santa Anita, Sawpit and Sierra Madre Dams).
- The U.S. Army Corps of Engineers built another dam (Eaton Wash Dam) in the Rio Hondo watershed in the mid-1930s, and transferred the facility to the District.
- The Corps constructed Hansen and Sepulveda Dams in the late 1930s/early 1940s. The Corps still operates and maintain these dams for flood control.

### *Channel Paving, Storm Drain Systems, and Debris Control*

The concrete sections of the Los Angeles River were constructed by the Corps between the late 1930s and the 1950s. Some reaches are maintained by the Corps; others are maintained by the District. Channel improvements and extensive watershed development decrease times of concentration and increase runoff flow rates and volumes. Much of the river's tributary network has been lined with concrete for flood control.

The watershed also contains major storm drain systems consisting of concrete pipes and box channels. The flood control system has prevented significant damage from large flood events.

Numerous debris basins have been constructed along the foothills of the San Gabriel Mountains to de-bulk the debris-laden flows before they continue through the neighborhoods below. Crib dams have also been constructed in the mountains and foothills to stabilize streams and lessen erosion.

### *Spreading Grounds*

There are several spreading ground facilities in the San Fernando Valley. The Flood Control District established the Pacoima and Hansen Spreading Grounds in the 1930s and 1940s, followed by Lopez and Branford Spreading Grounds in the 1950s. The Tujunga Spreading Grounds, established by the City of Los Angeles Department of Water and Power in the 1960s, is owned by the City and operated by Los Angeles County Public Works. These facilities take stormwater runoff, floodwaters released from upstream dams, and imported water diverted from Pacoima Wash and Tujunga Wash and infiltrate the water into the valley's aquifers.

There are also several spreading grounds in the Rio Hondo watershed. The Flood Control District established the Eaton Wash, Eaton Basin, Peck Road Basin Santa Anita, and Sawpit Spreading Grounds from the late 1940s through the 1950s. These facilities take from their adjacent flood control channels storm runoff and floodwaters released from upstream dams and infiltrate the water into the aquifers of the western San Gabriel Valley.

The Dominguez Gap Spreading Grounds, established by the Flood Control District in the late 1950s, is the only groundwater recharge facility in the lower Los Angeles River watershed. The eastern half of the facility was converted into a wetlands in the early 2000s. The facility takes in primarily dry weather flows and stormwater runoff for infiltration into the aquifer in the central coastal plain.

## 6.2.2 San Gabriel River

### Watershed Description

The San Gabriel River Watershed drains 640 square miles in the eastern portion of the county. The river drains the San Gabriel Mountains to the north. Below the San Gabriel Valley, the watershed is bounded by the watersheds of the Los Angeles River and Santa Ana River. The river outlets to the Pacific Ocean between Long Beach and Seal Beach after passing through the Alamitos Bay estuary. Tributaries to the San Gabriel River include the North, East and West Forks in the Angeles National Forest, Beatty Canyon, Walnut Creek, San Jose Creek, and Coyote Creek.

The upper portions of the watershed are almost entirely within the Angeles National Forest and are nearly untouched by development. The mountains in this area are extremely rugged, with steep V-shaped canyons. The vegetation is dominated by chaparral and coastal sage scrub with patches of oak woodlands. Conifers are dominant at higher elevations. The streambeds in the area contain sycamore and alder woodlands.

The lower part of the watershed, below the mouth of the San Gabriel Canyon, is mostly developed, with commercial, residential and industrial uses. The developed area in the San Gabriel Valley and Los Angeles Basin makes up 26 percent of the total watershed area.

Similar to the Los Angeles River, the San Gabriel River once occupied a wide floodplain and shifted course to accommodate large flows and sediment loads. Development of the floodplain changed the character of the river dramatically since periodic inundation of the floodplain was not compatible with the new land uses. Major flood events occurred in 1938, 1969, 1978, 1983, 1998, and 2005.

### Flood Control Measures

Several major dams and debris basins impound floodwaters and de-bulk debris flows originating in the San Gabriel Mountains:

- In the 1920s and 1930s, the Los Angeles County Flood Control District constructed the Cogswell Dam, San Gabriel Dam, Big Dalton Dam, San Dimas Dam, Puddingstone Diversion Dam, Live Oak Dam, and Thompson Creek Dam.
- In the 1940s and 1950s, the U.S. Army Corps of Engineers constructed Santa Fe Dam and Whittier Narrows Dam in the floor of the San Gabriel Valley. The Corps operates the facilities for flood control. Whittier Narrows Dam is also operated for stormwater capture.
- The City of Pasadena constructed Morris Dam in the 1930s as a water supply facility. The dam was quickly transferred to the Metropolitan Water District, which operated the dam until its transfer to the Flood Control District in 1995. The facility, located below Cogswell and San Gabriel Dams, is still operated primarily for stormwater capture.

From the late 1940s through the 1960s, the Corps of Engineers channelized the San Gabriel River below Santa Fe Dam—from the mouth of San Gabriel Canyon to the ocean—to aid in flood prevention. The channel invert was left unlined for much of its length between the canyon mouth and Florence Avenue in Downey. The unlined bottom promotes infiltration into the aquifers of stormwater, floodwaters released from upstream dams, imported water and recycled water. Los Angeles County Public Works installed rubber dams to further utilize the river bottom for groundwater recharge.

The San Gabriel River watershed contains most of the County's spreading ground facilities. San Gabriel Canyon Spreading Grounds in Azusa was originally operated by the San Gabriel River Water Committee (starting in 1917), and transferred to the Flood Control District in the 1970s. From the 1930s through the 1960s, the District established 13 other spreading grounds in the foothills, along the San Gabriel River, and along the river's

tributaries on the floor of the eastern San Gabriel Valley. Storm runoff, dam releases, imported water and recycled water are diverted from the adjacent channels into the spreading facilities and allowed to recharge the aquifers of the eastern San Gabriel Valley and the central coastal plain.

The watershed also contains major storm drain systems consisting of concrete pipes and box channels. The overall flood control system has prevented significant damage from large flood events.

## 6.2.3 Santa Clara River

### Watershed Description

The Santa Clara River originates in the northern slopes of the San Gabriel Mountains at Pacifico Mountain and travels west into Ventura County, discharging into the Pacific Ocean near the City of Ventura. The river runs approximately 100 miles from its headwaters near Acton to the ocean, draining an area of approximately 1,600 square miles.

The upper portion of the river within the County of Los Angeles has a watershed area of 644 square miles. Ninety percent of this area is mountainous with steep canyons; the remaining 10 percent is alluvial valleys. Major tributaries in the County's portion of the Santa Clara River watershed include Aliso Canyon, Agua Dulce Canyon, Sand Canyon, Mint Canyon, Bouquet Canyon, San Francisquito Canyon, the South Fork of the Santa Clara River, Castaic Creek, Hasley Canyon, San Martinez Chiquito Canyon, and Potrero Canyon. The Santa Clara River and its tributaries are ephemeral streams characterized by alluvial soils. Discharge occurs quickly during rainfall events and diminishes quickly after rainfall has ceased. As in other watersheds in the County, the mountain and foothill areas are susceptible to debris-laden flows during intense rainfall, especially when the watershed is recovering from fire.

Much of the area is undeveloped, with a large portion in the Angeles and Los Padres National Forests. The watershed also has several parks (Vasquez Rocks Natural Area Park, Placerita Canyon State Park, Central Park, Santa Clarita Woodlands park) and lands acquired for the preservation of open space, including the Michael D. Antonovich Open Space Preserve. There are mixed-use developed areas in and near the City of Santa Clarita. The watershed is currently experiencing an accelerated rate of development in areas adjacent to the river and its major tributaries below the Angeles and Los Padres National Forests and outside the parks and open space preservation areas.

### Flood Control Measures

The Santa Clara River and most of its tributaries remain in a generally natural state, with some modification (levees and embankments) related to floodplain development. There are also debris basins and storm drain systems in the watershed related to development. The expected population increase will continue to produce floodplain encroachment, requiring additional bank protection and channel crossings; additional storm drains and debris management measures are also expected. Modern development standards, however, are expected to prevent impacts on the hydrologic characteristics and sediment balance in the river.

## 6.2.4 Coastal (HUC-8 Watershed Santa Monica Bay)

The Coastal Watershed consists of a number of individual watersheds that outlet into Santa Monica and San Pedro Bays. These watersheds range from undeveloped to highly urbanized and are grouped together due to their relatively small sizes. These include the following:

- The Malibu Creek Watershed covers 109 square miles at the western end of the County of Los Angeles and extends into Ventura County. Most of the watershed is undeveloped public land managed by the California Department of Parks and Recreation, the Mountains Recreation and Conservation Authority,

and the National Park Service. There is sporadic but increasing development throughout the area. The most extensive development is along U.S. Highway 101. The northern portion is hilly and the southern portion, near the ocean, is rugged mountain terrain. The major tributaries to Malibu Creek include Triunfo Canyon, Medea Creek, Las Virgenes Creek, and Cold Creek. Malibu Creek drains into the Pacific Ocean near the Malibu Civic Center.

- Topanga Creek drains 18 square miles in the central Santa Monica Mountains. The watershed is primarily rural with widely scattered residential and commercial development. There are undeveloped lands managed by the California Department of Parks and Recreation, the Mountains Recreation and Conservation Authority, and the National Park Service. The creek flows unobstructed along its course and empties into the Santa Monica Bay in an unincorporated portion of the County east of Malibu.
- Ballona Creek is a flood control channel that drains the western Los Angeles basin. The watershed area is bounded by the Santa Monica Mountains on the north and the Baldwin Hills on the south. It extends east nearly to downtown Los Angeles. The total watershed area is roughly 130 square miles. The area is primarily developed but includes undeveloped areas on the south slope of the Santa Monica Mountains. The land use is 64-percent residential, 8-percent commercial, 4-percent industrial, and 17-percent open space. The major tributaries to Ballona Creek are Centinela Creek, Sepulveda Canyon Channel and Benedict Canyon Channel. There are extensive County and local city storm drain systems and one County debris basin. The watershed drains into Santa Monica Bay at Marina del Rey.
- The Dominguez Watershed covers 133 square miles in the southern portion of the county. The watershed extends from near the Los Angeles International Airport to the Los Angeles Harbor. The area is almost completely developed, with regions of residential, commercial, and industrial land use. Storm drains and the flood control channel network define the watershed rather than natural drainage features.

Many other smaller watersheds in the Coastal Watershed drain developed and undeveloped areas directly to the Pacific Ocean.

### 6.2.5 Antelope Valley (HUC-8 Watershed Antelope-Fremont Valleys)

The Antelope Valley encompasses approximately 1,200 square miles in the northern portion of the County of Los Angeles. The valley is bounded on the north by the Tehachapi Mountains and on the south by the Sierra Pelona and the San Gabriel Mountains. Numerous streams from the mountains and foothills flow across the valley floor. The valley lacks defined drainage channels outside of the foothills and is subject to unpredictable drainage patterns.

Nearly all the surface water runoff from the Los Angeles County portion of the Antelope Valley accumulates on Rosamond Dry Lake near the county line in Kern County. A small portion is tributary to other dry lakes in the area. This 20-square-mile playa is dry during most of the year but is likely to be flooded during prolonged periods of winter precipitation and large summer thunderstorms. Surface runoff and discharges from groundwater remain on the dry lake until removed by infiltration and evaporation. Anecdotal evidence indicates that at times the playa may be underwater for up to five months at a time, as occurred during the winter of 1965-66.

The valley contains the developed areas of Lancaster and Palmdale. The remainder of the valley is sparsely developed. However, the valley is one of the most rapidly developing areas in the county. Rapid development is likely to continue for some time. This development will significantly alter the hydrologic characteristics of the basin.

## 6.3 FLOODING TYPES IN LOS ANGELES COUNTY

In southern California, most flooding is the result of heavy precipitation over periods of one or two days. The short streams and steep watersheds emptying onto lowlands that may be heavily populated produce large volumes

of water within short periods and damage is often severe. The problem is sometimes compounded by the denuding of large areas of watershed by fire during the previous season (WRCC, 2019). However, there is no single type of flood in Los Angeles County or single area most susceptible to the flood risk. Many types of flooding occur and many areas of the County are affected, for a range of reasons. The following sections describe the primary flood types and flood hazard areas in the County.

### 6.3.1 FEMA Special Flood Hazard Areas

Special flood hazard areas are defined in the December 21, 2008, Digital Flood Insurance Rate Maps for Los Angeles County, Letters of Map Revision issued by FEMA, and FIRMs resulting from FEMA's final Physical Map Revisions in 2018 and 2019. These areas include the following:

- **Areas of Shallow Flooding (Zone AH)—**Shallow flooding occurs in flat areas when there are depressions in the ground that collect ponds of water, areas of sloping land and areas of sheet flow where flood depths range from 1 to 3 feet.
- **Riverine Flooding (Zones A, AE, AR, A99)—**Flooding that occurs in a river (including tributaries), stream, or brook.
- **Regulated Floodways—**The regulated floodway consists of a stream channel plus the portion of the overbanks that must be kept free from encroachment in order to convey the 100-year (base flood) event without increasing base flood levels/elevations.
- **Alluvial Fan Flooding (Zone AO)—**An alluvial fan is a sedimentary deposit at a point where ground surface slope changes suddenly, such as the base of a mountain front, escarpment, or valley side. Sediments at these locations are deposited in the shape of a fan. Alluvial fan flooding occurs on the surface of these deposits and is characterized by uncertain flow paths.
- **Coastal Areas (Zones V, VE)—**SFHAs along coasts are subject to inundation by the 100-year flood with the additional hazards associated with storm waves. FEMA's *Coastal Construction Manual* (FEMA, 2011) designates hazard areas along coasts as follows:

  - The coastal high hazard area is Zone V (including Zones VE, V1-30, and V). This zone extends from offshore to the inland limit of a primary frontal dune along an open coast and includes any other area that is subject to high-velocity wave action from storms or seismic sources. The boundary of Zone V is generally based on wave heights (3 feet or greater) or wave run-up depths (3 feet or greater). Zone V can also be mapped based on the wave overtopping rate (when waves run up and over a dune or barrier).
  - Zone A or AE consists of portions of the SFHA that are not within the coastal high hazard area. These zones include both coastal and non-coastal SFHAs. Regulatory requirements of the NFIP for buildings in Zone A are the same for both coastal and riverine flooding hazards. Zone AE in coastal areas is divided by the limit of moderate wave action (LiMWA), which is the landward limit of a 1.5-foot wave (FEMA, 2011).
  - The area between the LiMWA and the Zone V limit is the Coastal A-Zone or the Moderate Wave Action Area. This area is subject to wave heights between 1.5 and 3 feet during the base flood. The area between the LiMWA and the landward limit of Zone A is the Minimal Wave Action Area, and is subject to wave heights less than 1.5 feet during the base flood.

Figure 6-1 shows coastal hazard zones and the effects of energy dissipation and regeneration of a wave as it moves inland. Wave elevations are decreased by obstructions such as vegetation and rising ground elevation (FEMA, 2011).

*Source: FEMA, 2011*

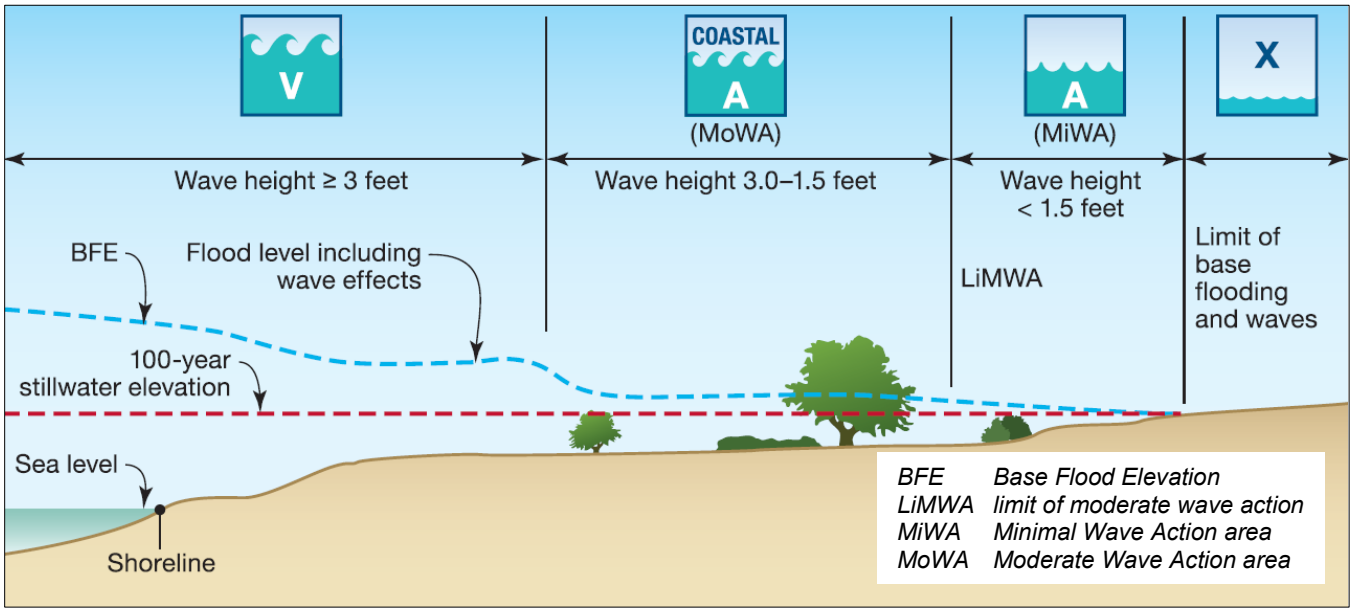



**Figure 6-1.** Coastal Hazard Zones

## 6.3.2 Flash Flooding

A flash flood is a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a defined flood level. Flash floods typically begin within six hours of the precipitation event that causes them (NWS, 2009). Flash flooding is characterized by a quick rise and fall of water level. Flash floods generally result from intense storms dropping large amounts of rain within a short period of time onto watersheds that cannot absorb or slow the flow. Natural terrain and vegetation help to reduce the potential for flash floods, but flash flooding can occur when vegetation is lost due to wildfires and the ground becomes impervious due to the fire's extreme heat. Such events usually include deposition of large amounts of sediment transported from the denatured hillsides. Flooding in Los Angeles County during large storm events is flashy, and the mountains and foothills of Los Angeles County are subject to wildfires.

## 6.3.3 Non-SFHA Urban Drainage Flooding

Local drainage issues and high groundwater levels can also lead to stormwater flooding. Many portions of Los Angeles County are subject to this type of flooding, making urban drainage and stormwater mitigation measures particularly important.

Heavy precipitation can produce local flooding in areas outside delineated floodplains or recognizable channels if local conditions cannot accommodate the precipitation through a combination of infiltration and surface runoff. Such flooding generally occurs in areas with flat gradients. Impervious areas associated with urbanization speed the accumulation of floodwaters. Shallow street flooding can occur unless channels have been improved to account for increased flows (FEMA 1997).

High groundwater levels can cause problems even where there is no surface flooding. Basements are susceptible to high groundwater levels. High groundwater is seasonal in some areas; elsewhere, it occurs only after a long periods of above-average precipitation (FEMA 1997).

Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent flooding on streets and other urban areas. They make use of pipes, roadside ditches, channels and roadways to

convey water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than prior to development in that area (FEMA 2008).

## 6.3.4 Non-SFHA Coastal Flooding

Coastal floods are the submersion of land areas along the ocean coast and other inland waters caused by seawater over and above normal tide action. Coastal flooding occurs along the coasts of oceans, bays, estuaries, coastal rivers and large lakes, regardless of whether they are within an SFHA. Coastal flooding can result in weakened or destroyed coastal structures. Several forces are associated with coastal flooding:

- *Hydrostatic forces* against a structure are created by standing or slowly moving water. Flooding can cause vertical hydrostatic forces, or flotation. These types of forces are one of the main causes of flood damage.
- *Hydrodynamic forces* on buildings are created when coastal floodwaters move at high velocities. These high-velocity flows can destroy solid walls and dislodge buildings with inadequate foundations. High-velocity flows can also move large quantities of sediment and debris that can cause additional damage. In coastal areas, high-velocity flows are typically associated with one or more of the following:

  - Storm surge and wave run-up flowing landward through breaks in sand dunes or across low-lying areas
  - Tsunamis
  - Outflow of floodwaters driven into bay or upland areas
  - Strong currents parallel to the shoreline, driven by waves produced from a storm.

  High-velocity flows can be created or exacerbated by the presence of manmade or natural obstructions along the shoreline and by weak points formed by roads and access paths that cross dunes, bridges or canals, channels, or drainage features.

- *Waves* can affect coastal buildings in the form of breaking waves, wave run-up, wave reflection and deflection, or wave uplift. The most severe damage is caused by breaking waves. The force created by these types of waves breaking against a vertical surface is often at least 10 times higher than the force created by high winds during a coastal storm.
- Flood-borne debris produced by coastal flooding events and storms typically includes decks, steps, ramps, breakaway wall panels, portions of or entire houses, heating oil and propane tanks, cars, boats, decks and pilings from piers, fences, erosion control structures, and many other types of smaller objects. Debris from floods can destroy unreinforced masonry walls, light wood-frame construction, and small-diameter posts and piles (FEMA 2011).

Most coastal flooding in California is due to a combination of winter storms, severe storms, rising sea levels, tidal action, currents and waves, and high winds (Los Angeles County, 2019b). Coastal flooding has many of the same problems identified for riverine flooding, as well as additional problems such as storm surge, beach erosion, loss or submergence of wetlands and other coastal ecosystems, saltwater intrusion, high water tables, loss of coastal structures (sea walls, piers, bulkheads, bridges or buildings), and loss of coastal recreation areas, beaches, sand dunes, parks and open space (FEMA, 2011).

### Storm Surge Areas

Storm surges inundate coastal floodplains by dune overwash, tidal rise in inland bays and harbors, and backwater flooding through coastal river mouths. Strong winds can increase tide levels and water-surface elevations. Storm systems generate large waves that run up and flood coastal beaches. The combined effects are storm surges that

affect the beach, dunes, and adjacent low-lying floodplains. Shallow, offshore depths can cause storm-driven waves and tides to pile up against the shoreline and inside bays. Based on an area's topography, a storm surge may inundate only a small area or coastal lands extending a mile or more inland from the shoreline.

Storm surge can cause significant property damage both by the momentum of waves crashing into property and by eroding, undermining, and weakening structural foundations. This second form also contributes to additional coastal erosion and the destruction of roadways. The maximum potential for storm surge depends on a number of locational and event factors, including storm intensity, forward speed of the storm, size of the storm, the storm's angle of approach to the coast, central pressure, the width and slope of the continental shelf, and the shape and characteristics of coastal features.

## Coastal Erosion Areas

Coastal erosion is one of the primary hazards leading to loss of lives or damage to property in coastal areas. Coastal shorelines change constantly in response to wind, waves, tides, sea-level fluctuation, seasonal and climatic variations, human alteration, and other factors that influence the movement of sand and material within a shoreline system. Coastal erosion resulting from flooding is typically seen when extreme rainfall scours and erodes dunes and when inland floodwaters return through the dunes and beach face into the ocean (FEMA 1996). Such erosion can result in significant economic loss through the destruction of buildings, roads, infrastructure, natural resources, and wildlife habitat.

Some methods used in the past to stop or reduce coastal erosion actually exacerbated the problem. Shore protection structures such as seawalls and revetments often are built to stabilize the upland property, but they can subject down-drift beaches to increased erosion. Typically they eliminate natural wave run-up and sand deposition processes and can increase reflected wave action and currents at the water line. Increased wave action can cause localized scour in front of structures and prevent settlement of suspended sediment (FEMA 1996). While hardened structures typically prove to be beneficial in reducing upland property damage, the rate of coastal erosion nearby typically increases. This impacts natural habitats, spawning grounds, recreational activity areas, and public access (Frizzera, 2009). Beaches, dunes, barrier beaches, salt marshes and estuaries can slowly disappear as the sediment sources that feed and sustain them are eliminated.

To counteract the negative impact of hard structures, alternative forms of shoreline stabilization that provide more natural forms of protection can be used. These include beach nourishment and dune restoration, as well as notching existing groins to reestablish a flow of sediment to previously sand-starved areas beaches.

## Tsunami Hazard Areas

Earthquakes, landslides on the ocean floor, and volcanic activity all have the potential to create large sea waves that can inundate coastal areas. The California coast has experienced about 80 tsunamis over the past 150 years, and four of these have caused fatalities. The travel time for a locally generated tsunami, from initiation at the source to arrival at coastal communities, can be 5 to 30 minutes.

The likelihood of catastrophic inundation of low-lying coastal areas as a result of a tsunami is low. However, the risk of losing vital commerce associated with the ports of Los Angeles and Long Beach warrants adequate risk reduction measures from tsunamis. The ports of Los Angeles and Long Beach have completed a tsunami hazard assessment to guide disaster planning and mitigate damage from a potential tsunami at their facilities. In addition, the Los Angeles County All-Hazard Mitigation Plan includes risk reduction measures for the coastal areas (Los Angeles County, 2015).

### 6.3.5 Dam Failure

A dam is an artificial barrier that can store water, wastewater, or liquid-borne materials for many reasons, such as flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, pollution control, or combinations of these purposes. Man-made dams can be classified according to the type of construction material used, the methods used in construction, the slope or cross-section of the dam, the way the dam resists the forces of water pressure behind it, or the means used for controlling seepage. Materials used to build dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, or combinations of these (Association of State Dam Safety Officials 2013).

More than a third of all dams in the U.S. are 50 or more years old. Approximately 14,000 of those dams pose a significant hazard to life and property if failure occurs. There are about 2,000 unsafe dams in the United States, located in almost every state. Dam failures can occur as a result of structural failures, such as progressive erosion of an embankment or overtopping and breaching by a severe flood. Failure of a dam can cause severe downstream flooding, depending on the magnitude of the failure. Floods caused by dam failures have caused loss of life and property damage (FEMA 1996).

Dam failures can result from one or a combination of the following reasons (FEMA 2013a):

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Movement or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Earthquakes
- Inadequate maintenance and upkeep.

Dam failures typically occur when spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled waters that rush downstream, damaging or destroying anything in its path (FEMA 1996). According to the 2010 California State Hazard Mitigation Plan, there have been nine dam failures in the state since 1950, some of which occurred in Los Angeles County. Overtopping caused two of the failures, and the others were caused by seepage or leaks. The historical record indicates that California has had about 45 failures of non-federal dams. The failures occurred for a variety of reasons, the most common being overtopping. Other reasons include shortcomings in the dams or an inadequate assessment of surrounding geomorphologic characteristics.

In Los Angeles County, dams hold billions of gallons of water in reservoirs. Seismic activity can compromise these dams, resulting in catastrophic flooding. Inundation caused by a catastrophic dam or aqueduct failure can devastate large areas and threaten residences and businesses (Los Angeles County, 2019). According to the California Division of Safety of Dams, there are 85 dams under their jurisdiction in Los Angeles County. Table 6-1 lists dams identified as high hazard by the Division of Safety of Dams. The high hazard classification does not mean that a dam has **a** high probability of failure; it is based on the downstream impacts on people, property, economy and environment if the dam were to fail. The listed dams have inundation areas within the unincorporated areas of the County, although some of them are located outside of the County. The County has inundation maps for all of the dams listed in the table; the maps are omitted from this plan for security purposes.

**Table 6-1.** High Hazard Dams with Flood Hazard for Unincorporated Los Angeles County

| Name[a] | Water Course | Owner | Year Built | Crest Length (feet) | Height (feet) | Storage Capacity (acre-feet) | Drainage area (sq. mi.) |
|---|---|---|---|---|---|---|---|
| **Big Santa Anita** [c] | Trib. to Rio Hondo | Los Angeles County Public Works | 1927 | 612 | 225 | 858 | -- |
| **Big Tujunga No. 1** [c] | Big Tujunga Creek | Los Angeles County | 1931 | 505 | 220 | 5,750 | 81.7 |
| **Bouquet Canyon** [c] | Bouquet Creek | City of Los Angeles | 1934 | 1,180 | 190 | 36.505 | 13.6 |
| **Castaic** | Castaic Creek | California Department of Water Resources | 1973 | 5,200 | 340 | 323,700 | 153.7 |
| **Century** | Malibu Creek | California Dept. of Parks & Recreation | 1913 | 149 | 44 | 70 | 68.1 |
| **Cogswell** [c] | W Fork San Gabriel River | Los Angeles County Public Works | 1935 | 585 | 266 | 8,969 | 38.4 |
| **Fairmont** [c] | Antelope Valley | City of Los Angeles | 1912 | 4300 | 121 | 7507 | 2.64 |
| **Fairmont #2** [c] | Trib. to Antelope Valley Cr. | City of Los Angeles | 1982 | 4437 | 24 | 493 | 0.08 |
| **Garvey Reservoir** | Trib. to Rio Hondo | Metropolitan Water District | 1954 | 5,164 | 160 | 1,610 | 0 |
| **Harold Reservoir** | Trib. to Antelope Valley | Palmdale Water District | 1891 | 2,800 | 30 | 3,870 | 4.63 |
| **Lake Sherwood** | Potrero Valley Cr | Sherwood Development Company | 1904 | 45 | 350 | 2,600 | 165.1 |
| **Littlerock** | Littlerock Cr | Littlerock Creek Irrigation District | 1924 | 124 | 576 | 4,600 | 63.7 |
| **Live Oak** | Live Oak Creek | Los Angeles County Public Works | 1922 | 303 | 76 | 239 | 2.3 |
| **Malibou Lake Club** | Malibu Creek | Private Entity | 1923 | 190 | 44 | 500 | 64 |
| **Morris** [c] | San Gabriel River | Los Angeles County Public Works | 1935 | 750 | 245 | 27,500 | 210 |
| **Morris S. Jones** | unnamed | Pasadena Dept. of Water and Power | 1952 | 1,470 | 49 | 153.3 | -- |
| **Pacoima** | Pacoima Creek | Los Angeles County | 1929 | 640 | 365 | 3,777 | 27.8 |
| **Potrero** | Triunfo Canyon Creek | Private Entity | 1960 | 730 | 40 | 791 | 28.9 |
| **Puddingstone** | Walnut Creek | Los Angeles County Public Works | 1928 | 2,698 | 147 | 16,341 | 33.1 |
| **Pyramid** [c] | Piru Creek | California Department of Water Resources | 1973 | 1,080 | 386 | 178,700 | 295 |
| **San Gabriel #1** [c] | San Gabriel River | Los Angeles County Public Works | 1938 | 1,520 | 320 | 44,183 | 205 |
| **Sawpit** | Sawpit Creek | Los Angeles County Public Works | 1927 | 527 | 150 | 406 | 3.27 |
| **Thompson Creek** | Thompson Creek | Los Angeles County Public Works | 1928 | 1,500 | 66 | 543 | 3.46 |
| **Westlake Reservoir** | Tree Springs Creek | Las Virgenes Municipal Water District | 1972 | 1,400 | 158 | 9,200 | 0.9 |
| **Whittier Narrows Dam**[b] | San Gabriel River | Federal, Corps of Engineers | 1957 | 16,960 | 56 | 66,702 | 554 |

a. Dams listed are only those:
   - Listed by California Department of Water Resources in 2019 as jurisdictional for the State of California (except, Note b.)
   - Rated as high or extremely high hazard
   - Located in unincorporated Los Angeles County or having an inundation area that includes areas of unincorporated county.

b. Federal dam not listed in California Department of Water Resources list of jurisdictional dams; information taken from U.S. Army Corps of Engineers National Inventory of Dams

c. Dam location or part of its inundation area is in U.S. National Forest area.

*Source:* California Department of Water Resources, 2019; U.S. Army Corps of Engineers, 2020

The Division of Safety of Dams of the California Department of Water Resources has jurisdiction over large dams throughout the state and enforces safety requirements and annual inspections. Dam owners submit inundation maps to California's Office of Emergency Services that represent the best estimate of where water would flow if a dam failed completely and suddenly with a full reservoir (Los Angeles County, 2019). At the time of the drafting of this plan update, the following high-hazard state jurisdictional dams with potential to impact unincorporated Los Angeles County had approved dam breach inundation maps: Big Santa Anita, Castaic, Pyramid, Live Oak, Littlerock, Harold Reservoir, Sawpit, and Westlake Reservoir.

The 2019 County of Los Angeles All-Hazards Mitigation Plan includes a profile and assessment of the Dam Failure Hazard as well as mitigation actions that address the risk associated with this hazard.

### 6.3.6 Levee Failure

Levees are a basic means of providing flood protection along waterways in regions where development exists or is planned, and in agricultural areas. Levees confine floodwaters to the main river channel or protect inland areas from high tides. Failure of a levee can lead to inundation of surrounding areas.

The causes of levee failures are structural failures, foundation failures of underlying soils, and overtopping by flood flows, tides and waves. Contributing factors include poor construction materials, erosion by current and wave action, seepage through or under the levee, burrowing rodents, and improper repairs. Lack of adequate and regular maintenance to correct these problems also contributes to levee failure. Most failures are composites of several of these factors.

FEMA accredits levees as providing adequate risk reduction if levee certification and an adopted operation and maintenance plan are adequate. The criteria for which a levee can be accredited are specified in 44 CFR Section 65.10 Section 65.10 provides the minimum design, operation and maintenance standards levee systems must meet in order to be recognized as providing protection from the base flood on a Flood Insurance Rate Map. In order for a levee to be accredited, the owner must provide data and documentation to demonstrate that the levee complies with these requirements.

An area impacted by an accredited levee is shown as a moderate-risk area and labeled Zone X on a FIRM. This accreditation affects insurance and building requirements. The NFIP does not require flood insurance for structures with federally backed mortgages in areas protected by accredited levees. However, FEMA recommends the purchase of flood insurance in these areas due to the risk of flooding from levee failure or overtopping. If a levee is not accredited, the area it protects will still be mapped as a high-risk area (an SFHA), and the federal mandatory purchase of flood insurance applies (FEMA, 2012).

Even with levee certification and FEMA accreditation, there is a flood risk associated with levees. While levees are designed to reduce risk, even properly maintained levees can fail or be overtopped by large flood events. Levees reduce risk, they do not eliminate it.

In Los Angeles County, there are over 200 miles of levees that provide protection against floods of 25-year or greater magnitude. Most of these levees are in cities; fewer than 10 percent are in the unincorporated County. Figure 6-2 and Figure 6-3 show the levees with greater than 25-year protection that would flood developed areas of the County should they be overtopped (mapping of levees with 25-year or great protection is required under Step 4 of Activity 510 of the 2013 CRS Coordinator's Manual). These maps indicate levees that have been accredited by FEMA, and therefore do not represent a flood hazard. The County has received accreditation on 89 percent of the levees for which FEMA certification was required. The Compton Creek Levee is the only County levees in unincorporated areas not accredited by FEMA.

**Figure 6-2.**
Unincorporated Area **Flood Control Levees in Los Angeles County; Santa Clarita Area**



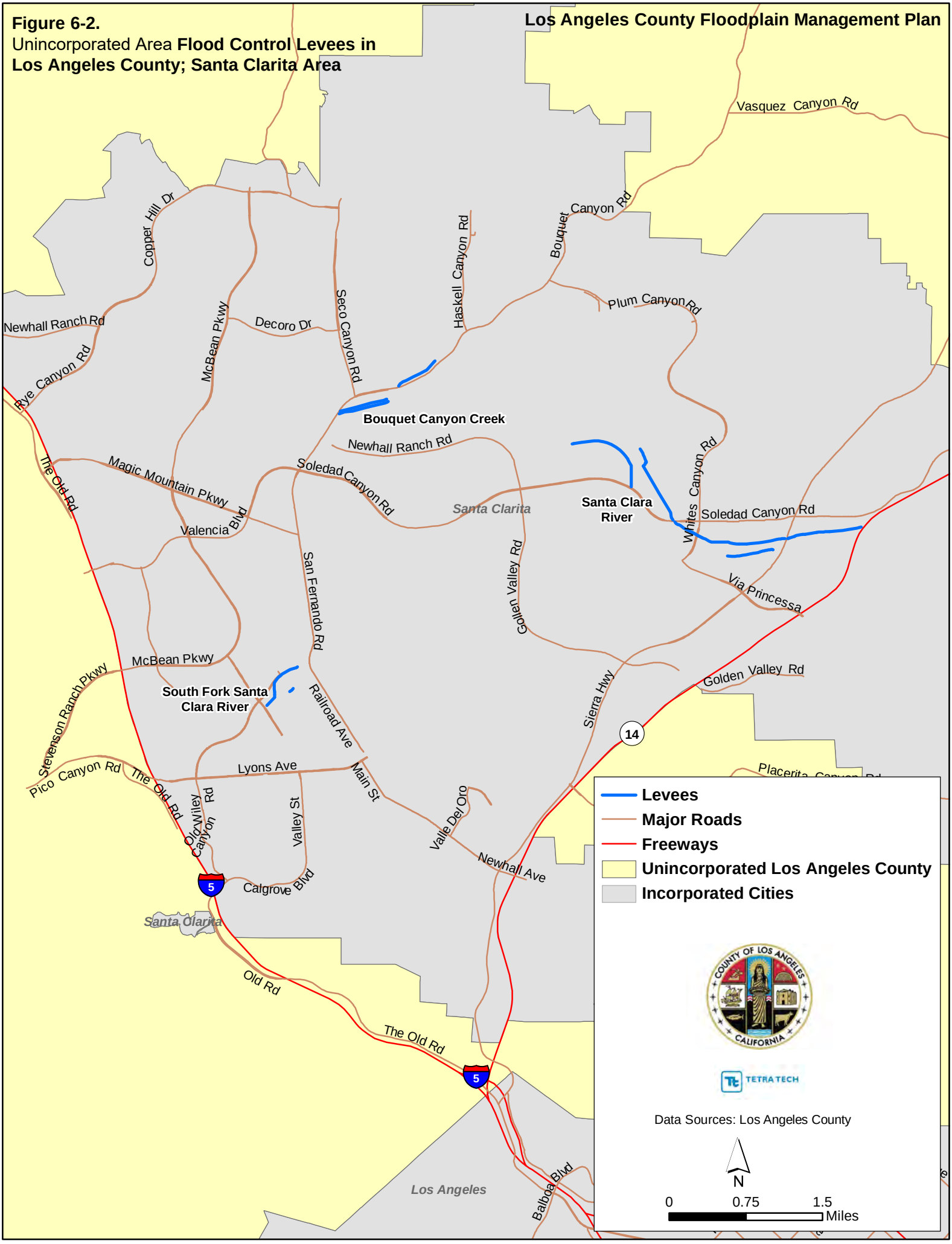
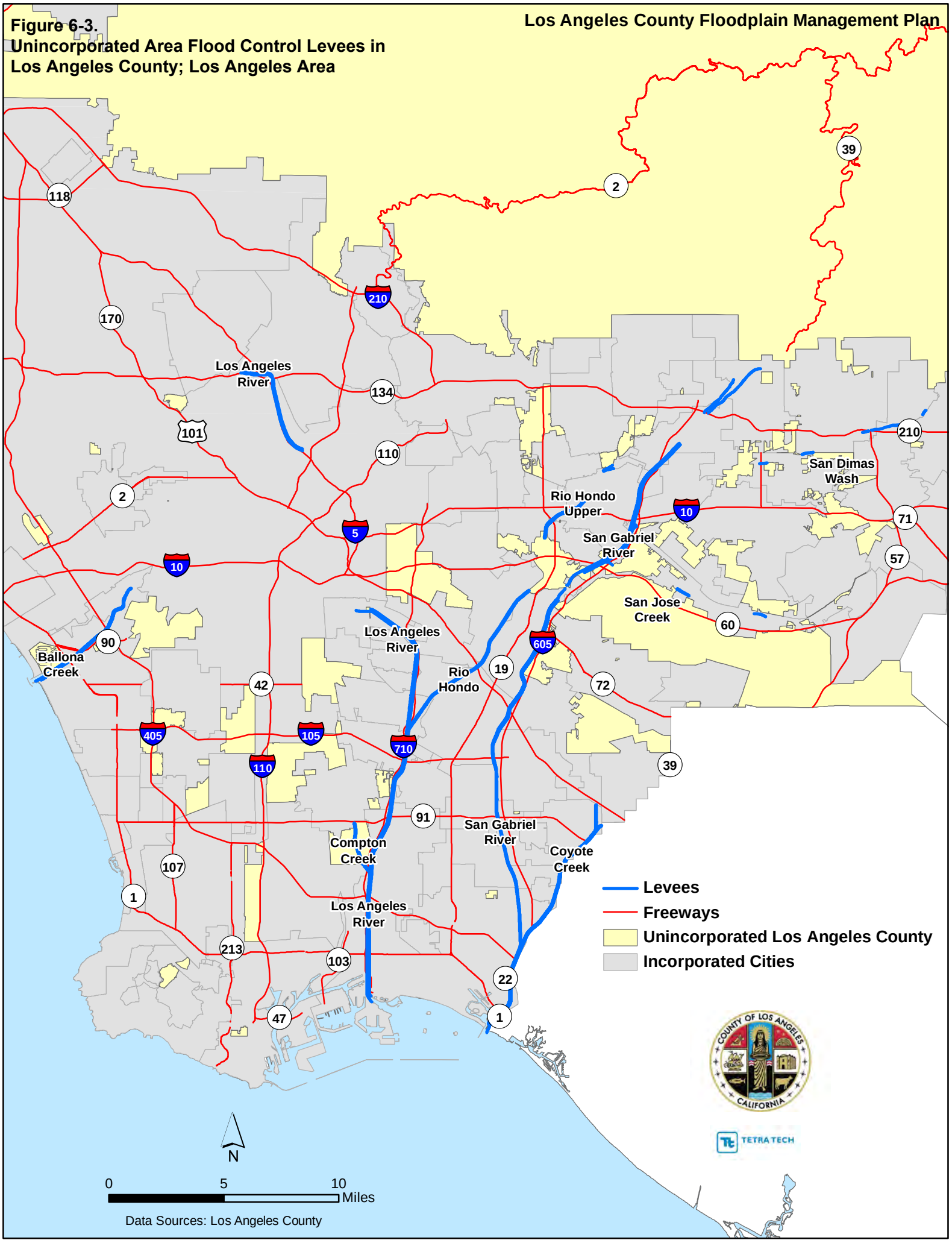


**Figure 6-3.**
**Unincorporated Area Flood Control Levees in Los Angeles County; Los Angeles Area**




Data Sources: Los Angeles County

### 6.3.7 Geologic Hazard Areas

Flooding is associated with geologic hazards in two ways:

- **Subsidence Areas**—Human activities such as underground mining, groundwater or oil withdrawal, or soil drainage can cause the ground to subside. This may occur gradually, resulting in greater flood potential due to lower land elevation, or suddenly, resulting in sinkholes and collapses that may damage buildings, roads and utilities.
- **Landslide Areas**—Floods, earthquakes and volcanic eruptions can trigger landslides. The landslide risk can be exacerbated by human activities such as mining or the cut-and-fill construction of highways, buildings and railroads.

## 6.4 PRINCIPAL FLOODING SOURCES IN LOS ANGELES COUNTY

Flooding in southern California, including the County of Los Angeles, is most frequently the result of coastal storms or heavy rains resulting in one to several days of precipitation. Although flooding resulting from heavy precipitation can occur anywhere in the County, certain areas are more vulnerable than others. This section provides information regarding flood-prone areas in unincorporated areas of the County.

### 6.4.1 Water Bodies

The FEMA Flood Insurance Study for Los Angeles County divides the unincorporated areas into four sub-areas: Antelope Valley, Santa Clarita Valley, Malibu, and the Los Angeles basin. The Los Angeles basin holds the largest amount of unincorporated area.

The main bodies of water (and sources of flooding) in these areas are as follows:

- Ballona Creek
- Los Angeles River
- Malibu Creek
- Pacific Ocean
- Rio Hondo River
- San Gabriel River and its tributaries
- Santa Clara River
- Topanga Canyon

Other sources of potential flooding, as identified in the Flood Insurance Study, include the following:

- Acton Canyon
- Agua Dulce Canyon
- Amargosa Creek
- Anaverde Creek
- Big Rock Creek
- Bouquet Canyon
- Castaic Creek
- Cheseboro Creek
- Cold Creek
- Dark Canyon
- Dry Canyon
- Elizabeth Canyon
- Escondido Canyon
- Garapito Canyon
- Gorman Creek
- Halsey Canyon
- Haskell Canyon
- Iron Canyon
- Las Flores Canyon
- Las Virgenes Creek
- Liberty Canyon
- Lindero Canyon
- Little Rock Creek
- Malibou Lake
- Medea Canyon
- Mint Canyon
- Newhall Creek
- Oak Springs
- Old Topanga Canyon
- Palo Comado Creek
- Pine Canyon
- Placerita Creek
- Railroad Canyon
- Ramirez Canyon
- Sand Canyon
- San Francisquito Canyon
- San Martinez-Chiquito Canyon
- Santa Maria Canyon
- Stokes Canyon
- Topanga Canyon
- Trancas Creek
- Triunfo Creek
- Unnamed Canyon near Serra Retreat Area
- Vasquez Canyon
- Violin Canyon
- Wildwood Canyon
- Zuma Creek

### 6.4.2 Climate Variations

Although awareness of potential flooding sources is important, rainfall and precipitation characteristics in the County provide clarity on when these sources are likely to experience flooding:

- In the coastal and mountain areas, precipitation is mainly the result of winter rains associated with North-Pacific extra-tropical cyclones. Major storms approach from the west or northwest, and they often consist of one or more frontal systems that can last four days or longer.
- The mountain ranges greatly intensify the amount of precipitation. Seasonal normal rainfall for the County ranges from 27.50 inches in the San Gabriel Mountains to 7.83 inches in the desert.
- Warm rains from southerly spring storms can increase snowmelt and flood runoff.
- In mountainous regions, steep canyons and channel gradients encourage stormwater runoff.
- In the County's desert regions, the most serious flooding usually results from summer convective storms. This rainfall is most frequent in the upper San Gabriel Mountains and Mojave Desert regions (Los Angeles County Public Works, 2013).

### 6.4.3 Development Effects

Stormwater runoff and drainage issues in the hill and valley areas of the County are dependent on the amount of development. More developed valley areas experience increased runoff volumes due to the large amount of impervious surface.

## 6.5 MAJOR FLOOD EVENTS

Federal disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A federal disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Los Angeles County has experienced 14 flooding events since 1969 for which federal disaster declarations were issued, as summarized in Table 6-2. Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future.

**Table 6-2.** History of Los Angeles County Flood Events With Federal Disaster Declarations

| Event Dates | Declaration # | Type of event |
|---|---|---|
| **1/26/1969** | DR-253 | Severe storms & flooding |
| **2/15/1978** | DR-547 | Coastal storms, mudslides & flooding |
| **1/8/1980** | DR-615 | Severe storms, mudslides & flooding |
| **1/21 – 3/30/1983** | DR-677 | Coastal storms, floods, slides & tornadoes |
| **1/17 – 22/1988** | DR-812 | Severe storms, high tides & flooding |
| **2/10 – 18/1992** | DR-935 | Rain/snow/windstorms, flooding, mudslides |
| **1/5 – 3/20/1993** | DR-979 | Severe winter storm, mud & landslides, & flooding |
| **1/3 – 2/10/1995** | DR-1044 | Severe winter storms, flooding, landslides, mud flows |
| **2/13 – 4/19/1995** | DR-1046 | Severe winter storms, flooding landslides, mud flow |
| **2/2 – 4/30/1998** | DR-1203 | Severe winter storms, and flooding |
| **12/27/2004 – 1/11/2005** | DR-1577 | Severe storms, flooding, debris flows, and mudslides |
| **2/16 – 23/2005** | DR-1585 | Severe storms, flooding, landslides, and mud and debris flows |
| **1/17 – 2/6/2010** | DR-1884 | Severe winter storms, flooding, and debris and mud flows |
| **1/18 – 1/23/2017** | DR-4305 | Severe Winter Storms, Flooding, and Mudslides |

Source: FEMA, 2019b

Many flood events do not trigger federal disaster declaration protocol but still have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for flooding. The following sections provide an overview of some of the more significant floods that have affected unincorporated areas of the county.

## 6.5.1 August 2017 Acton Flood

In the summer of 2017, heavy rain and thunderstorms fed by monsoonal moisture pounded the community of Acton. More than 1.5 inches of rain fell in just 30 minutes, as temperatures dropped from 93 ºF to 69 ºF and wind gusts exceeded 55 miles per hour. Sudden flash flooding left drivers stranded in their cars on roadways inundated with mud and debris. A County Fire Department rescue helicopter team hoisted one stranded driver to safety. Metrolink trains were prevented from making their way to Acton due to flooded tracks, leaving commuters scrambling to find alternative transportation. Crown Valley Road and Soledad Canyon Road were also closed. (Los Angeles Times, 2017; KTLA, 2017).

## 6.5.2 January 2017 Winter Storms

A powerful winter storm moved across Southern California, bringing heavy rain, flash flooding and strong winds to the area. Flash flooding as well as mud and debris flows were reported in and around the recent burn areas of Santa Barbara and Los Angeles counties. In the mountains, strong and gusty southerly winds were reported.

## 6.5.3 October 2015 Antelope Valley Flood

Torrential rains in October 2015 brought flooding and debris flows to the Antelope Valley areas of Lake Hughes, Elizabeth Lake, Leona Valley and Quartz Hill. Three inches of rain fell in Leona Valley in just 30 minutes—a greater than 500-year rainfall event. Los Angeles County Public Works crews estimated 300,000 cubic yards of debris was removed from the region. Five structures were heavily damaged; three structures were flooded; and one modular home was destroyed. One of the damaged houses belonged to an older disabled couple. Debris closed a 40-mile stretch of Interstate 5 at the Grapevine. Along State Route 58, stretches were covered in mud and debris up to 6 feet deep, stranding 200 vehicles. The County of Los Angeles Board of Supervisors declared a local state of emergency (KTLA, 2015; mynewsla.com, 2015)

## 6.5.4 2014 Hurricane Marie

Hurricane Marie in August 2014 is the seventh-most intense Pacific hurricane on record. Although Hurricane Marie's center remained well away from land throughout its existence, its large size brought increased surf to areas from southwestern Mexico to southern California. Marie brought one of the largest hurricane-related surf events to southern California in decades. Swells of 10 to 15 feet battered coastal areas, with structural damage occurring on Santa Catalina Island and in the Greater Los Angeles Area. One person drowned in the surf near Malibu. A breakwater near Long Beach sustained $10 million worth of damage, with portions gouged out. Hundreds of ocean rescues were performed due to the storm, and overall losses reached $20 million.

## 6.5.5 1997-1998 El Niño

Noteworthy storm incidents in Los Angeles due to the 1997-1998 El Niño include the following:

- October 1997—Hurricane Nora caused three deaths and caused damage due to mudslides throughout the Los Angeles area.
- On February 6, 1998—Mud crashed into an apartment building in the Westlake area; more than 100 residents were evacuated.

- On February 8, 1998—An ocean-eroded cliff in Malibu buckled, causing one home to collapse and threatening two others.
- On February 13, 1998—A rain-soaked hillside collapsed in the Canoga Park area, forcing the evacuation of five homes and threatening several others.

## 6.5.6 1980 Storm

In February 1980, 12.75 inches of rain fell in downtown Los Angeles in a 10-day period (Wahl et al., 1980). Extensive debris flow damage occurred in the unincorporated area of Altadena, the Cities of Duarte and Sierra Madre, and other foothill communities. The Los Angeles County Flood Control District's reservoirs received about 5.4 million cubic yards of debris; the District's debris basins received over 1 million cubic yards (Davis, 1980). Homes were damaged by mudflows and floodwaters in the Topanga Creek and Malibu Creek watersheds. Raw sewage flowed down Malibu Creek after a sewer line was broken by floodwaters; the resulting contamination caused health officials to close about 65 miles of beaches for several weeks to swimmers and surfers (Wahl et al., 1980).

The storm's heavy runoff also caused very high water levels in the Los Angeles River. The peak flow for the Los Angeles River at the Wardlow Avenue bridge in Long Beach was 125,000 cubic feet per second, the highest at that location since records began in 1928 (Wahl et al., 1980). Debris lines were seen at the Wardlow Avenue Bridge, water-borne debris was found on top of the channel levee, and the river may have overtopped in some locations. This event was the origin of the eventual Los Angeles County Drainage Area (LACDA) Improvement Project that was constructed in the lower Los Angeles River and the Rio Hondo in the late 1990s and early 2000s.

Los Angeles County was declared a disaster area. However, the U.S. Army Corps of Engineers estimated at the time that the facilities it constructed in Los Angeles County prevented over $1.9 billion in damage (Evelyn, 1980).

## 6.5.7 1977-1978 Winter Storms

Significant coastal flooding resulted as a combination of high astronomical tides, strong onshore winds, and high storm waves in the winter of 1977-1978. This flooding caused significant damage, including an estimated $1 million to $8 million in property damage for private residences along the Malibu coastline, $150,000 in damage to Long Beach Harbor, $80,000 in damage to the Santa Monica Pier, and $140,000 in damage to a bicycle path in El Segundo.

In the La Crescenta area, a debris basin overflowed, inundating several homes with mud and water. Localized flooding damaged other homes in the area. Virtually all of the Flood Control District debris basins in this area were filled to capacity. In the Hidden Springs area in the Big Tujunga Canyon watershed in the San Gabriel Mountains),mud and water flowing down Mill Creek took 10 lives and destroyed numerous structures (FEMA Flood Insurance Study, 2008).

## 6.5.8 February 1969 Storm

The February 1969 storm produced nearly 20 inches of rain in the mountains in three days. Additional debris deposited in the Flood Control District's reservoirs and debris basins (LACFCD, 1969). In the Santa Clara River watershed communities (at the time unincorporated), bridges and channel improvements were damaged. More than 20 feet of approach roadway fell out of the Soledad Canyon Road bridge over the Santa Clara River. The State Route 14 bridge over the river was also closed. Another bridge over Bouquet Canyon Creek was destroyed. Several homes in a new housing development the east side of the Santa Clara River had been inundated when portions of concrete embankment gave way. On several main roads, including Bouquet, Sand and Soledad Canyon Roads, the runoff from the rains eroded large portions of the roads' pavement and thickly covered the

roads with tons of mud and rock. Several homes in a new housing development the east side of the Santa Clara River at the Soledad Canyon bridge were inundated when portions of concrete embankment gave way. One motorist died in the floodwaters (scvhistory.com, 2020). There was considerable damage to railroad tracks, bridges and agriculture in the Antelope Valley; three people lost their lives; damage at the time was estimated at over $2.2 million (U.S. Army Corps of Engineers, 1973).

Eleven of the Flood Control District's dams went to spillway flow, since so much of their capacity was taken up by water and debris from another storm one month earlier. Dam operations were hindered because outlet works were buried by debris. The storm delivered 6.3 million cubic yards of debris to the District's reservoirs and 590,000 cubic yards to the debris basins. The debris flow into some of the debris basins above Azusa was so much they overtopped, damaging homes and a portion of the Azusa Pacific University campus. In the San Fernando Valley, extensive damage occurred along Tujunga Wash, where houses were inundated; seven houses were destroyed. The footings of the Foothill Boulevard bridge over the wash were undermined (LACFCD, 1969).

The Flood Control District's emergency repairs, cleanouts and emergency levee construction prior to the February storm enabled the flood control system to minimize extensive damage and loss of life in the County (LACFCD, 1969).

## 6.5.9 January 1969 Storm

The winter of 1969 produced two severe storm systems about one month apart. The effects of the storms were exacerbated by fires in 1968 that burned 19,000 acres above the San Gabriel Valley Cities of Azusa and Glendora, and almost 3,000 acres in the unincorporated San Fernando Valley areas of Little Tujunga and Pacoima Canyons (LACFCD, 1969).

The nine-day January 1969 storm produced heavy rainfall: over 45 inches at Opids Camp in the Angeles National Forest and over 13 inches in downtown Los Angeles (California Department of Water Resources, 1969). The result was heavy runoff and severe erosion. Eleven of the Los Angeles County Flood Control District's dams became so full that water went over their spillways. The District's reservoirs received 8.4 million cubic yards of debris. Its debris basins received almost 2 million cubic yards of debris. Properties below burned watersheds and without the protection of debris basins suffered considerable damage, especially those below small frontal slope canyons in the Azusa-Glendora area. Significant debris flows also occurred in the unincorporated area of Pasadena Glen, and Mandeville and Rustic Canyons in the City of Los Angeles (LACFCD, 1969).

Record peak flood flows occurred in the unincorporated area of Topanga Canyon, causing considerable damage and leaving 500 people homeless or isolated. Flood damage also occurred in the San Fernando Valley, the Santa Clara River area, the Antelope Valley, Glendale, and Mt. Baldy Village (near the border between the Los Angeles and San Bernardino Counties). A total of 53 people lost their lives. Damage was estimated at the time to be $82 million (LACFCD, 1969).

Although the storm damage was considerable, the extensive flood control system built by the Flood Control District and the U.S. Army Corps of Engineers allowed many areas of Los Angeles and its major suburbs to endure the storm without significant damage. The amount of damage prevented by the flood control system was estimated at the time to be $900 million (Rantz, 1970; LACFCD, 1969).

## 6.5.10 Summer Storms, 1968

Summer storms in 1968 caused damage in unincorporated County areas downstream of brush fires that occurred earlier in the summer. In the Malibu area, damage occurred along Malibu Creek and Topanga Canyon, where flows damaged homes, swept away bridges, and washed out roads. Approximately 500 people were left homeless or isolated. In the Santa Clarita Valley, most damage was caused by erosion and sedimentation of natural

watercourses. In the Antelope Valley, at least one home was completely destroyed. Railroads, public utilities, and agriculture also sustained damage (FEMA Flood Insurance Study, 2008).

## 6.5.11 1938 Storm

Two closely spaced storms hit the region in late February/early March 1938. The five-day combined storm event produced over 11 inches of rainfall in downtown Los Angeles and over 32 inches in the San Gabriel Mountains. When the event was over, about 115 people had died, 6,000 homes had been flooded, and nearly 169 square miles (about one-third) of Los Angeles was flooded. The damage was estimated at the time to be over $78.6 million. The areas hardest hit were Compton, Long Beach, the San Fernando Valley and Venice (KCET, 2012; Troxell et al., 1942).

Areas along the San Gabriel River were less severely impacted because of the Los Angeles County Flood Control District's Cogswell Dam (constructed in the mid-1930s) and San Gabriel Dam (construction of which was nearing completion). Flooding along the Los Angeles River was more severe but also lessened by the District's Big Tujunga, Devils Gate and Pacoima Dams (Troxell et al., 1942). The river had some temporary improvements installed prior to the storm event, but still had erosion, damage, and overflows in some areas. Some areas and main tributaries like Tujunga Wash had severe erosion, and bridges and buildings were damaged.

The District's reservoirs (including the recently completed Eaton Wash Dam) received about 8.8 million cubic yards of debris; the District's 15 new debris basins received about 606,000 cubic yards (Troxell et al., 1942). The Los Angeles and Long Beach harbors were impacted by silting.

The 1938 event accelerated the U.S. Army Corps of Engineers' construction of the Los Angeles County Drainage Area (LACDA) flood control facilities, starting with the Los Angeles River (KCET, 2012; Turhollow, 1975).

## 6.5.12 1934 La Crescenta Mudflows

In January 1934, 11 inches of rain fell in 11 hours over the mountains above La Crescenta, which had burned in November 1933. Over 600,000 cubic yards of debris-laden flows (an estimated 600,000 cubic yards) descended out of the canyons at high velocities and overran the community. In a little over one hour, 40 lives were lost, and 400 structures were destroyed (Troxell and Peterson, 1937). The damage estimated at the time was $6 million (Turhollow, 1975). This event spurred the construction of the County's first debris basins and the U.S. Army Corps of Engineers' construction of Eaton Wash Dam.

## 6.5.13 Flood of 1914

In February 1914 a devastating flood hit Los Angeles County, which by that time had a population of almost 800,000 people in 31 cities and the unincorporated areas (Los Angeles County, 2012a). For four days rain soaked the cities, the farms, the beaches, and the mountains. On the first day, 1.5 inches of rain fell on the city of Los Angeles in just one hour. By the third day more than 19 inches of water had fallen in parts of the San Gabriel Mountains, and 3 or more inches along the coast. Runoff from almost barren mountain slopes, from city roofs and streets, and from farms began almost immediately.

Two weeks of general precipitation in the preceding month had thoroughly soaked the ground; its absorptive capacity had vanished. With little warning, water, laden with tons of debris, gushed out of the steep mountain canyons, flashed down the creeks and washes, into the Los Angeles and San Gabriel Rivers. The water and debris (soil, rock, vegetative matter) swept over the highly unstable banks of the streams and washes and into the built-up areas in the foothills, valleys and coastal plains (Bigger, 1959).

The flood destroyed many bridges, flooded many properties, and filled the harbors of the Ports of Los Angeles and Long Beach with over 4 million cubic yards of sediment (rendering them almost unusable). For one week

there was practically no communication with the outside world. Rail traffic was entirely suspended. Long Beach was an island, cut off on all sides by rushing waters. Hundreds of people became temporary refugees. Many people were injured. The estimated damage was $10 million, including wreckage to bridges, roads, rail lines, buildings, agriculture, industry, and public utilities. In addition, the Corps of Engineers estimated that $400,000 would be needed to dredge out the deposit of sediment at the harbors (Bigger, 1959). In response to this event, the California State Legislature adopted the Los Angeles County Flood Control Act, which established the Los Angeles County Flood Control District.

### 6.5.14 Dam Failures

The most catastrophic dam failure in California's history was that of the St. Francis Dam in Los Angeles County in the Santa Clara River watershed in March 1928. This failure resulted in the deaths of more than 450 people and destruction of nearly 1,000 homes and buildings. Numerous roads and bridges were destroyed or damaged beyond repair. The California Division of Safety of Dams came into existence as a direct result of this catastrophe. Other significant dam failures in California's history include the Baldwin Hills Dam failure in 1963, which resulted in three deaths, and the near-failure of the Lower San Fernando Dam in 1971.

## 6.6 LOCATION

### 6.6.1 Mapped FEMA Flood Zones

FEMA's official delineations of special flood hazard areas for the County of Los Angeles are as follows:

- September 26, 2008 to December 21, 2018—FIRMs for Los Angeles County
- April 26, 2018—FIRMs for the Triunfo Creek watershed
- December 21, 2018—FIRMs for Topanga Canyon and other nearby canyons in the Santa Monica Mountains
- December 21, 2018—FIRMs for the Ballona Creek watershed
- Numerous Letters of Map Revision issued by FEMA.

Identified SFHAs include shallow flooding, floodway, alluvial fans, and coastal areas. They were determined using statistical analysis of records of river flow, storm tides, and rainfall; information obtained through consultation with the City of Los Angeles and the County of Los Angeles; floodplain topographic surveys; and hydrologic and hydraulic analyses. FEMA's mapped flood zones for the County are shown on maps provided in Appendix F.

These maps are the basis for the exposure and vulnerability analyses presented in this floodplain management plan. They represent the best data available at the time of this analysis, but they are not representative of all sources of flood risk. Extent and location mapping is not currently available for all flood hazard areas identified; such mapping has been identified as a need by this plan update process. Errors in the FEMA mapping were identified during the course of this project. It is not within the scope of this plan to correct errors in FEMA mapping, but it is within the scope to identify the correction of these errors as a proposed mitigation action.

### 6.6.2 County Floodways

The floodway is an area immediately adjacent to a water course where floodwaters during a flood are deepest and fastest-moving. It is the most dangerous part of the floodplain, and its hazardous nature requires that development in this area be carefully managed. The floodway must remain free of obstruction and construction unless engineering analysis demonstrates that flood hazards will not be increased on adjoining properties. Ideally, development in the floodway should be restricted to uses that do not interrupt the natural flow of the water (tennis courts, swimming pools, etc.).

The limits of the County floodway are defined as the point where the velocity of flood flow is 10 feet per second or the water surface elevation is 1 foot above the floodplain water surface elevation. The first of either criteria reached controls the floodway width. Where the flow velocity exceeds 10 feet per second for the entire width of the floodplain, the floodplain lines and floodway lines are the same.

Los Angeles County Public Works' Capital Flood protection requirements apply to all unincorporated areas mapped as floodways. The capital flood is defined as the flooding produced by a 50-year frequency storm falling on a saturated watershed.

### 6.6.3 Non-SFHA Urban Drainage Flood Areas

Flooding problem areas outside SFHAs are identified on a case by case basis. One source of information is mapping performed by the Los Angeles County Road Maintenance Division in northern unincorporated portions of the County. Areas mapped through this process are shown on Figure 6-4 and Figure 6-5.

## 6.7 FREQUENCY

The historical record indicates that large floods occur infrequently in Los Angeles County, but the damage they cause is significant, especially as development in the floodplain has increased dramatically. The frequency of other flood-related hazard events is more difficult to predict:

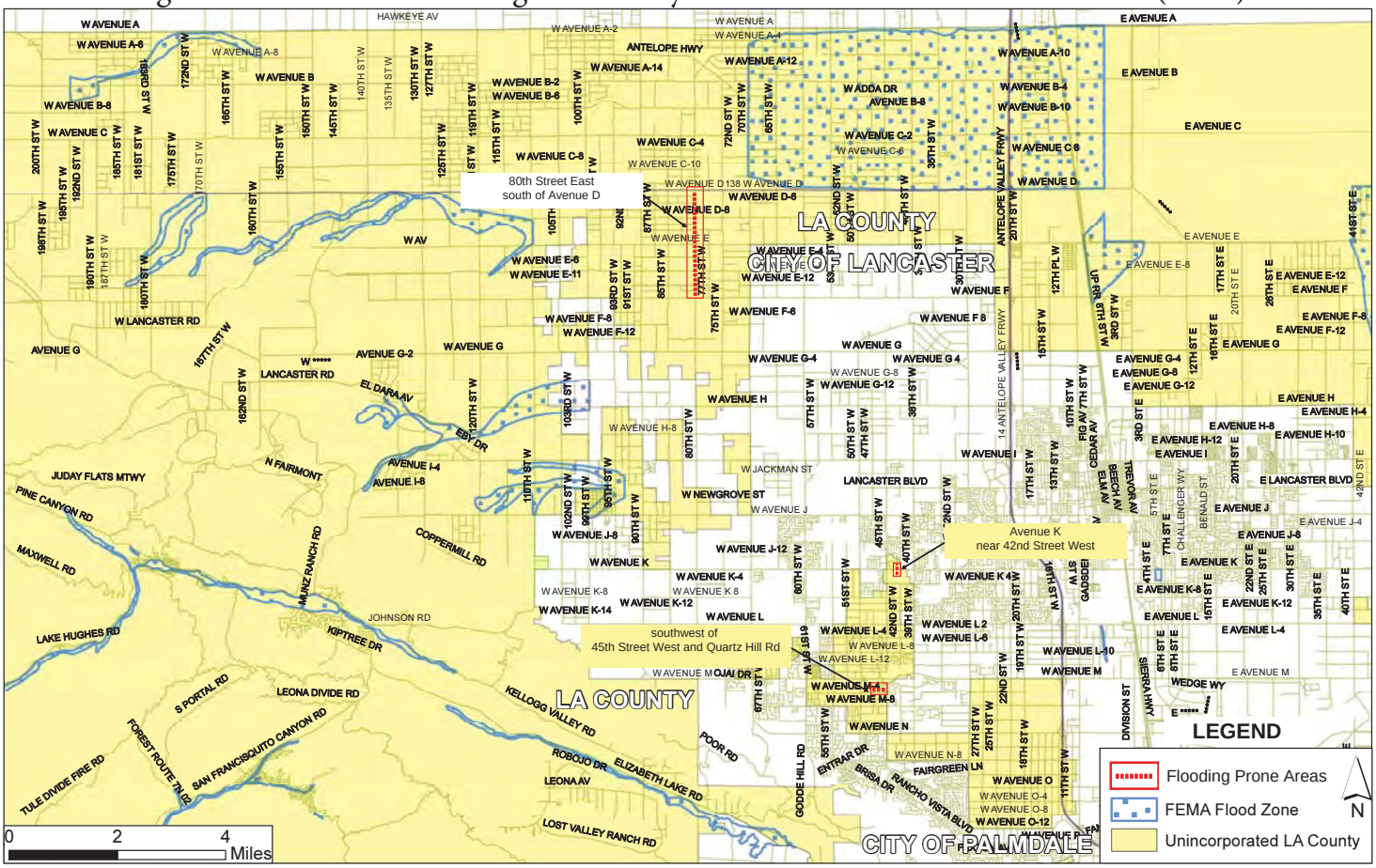
- Dam failures are difficult to predict and do not typically have an associated frequency. Dam vulnerability is unique to each dam, depending on its type, age, and previous incident information. Dam failure frequency is typically based on anecdotal information and historical events (Ferrante et al., 2012).
- Coastal erosion is a frequent event that is tied to both natural and human activities. While all beaches experience coastal erosion, rate and severity vary by location. Because coastal erosion is tied so closely to other activities, frequency rates and severity levels are best evaluated in conjunction with other related hazards' probabilities and by analyzing secondary impacts from storms, human actions, etc.
- Storm surge frequency is similar to coastal erosion in that its frequencies are tied to other hazard events, such as severe storms. In general, the severity of a storm can provide a rough prediction for the occurrence of storm surge.
- Sea level change is an ongoing process and can be monitored on both long-term and shorter-term scales. Global sea level changes are due to changes in the volume of water in ocean basins through thermal expansion, glacial melt, or net changes in the size of ocean basins. Global sea rise has been occurring for the past 20,000 years as a natural result of glacial maximum decline.

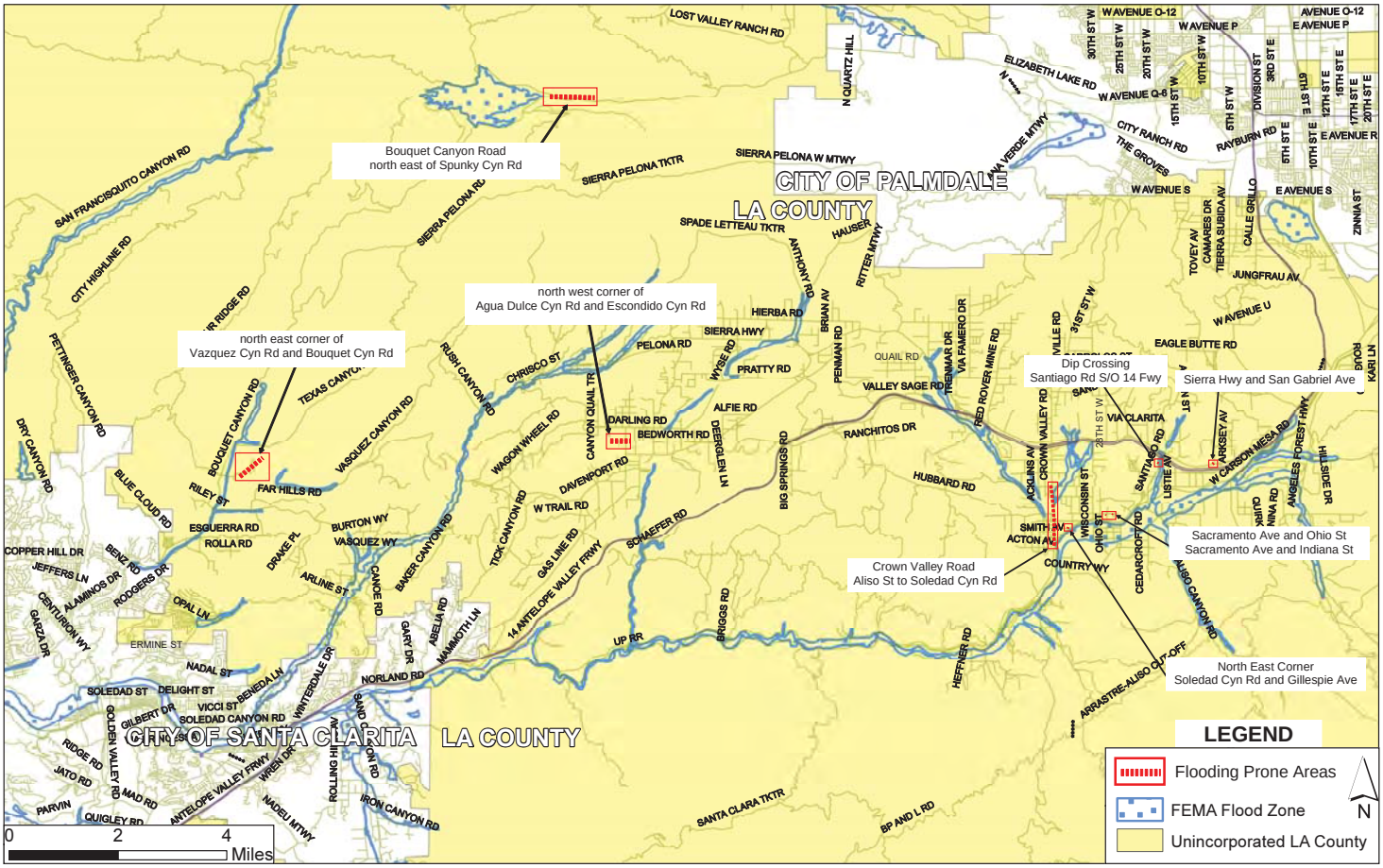
## 6.8 SEVERITY

### 6.8.1 Riverine Flooding

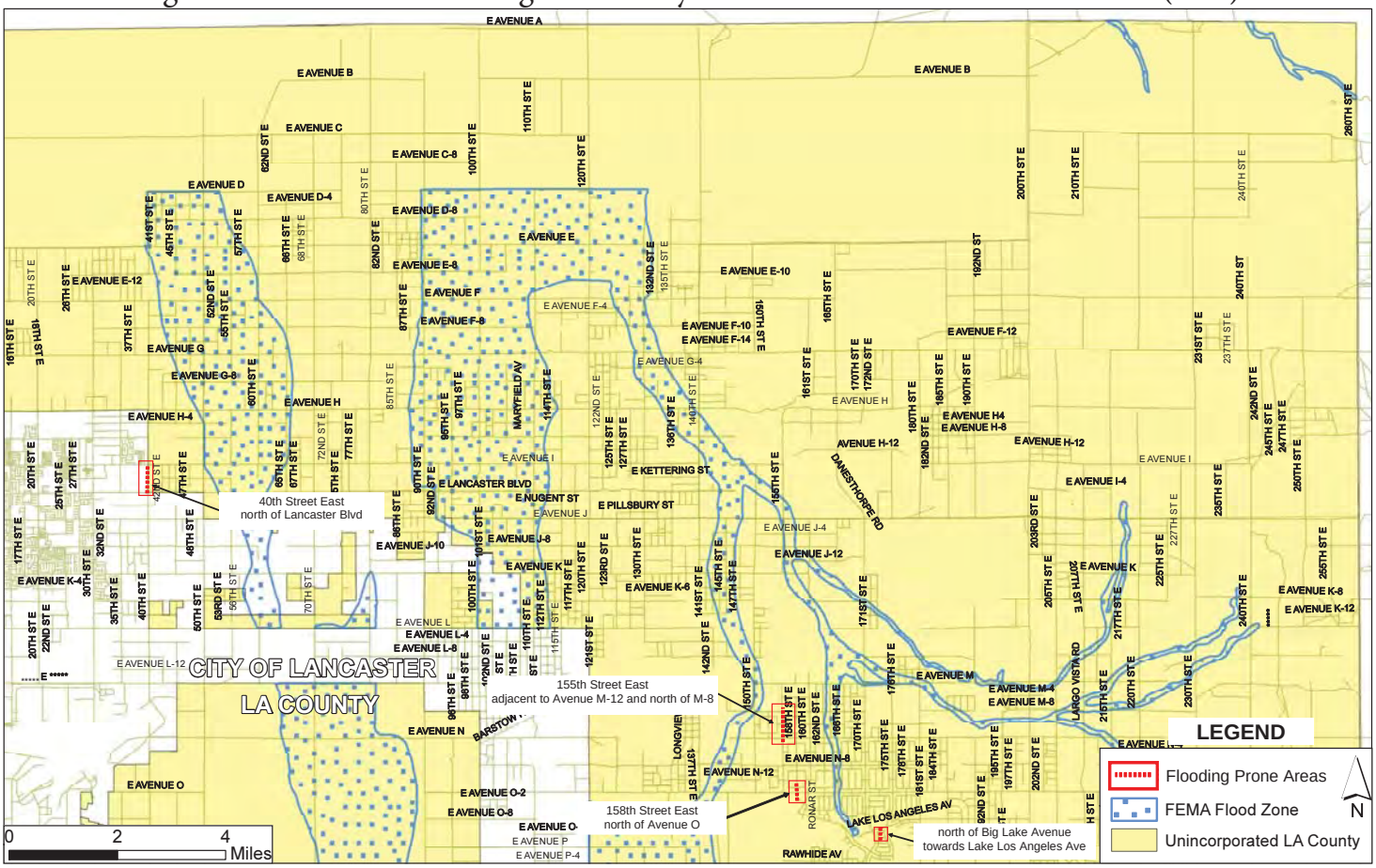
The principal factors affecting flood damage along a river or stream are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges; Table 6-3 lists peak flows used by FEMA to map the floodplains of the planning area (unincorporated areas of Los Angeles County), as noted in the effective Los Angeles County Flood Insurance Study.

# Figure 6-4. Northern Los Angeles County Flood-Prone Areas Outside SFHA (West)



# Figure 6-5. Northern Los Angeles County Flood-Prone Areas Outside SFHA (East)



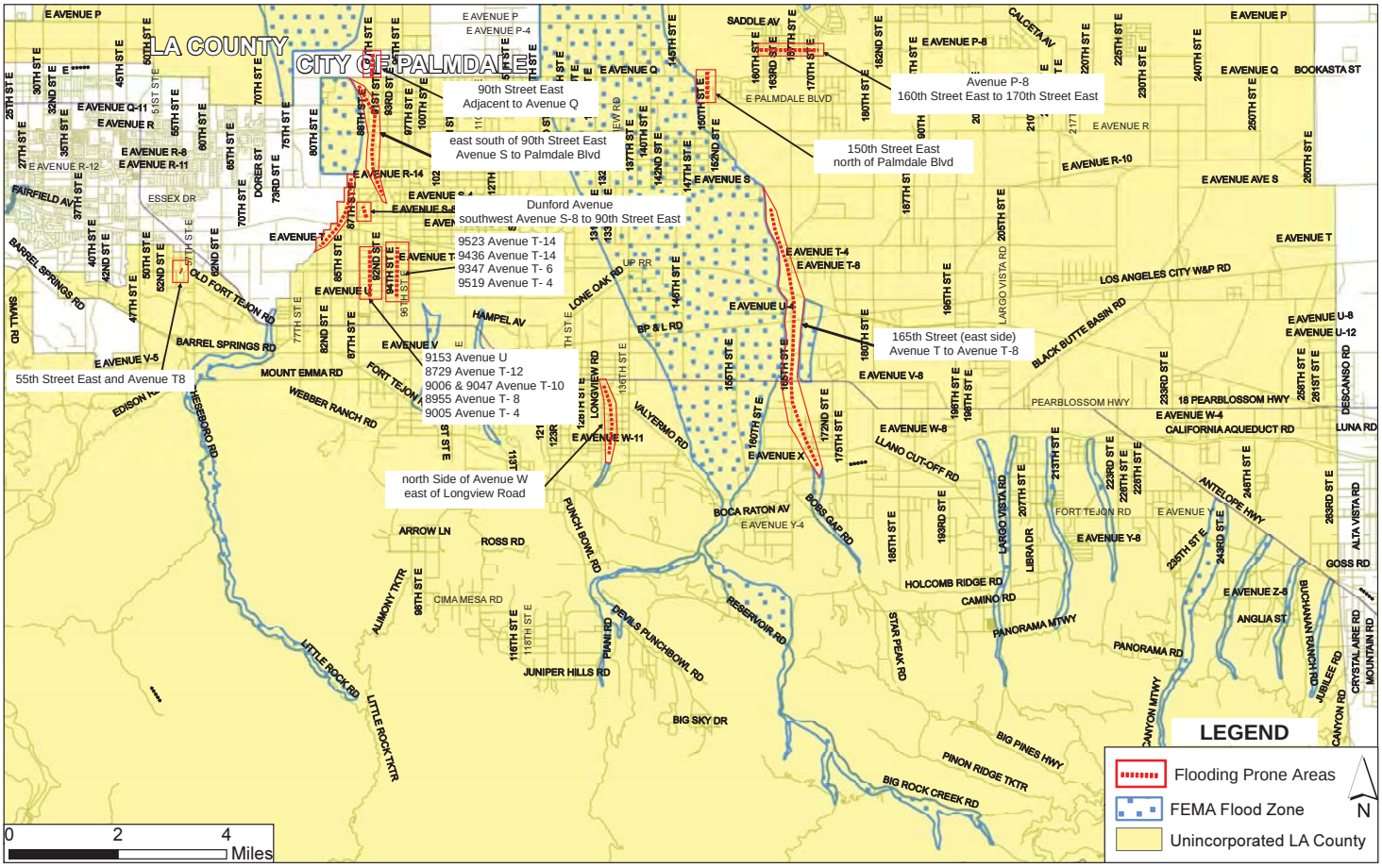



**Table 6-3.** Summary of Peak Discharges in Unincorporated Los Angeles County

| Source/Location | Drainage Area (square miles) | Discharge (cubic feet/second) | | | |
|---|---|---|---|---|---|
| | | 10-Year | 50-Year | 100-Year | 500-Year |
| 165th Street East Approximately 4.000 feet south of Pearblossom Highway | 7.3 | 500 | 1,700 | 2,300 | 4,700 |
| Acton Canyon Road, Escondido Canyon Road, and Crown Valley Road | 20.3 | — | — | 3,421 | 6,052 |
| Acton Canyon at Intersection of Crown Valley Road and Acton Avenue | 20.3 | — | — | 3,421 | 6,052 |
| Agua Dulce Canyon Approximately 5,600 feet upstream of Darling Road | 10.3 | — | — | 3,509 | 6,360 |
| Agua Dulce Canyon Approximately 800 feet upstream of Escondido Road | 14.3 | — | — | 4,401 | 7,977 |
| Amargosa Creek at 90th Street West | 6.9 | 500 | 2,000 | 3,100 | 4,500 |
| Amargosa Creek Approximately Midway between 20th Street West and 10th Street West | 32.7 | 1,800 | 3,300 | 5,000 | 10,100 |
| Anaverde Creek East of Antelope Valley Freeway | 16 | 700 | 2,100 | 3,000 | 6,400 |
| West of Antelope Valley Freeway North of Avenue H | 147 | 2,000 | 5,600 | 8,400 | 18,000 |
| East of Antelope Valley North of Avenue H | 206 | 3,000 | 9,000 | 13,000 | 30,000 |
| Avenue F at Sierra Highway | 206 | 3,000 | 9,000 | 13,000 | 30,000 |
| West of Sierra Highway at Avenue P-8 | 19 | 700 | 2,100 | 3,100 | 6,600 |
| West of 136th Street East of Avenue W-8 | 2.4 | 440 | 1,500 | 1,900 | 3,900 |
| At intersection of Sixth Street and Quincy Avenue | 1.0 | 271 | 598 | 763 | 1,194 |
| Ballona Creek | 16.7 | 2,100 | 4,700 | 6,000 | 9,400 |
| Big Rock Wash | 23.0 | — | — | 15,000 | — |
| Bouquet Canyon Approximately 4,500 feet upstream of Vasquez Canyon Road | 38.6 | — | — | 11,303 | 23,161 |
| Bouquet Canyon Approximately 2,600 feet upstream of Bouquet Canyon Road | 32.1 | — | — | 11,117 | 22,707 |
| Castaic Creek Approximately 2,100 feet upstream of Confluence with Charlie Canyon | 16.8 | — | — | 11,805 | 22,326 |
| Cheseboro Creek | 7.6 | 2,169 | 4,779 | 6,088 | 9,551 |
| Cold Creek – Cross Section A | 8.1 | 2,280 | 5,019 | 6,406 | 10,023 |
| Cold Creek – Cross Section C | 7.8 | 2,280 | 5,041 | 6,432 | 10,066 |
| Cold Creek – Cross Section G | 5.7 | 1,734 | 3,826 | 4,881 | 7,640 |
| Dark Canyon | 1.2 | 753 | 1,600 | 2,118 | 3,314 |
| Dowd Canyon at Calle Corona Extended | 3.9 | — | — | 2,982 | 5,963 |
| Dry Canyon – Cross Section C | 1.1 | 527 | 1,104 | 1,484 | 2,323 |
| Dry Canyon – Cross Section M | 0.8 | 490 | 1,083 | 1,382 | 2,162 |
| Dry Canyon – Cross Section T | 0.4 | 242 | 534 | 681 | 1,065 |
| Dry Canyon – Approximately 2,000 feet upstream of San Francisquito Road | 5.5 | — | — | 5,235 | 10,470 |
| Elizabeth Canyon Approximately 2,300 feet downstream of Elizabeth Lake Pine Canyon Road | 7.7 | — | — | 3,455 | 7,176 |
| Escondido Canyon – Cross Section B | 3.2 | 958 | 2,116 | 2,700 | 4,226 |
| Escondido Canyon – Cross Section F | 1.7 | 986 | 2,176 | 2,778 | 4,346 |
| Garapito Canyon – Cross Section A | 2.9 | 996 | 2,171 | 2,807 | 4,392 |
| Garapito Canyon – Cross Section E | 2.0 | 675 | 1,470 | 1,910 | 2,974 |
| Gorman Creek Approximately 250 feet north of Interstate Highway 5 Overcrossing Gorman Road | 3.8 | — | — | 1,713 | 3,221 |

| Source/Location | Drainage Area (square miles) | Discharge (cubic feet/second) | | | |
|---|---|---|---|---|---|
| | | 10-Year | 50-Year | 100-Year | 500-Year |
| Halsey Canyon Approximately 1,150 feet downstream of Halsey Canyon Road | 7.3 | — | — | 5,544 | 10,163 |
| Halsey Canyon Approximately 500 feet downstream of Romero Canyon Road | 5.9 | — | — | 4,523 | 8,292 |
| Haskell Canyon approximately 1,300 feet downstream of Headworks | 6.7 | — | — | 5,363 | 10,516 |
| Haskell Canyon approximately 6,400 feet upstream of confluence with Bouquet Canyon | 10.4 | — | — | 7,268 | 14,072 |
| Iron Canyon Approximately 2,000 feet upstream of Sand Canyon Road | 2.8 | — | — | 2,078 | 2,833 |
| Las Flores Canyon | 4.1 | 1,758 | 3,882 | 4,954 | 7,752 |
| Las Virgenes Creek – Cross Section D | 14.3 | 3,591 | 7,928 | 10,175 | 15,832 |
| Las Virgenes Creek – Cross Section H | 12.2 | 3,542 | 7,822 | 9,980 | 15,619 |
| Liberty Canyon | 1.4 | 938 | 2,072 | 2,645 | 4,140 |
| Lindero Canyon – Cross Section C | 6.7 | 1,725 | 3,809 | 4,860 | 7,604 |
| Lindero Canyon – Cross Section E | 4.1 | 1,369 | 3,024 | 3,858 | 6,037 |
| Lindero Canyon – Cross Section H | 3.8 | 1,343 | 2,965 | 3,783 | 5,920 |
| Lindero Canyon – Cross Section M | 3.4 | 1,290 | 2,847 | 3,632 | 5,685 |
| Lindero Canyon – Cross Section N | 3.1 | 1,258 | 2,776 | 3,542 | 5,545 |
| Little Rock Reservoir | 48.0 | — | — | 20,000 | — |
| Los Angeles River – At Compton Creek | 808 | 92,900 | 133,000 | 142,000 | 143,000 |
| Los Angeles River – At Imperial Highway | 752 | 89,400 | 126,000 | 140,000 | 156,000 |
| Malibu Creek – Cross Section A | 109.6 | 14,183 | 31,648 | 40,544 | 63,934 |
| Malibu Creek – Cross Section B | 109.2 | 14,183 | 31,648 | 40,544 | 63,934 |
| Malibou Lake | 64.6 | 11,859 | 26,556 | 34,043 | 53,712 |
| Medea Canyon – Cross Section B | 24.6 | 5,794 | 12,788 | 16,319 | 25,537 |
| Medea Canyon – Cross Section H | 23.0 | 6,174 | 13,628 | 17,389 | 25,537 |
| Medea Canyon – Cross Section K | 22.2 | 6,363 | 14,074 | 17,925 | 28,049 |
| Medea Canyon – Cross Section P | 6.3 | 2,558 | 5,647 | 7,204 | 11,272 |
| Mint Canyon 3,600 feet downstream of Vazquez Canyon Road | 26.8 | — | — | 7,896 | 14,179 |
| Mint Canyon 1,600 feet downstream of Sierra Highway Crossing | 29.3 | — | — | 8,300 | 14,581 |
| Mint Canyon Approximately 2,600 feet downstream of Davenport Road | 19.9 | — | — | 6,691 | 12,604 |
| Newhall Creek Approximately 800 feet downstream of Sierra Highway | 5.2 | — | — | 3,224 | 4,396 |
| Newhall Creek Approximately 650 feet upstream of Sierra Highway | 6.2 | — | — | 3,390 | 5,424 |
| Newhall Creek Approximately 650 downstream of Railroad Canyon | 7.3 | — | — | 3,892 | 6,228 |
| Oak Springs Canyon Approximately 100 feet upstream of Union Pacific Railroad | 5.7 | — | — | 2,703 | 4,054 |
| Old Topanga Canyon – Cross Section E | 1.7 | 567 | 1,253 | 1,597 | 2,499 |
| Old Topanga Canyon – Cross Section H | 0.8 | 251 | 554 | 706 | 1,104 |
| Palo Comado Creek – Cross Section E | 4.1 | 1,159 | 2,562 | 3,268 | 5,113 |
| Palo Comado Creek – Cross Section J | 3.5 | 1,074 | 2,374 | 3,028 | 4,738 |
| Palo Comado Creek – Cross Section K | 3.2 | 1,032 | 2,279 | 2,908 | 4,551 |
| Pine Canyon Approximately 1,200 feet upstream of Lake Hughes Road | 6.4 | — | — | 2,969 | 6,166 |
| Placerita Creek Approximately 850 feet downstream of Antelope Valley Freeway | 6.3 | — | — | 3,546 | 5,673 |

| Source/Location | Drainage Area (square miles) | Discharge (cubic feet/second) | | | |
|---|---|---|---|---|---|
| | | 10-Year | 50-Year | 100-Year | 500-Year |
| Placerita Creek Approximately 2,000 feet upstream of Quigley Canyon Road | 7.1 | — | — | 4,085 | 6,313 |
| Placerita Creek Approximately 2,900 feet upstream of Quigley Canyon Road | 8.6 | — | — | 4,988 | 7,482 |
| Placerita Creek Approximately 575 feet upstream of San Fernando Road | 9.3 | — | — | 5,321 | 7,981 |
| Plum Canyon approximately 2,350 feet upstream of Bouquet Canyon Road | 3.4 | — | — | 1,942 | 3,453 |
| Railroad Canyon Approximately 350 feet upstream of San Fernando Road | 1.2 | — | — | 835 | 1,253 |
| Ramirez Canyon – Cross Section B | 3.3 | 1,066 | 2,352 | 3,000 | 4,696 |
| Ramirez Canyon – Cross Section I | 2.8 | 1,150 | 2,540 | 3,240 | 5,070 |
| Rio Hondo River – At Stewart and Gray Road | 132 | 35,600 | 41,000 | 39,300 | 40,200 |
| Rio Hondo River – At Beverly Boulevard | 113 | 33,800 | 37,500 | 38,000 | 38,400 |
| Rio Hondo River – At Outflow from Whittier Narrows Dam | 110 | 33,500 | 36,500 | 36,500 | 36,500 |
| Sand Canyon Approximately 800 feet upstream of Placerita Canyon Road | 6.4 | — | — | 4,371 | 5,961 |
| Sand Canyon Approximately 2,900 feet downstream of Placerita Canyon Road | 7.3 | — | — | 4,908 | 6,693 |
| Sand Canyon Approximately 250 feet downstream of Iron Canyon Confluence | 10.1 | — | — | 6,372 | 8,689 |
| San Francisquito Canyon at Spunky Road | 2.7 | — | — | 2,140 | 4,281 |
| San Martinez-Chiquito Canyon Approximately 1,000 feet upstream of Chiquito Canyon Road (Lower Crossing) | 4.7 | — | — | 4,659 | 8,607 |
| San Martinez-Chiquito Canyon Approximately 400 feet upstream of Chiquito Canyon Road (Upper Crossing) | 3.1 | — | — | 3,112 | 5,705 |
| San Martinez-Chiquito Canyon Approximately 250 feet downstream of Verdale Street | 1.1 | — | — | 1,205 | 2,208 |
| Santa Clara River – Approximately 3,500 feet upstream of Arrastre Canyon Road | 67.7 | — | — | 8,408 | 13,849 |
| Santa Clara River – 7,600 feet upstream of Oak Springs Canyon | 172.7 | — | — | 13,412 | 22,588 |
| Santa Clara River – At Sand Canyon Road | 179.4 | — | — | 13,934 | 23,467 |
| Santa Clara River – Approximately 2,600 feet upstream of Los Angeles Aqueduct | 235.4 | — | — | 15,182 | 26,369 |
| Approximately 1,800 feet south of Intersection of San Fernando Road and Magic Mountain Parkway | 1.9 | — | — | 1,437 | 2,495 |
| Santa Maria Canyon | 3.1 | 1,070 | 2,333 | 3,016 | 4,719 |
| South Fork Santa Clara River Approximately 600 feet downstream of Golden State Freeway | 12.8 | — | — | 8,417 | 13,596 |
| South Fork Santa Clara River Approximately 500 feet Downstream of Wiley Canyon Road | 12.9 | — | — | 8,483 | 13,704 |
| Stokes Canyon – Cross Section B | 2.9 | 1,089 | 2,403 | 3,067 | 4,799 |
| Stokes Canyon – Cross Section C | 2.4 | 934 | 2,062 | 2,632 | 4,117 |
| Topanga Canyon – Cross Section H | 19.6 | 4,095 | 9,040 | 11,537 | 18,054 |
| Topanga Canyon – Cross Section M | 15.0 | 5,404 | 11,930 | 15,223 | 23,882 |
| Topanga Canyon – Cross Section Q | 14.5 | 5,208 | 11,499 | 14,672 | 22,960 |
| Topanga Canyon – Cross Section T | 7.3 | 2,560 | 5,656 | 7,215 | 11,289 |

| Source/Location | Drainage Area (square miles) | Discharge (cubic feet/second) | | | |
|---|---|---|---|---|---|
| | | 10-Year | 50-Year | 100-Year | 500-Year |
| Topanga Canyon – Cross Section V | 7.0 | 2,364 | 5,222 | 6,601 | 10,422 |
| Topanga Canyon – Cross Section X | 5.5 | 1,862 | 4,113 | 5,247 | 8,210 |
| Trancas Creek – Upstream of Pacific Coast Highway | 8.6 | 2,499 | 5,518 | 7,040 | 11,106 |
| Triunfo Creek – Cross Section B | 28.7 | 1,781 | 11,396 | 14,898 | 24,298 |
| Triunfo Creek – Cross Section E | 28.3 | 4,846 | 11,544 | 15,090 | 24,606 |
| Unnamed Canyon (Serra Retreat Area, Malibu Area) | 0.4 | 281 | 619 | 791 | 1,237 |
| Vasquez Canyon Approximately 1,373 feet upstream of Vasquez Canyon Road | 4.2 | — | — | 2,851 | 5,009 |
| Violin Canyon Approximately 2,000 feet downstream of Interstate Highway 5 | 10.5 | — | — | 9,421 | 17,818 |
| Wildwood Canyon Approximately 600 feet upstream of Intersection of Valley Street and Maple Street | 0.23 | — | — | 172 | 279 |
| Zuma Canyon – Cross Section A | 8.9 | 2,024 | 4,469 | 5,705 | 8,925 |
| Zuma Canyon – Cross Section B | 8.4 | 2,079 | 4,590 | 5,858 | 9,167 |

The FEMA Flood Insurance Study identified the following as waterways in unincorporated areas of the County that have relatively high velocity discharges:

- Trancas Creek
- Malibu Creek
- Garapito Creek
- Cold Creek
- Cheseboro Creek
- Palo Comado Creek
- Las Virgenes Creek
- Medea Creek
- Lindero Creek
- Triunfo Creek
- Hacienda Creek
- Zuma Canyon
- Ramirez Canyon
- Escondido Canyon
- Unnamed Canyon (Serra Retreat Area)
- Las Flores Canyon
- Topanga Canyon
- Old Topanga Canyon
- Dark Canyon
- Dry Canyon

Such discharges historically tend to erode the main channel, creating the potential for more unpredictable flood flows and greater flood risk to structures in the floodplain.

## 6.8.2 Coastal Flooding

FEMA evaluates the potential impact of a flood event along the coastline through coastal hydraulic analysis and wave run-ups. Wave run-ups are defined as "the uprush of the wave along the shore; also, the combined vertical and horizontal distance that a tsunami moves inland from the shoreline" (Keller and Blodgett, 2008). The FEMA standard definition of wave run-up is " the height above the stillwater elevation (tide and surge) reached by the swash" (FEMA 2005a). Figure 6-6 shows the features of wave run-up.

Run-up calculations provide a greater understanding of potential beach and dune erosion that may result from a flood or storm. Run-up can be impacted by factors including local water level, wave conditions of a particular incident (height, period, steepness, direction), and the nature of the impacted beach/structure (FEMA 2005a). Run-up analysis considers "wave setup," which is the increased elevation of the water level that occurs from transferring wave-related momentum to the surf zone (FEMA 2005b).

Wave run-up measurements are important for making accurate evaluations of overtopping that occurs when a barrier's crest height is lower than the potential run-up level, so that waves running up the face of the barrier pass over the crest. If a run-up calculation indicates potential overtopping, it can increase a hazard zone in flood maps (FEMA 2005b).

*Source: FEMA 2005a*

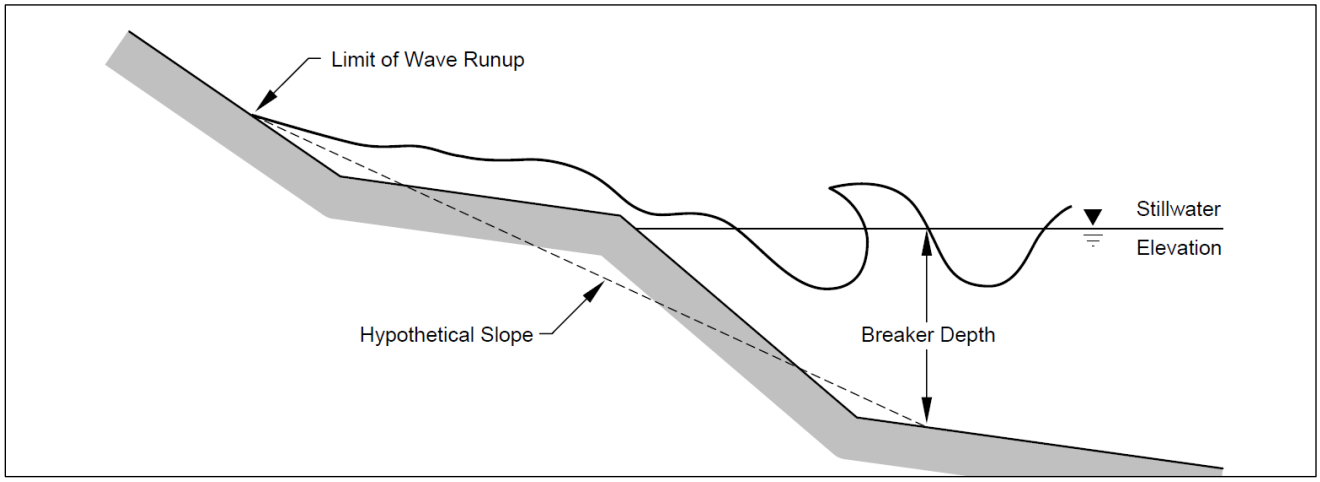



**Figure 6-6.** Wave Run-Up

A summary of wave run-up and setup information for relevant Pacific Ocean beach areas in Los Angeles County is provided in Table 6-4 and Table 6-5.

## 6.9 WARNING TIME

Due to the sequential pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger.

Each watershed has unique qualities that affect its response to rainfall. A hydrograph, which is a graph or chart illustrating stream flow in relation to time, is a useful tool for examining a stream's response to rainfall. Once rainfall starts falling over a watershed, runoff begins and the stream begins to rise. Water depth in the stream channel (stage of flow) will continue to rise in response to runoff even after rainfall ends. Eventually, the runoff will reach a peak and the stage of flow will crest. It is at this point that the stream stage will remain the most stable, exhibiting little change over time until it begins to fall and eventually subside to a level below flooding stage.

The potential warning time a community has to respond to a flooding threat is a function of the time between the first measurable rainfall and the first occurrence of flooding. The time it takes to recognize a flooding threat reduces the potential warning time to the time that a community has to take actions to protect lives and property. Another element that characterizes a community's flood threat is the length of time floodwaters remain above flood stage.

The Los Angeles County flood threat system consists of a network of precipitation gages throughout the watershed and stream gages at strategic locations in the County that constantly monitor and report stream levels. This information is provided to the National Weather Service (NWS) and National Oceanic and Atmospheric Administration. In addition to this program, data and flood warning information is provided by the NWS.

**Table 6-4.** Summary of Elevations for Wave Run-up in the County of Los Angeles

| | Wave Run-Up Elevation (feet) | | |
|---|---|---|---|
| | 10-Percent Annual Chance | 1-Percent Annual Chance | 0.2-Percent Annual Chance |
| At Will Rogers Beach, approximately 400 feet south of the Intersection of Tramonto Drive and Porto Marina Way | 14.3 | 19 | 22.1 |
| At Will Rogers Beach, Approximately 300 feet South of the Intersection of Breve Way and Porta Marina Way | 13.4 | 17.5 | 20.4 |
| At Will Rogers Beach, at Sunset Boulevard Extended | 11.3 | 13.9 | 16.5 |
| At Will Rogers Beach at Temescal Canyon Road Extended | 10.9 | 13.3 | 15.8 |
| At Will Rogers Beach, Approximately 900 feet South of the Intersection of Beirut Avenue and Via De Las Olas | 11 | 13.5 | 16 |
| At Will Rogers Beach at Entrada Drive Extended | 12 | 15.1 | 17.8 |
| At Venice Beach at Washington Street Extended | 12 | 15.1 | 17.8 |
| At Dockweiler Beach, at Culver Boulevard Extended | 11.3 | 14 | 16.6 |
| At Dockweiler Beach, at Beaumont Street Extended | 11.9 | 14.9 | 17.6 |
| At Dockweiler Beach, at Fountainbleau Street Extended | 12.5 | 15.9 | 18.7 |
| At Dockweiler Beach, at Ipswich Street Extended | 13.7 | 18 | 21 |
| At Dockweiler Beach, Approximately 900 feet Northwest of the Intersection of Imperial Highway and Vista Del Mar | 13.1 | 17.1 | 19.9 |
| At Dockweiler Beach, Approximately 5,000 feet Northwest of the Corporate Limits | 12.8 | 16.1 | 18.9 |
| At Dockweiler Beach, Approximately 4,100 feet Northwest of the Corporate Limits | 12 | 15.2 | 17.9 |
| Along Dockweiler Beach, Approximately 3,400 feet Northwest of the Corporate Limits | 11.5 | 14.2 | 16.8 |
| Along Dockweiler Beach, Approximately 2,400 feet Northwest of the Corporate Limits | 10.9 | 13.3 | 15.8 |
| Along Dockweiler Beach, Approximately 1,000 feet Northwest of the Corporate Limits | 11.5 | 14.3 | 16.9 |
| Along Dockweiler Beach, Approximately 100 feet Northwest of the Corporate Limits | 12.1 | 15.3 | 18.1 |
| At Corporate Limits, at Royal Palms Beach, Approximately 1,000 feet Northwest of Shad Place Extended | 14.1 | 18.7 | 21.7 |
| At Royal Palms Beach, at Anchovy Avenue Extended | 12.9 | 16.7 | 19.5 |
| At Whites Point | 12.3 | 15.7 | 18.4 |
| At Beach, at Weymouth Avenue Extended | 13.5 | 17.7 | 20.6 |
| At Point Fermin Beach, at Barbara Street Extended | 12.3 | 15.7 | 18.4 |
| At Point Fermin Beach, at Cabrillo Avenue Extended | 13.8 | 18.2 | 21.2 |
| Approximately 1,000 feet North of Point Fermin along Beach | 17.4 | 24.7 | 28.3 |
| At Beach, at Carolina Street Extended | 16.5 | 22.7 | 26.1 |
| At Beach, at Pacific Avenue Extended | 15.5 | 21 | 24.3 |
| At Cabrillo Beach, at 40th Street Extended | 14.1 | 18.7 | 21.7 |
| Catalina Avenue Extended at Beach | 7.3 | 7.9 | 8.2 |
| Approximately 1,500 feet North of Catalina Avenue Extended along Beach | 8.8 | 10 | 10.7 |
| At Hamilton Beach | 7.9 | 8.8 | 9.2 |
| At Sequit Point | 11.5 | 14.3 | 16.9 |
| At Arroyo Sequit Mouth | 10.7 | 13 | 15.5 |
| Approximately 800 feet East of Arroyo Sequit Mouth along Beach | 11.5 | 14.3 | 17 |
| Approximately 800 feet South of the Intersection of Nicholas Beach Road and Pacific Coast Highway | 12 | 15.2 | 17.8 |
| Approximately 2,400 feet West of Los Alisos Canyon Creek Mouth along Beach | 14.3 | 19 | 22 |
| At Los Alisos Canyon Creek Mouth | 12 | 15.1 | 17.8 |

| | Wave Run-Up Elevation (feet) | | |
|---|---|---|---|
| | 10-Percent Annual Chance | 1-Percent Annual Chance | 0.2-Percent Annual Chance |
| Approximately 900 feet Southeast of the Intersection of Encinal Canyon Road and Pacific Coast Highway along Beach | 12.3 | 15.7 | 18.4 |
| At Encinal Canyon Creek Mouth | 12.9 | 16.7 | 19.5 |
| Approximately 250 feet South of the Intersection of Seal Level Drive and Roxanne Beach Road | 10.9 | 13.3 | 15.8 |
| At Lechuza Point | 15.5 | 20.8 | 24.3 |
| At Steep Hill Canyon Creek Mouth | 13.1 | 17 | 19.9 |
| At Trancas Creek | 10.9 | 13.3 | 15.8 |
| Approximately 200 feet West of Point Dume | 12.4 | 16 | 18.8 |
| At Point Dume | 15.5 | 20.8 | 24.3 |
| At Dume Cove, Approximately 500 feet Southeast of the Intersection of Dume Drive and Cliffside Drive | 13.1 | 16.9 | 19.9 |
| At Dume Cove, Approximately 400 feet South of the Intersection of Fernhill Drive and Cliffside Drive | 12.1 | 15.3 | 18.1 |
| At Dume Cove, Approximately 750 feet South of the Intersection of Grayfox Street and Cliffside Drive | 13.1 | 16.9 | 19.9 |
| At Paradise Cove, at Walnut Canyon | 12.4 | 15.8 | 18.6 |
| At Paradise Cove, Approximately 2,000 feet Northeast of Walnut Canyon Creek Mouth along Beach | 15.8 | 20.8 | 24.3 |
| At Paradise Cove, at Ramirez Canyon Mouth | 11.5 | 14.3 | 16.9 |
| At Escondido Beach, at Escondido Canyon Mouth | 10.7 | 12.9 | 15.5 |
| At Escondido Beach, Approximately 200 feet East of the Intersection of Latigo Shore Place and Latigo Shore Drive | 11.5 | 14.3 | 16.9 |
| Approximately 500 feet West of Solstice Canyon Creek Mouth along Beach | 13.9 | 18.3 | 21.3 |
| At Solstice Canyon Creek Mouth | 12.1 | 15.3 | 18.1 |
| At Corral Beach, at Corral Canyon Creek Mouth | 11.3 | 13.9 | 16.4 |
| At Corral Beach, Approximately 250 feet South of the Intersection of Malibu Road and Pacific Coast Highway | 13 | 16.9 | 19.6 |
| Approximately 1,500 feet East of Corral Canyon Creek Mouth along Beach | 13 | 16.9 | 19.6 |
| At Puerco Beach, Approximately 200 feet South of the Intersection of Puerco Canyon Road and Malibu Road | 11.3 | 13.9 | 16.4 |
| At Puerco Beach, at Puerco Canyon Creek Mouth | 13 | 16.9 | 19.6 |
| At Amarillo Beach, Approximately 2,200 feet East of Marie Canyon Creek Mouth along Beach | 11.3 | 13.9 | 16.4 |
| At Amarillo Beach, Approximately 3,000 feet East of Marie Canyon Creek Mouth Along Beach | 13 | 16.9 | 19.6 |
| At Malibu Beach, Approximately 850 feet Southwest of Intersection of Malibu Road and Malibu Colony Drive | 11.3 | 13.9 | 16.4 |
| At Malibu Creek Mouth | 10.6 | 12.8 | 15.2 |
| At Las Flores Canyon Mouth | 11.3 | 13.9 | 16.4 |
| Approximately 2,500 feet East of Las Flores Canyon Mouth along Beach | 11.6 | 14.5 | 17.1 |
| Approximately 1,500 feet West of Piedra Gorda Canyon Creek Mouth Along Beach | 11.4 | 14.2 | 16.8 |
| Approximately 100 feet South of the Intersection of Budwood Motorway and Pacific Coast Highway | 11.9 | 14.9 | 17.6 |
| At Topanga Canyon Mouth | 11.4 | 14.1 | 16.7 |

**Table 6-5.** Summary of Elevations for Wave Setup in the County of Los Angeles

| | Wave Setup Elevation (feet) | | |
|---|---|---|---|
| | 10-Percent Annual Chance | 1-Percent Annual Chance | 0.2-Percent Annual Chance |
| At Marina Del Ray Entrance Channel and Ballona Creek | 7.7 | 8.9 | 11.1 |
| At Los Angeles Harbor | 7.7 | 8.9 | 11.1 |
| At Malibu Creek Mouth | 7.7 | 8.9 | 11.1 |
| At Marina Del Ray | 7.7 | 8.9 | 11.1 |

Wireless Emergency Alerts from NWS are notices about potentially hazardous weather that are sent out to all compatible cell phones in affected areas. All of this information is analyzed to evaluate the flood threat and possible evacuation needs. Figure 6-7 shows stream gage locations for Los Angeles County, as provided in the 2017-2018 Hydrologic Report.

Figure 6-8 is a typical hydrograph for major waterways in Los Angeles County. The hydrograph provides real-time data with action levels, minor, moderate, and major flood stages in relation to current river heights.

The NWS issues watches and warnings as follows when forecasts indicate rivers may approach bank-full levels:

- Minor Flooding—Minimal or no property damage, but possibly some public threat or inconvenience.
- Moderate Flooding—Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding—Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NWS, 2011).

When a watch is issued, the public should prepare for the possibility of a flood. When a warning is issued, the public is advised to stay tuned to a local radio station for further information and be prepared to take quick action if needed. A warning means a flood is imminent, generally within 12 hours, or is occurring. Local media broadcast NWS warnings. NWS has established thresholds for flood warnings on the major rivers in Los Angeles County as follows:

- Los Angeles River—Forecasted river stage of 13.9 feet or higher at the gage near Tujunga Avenue
- Ballona Creek—Forecasted river stage of 15 feet or higher at the gage near Sawtelle Boulevard.

## 6.10 LOS ANGELES COUNTY DRAINAGE AREA PROJECT

In 1915, the State Legislature created the Los Angeles County Flood Control District to control floods and conserve water. Early bond issues financed construction of 14 dams in the San Gabriel Mountains as well as flood channel modifications. District funding financed construction of debris basins to trap sediment. The federal Emergency Relief Appropriations Act of 1935 financed the construction of Eaton Wash Dam. The federal Flood Control Act of 1936 made the Army Corps of Engineers a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities.

The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the Los Angeles County Drainage Area (LACDA) study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel and Ballona Creek. Flood control facilities in the LACDA system fall into four general categories, as described in the following sections. In total, the system has over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 15 flood control and stormwater capture dams, and five flood control dams.

*Source: Los Angeles County Hydrologic Report, 2017-2018*

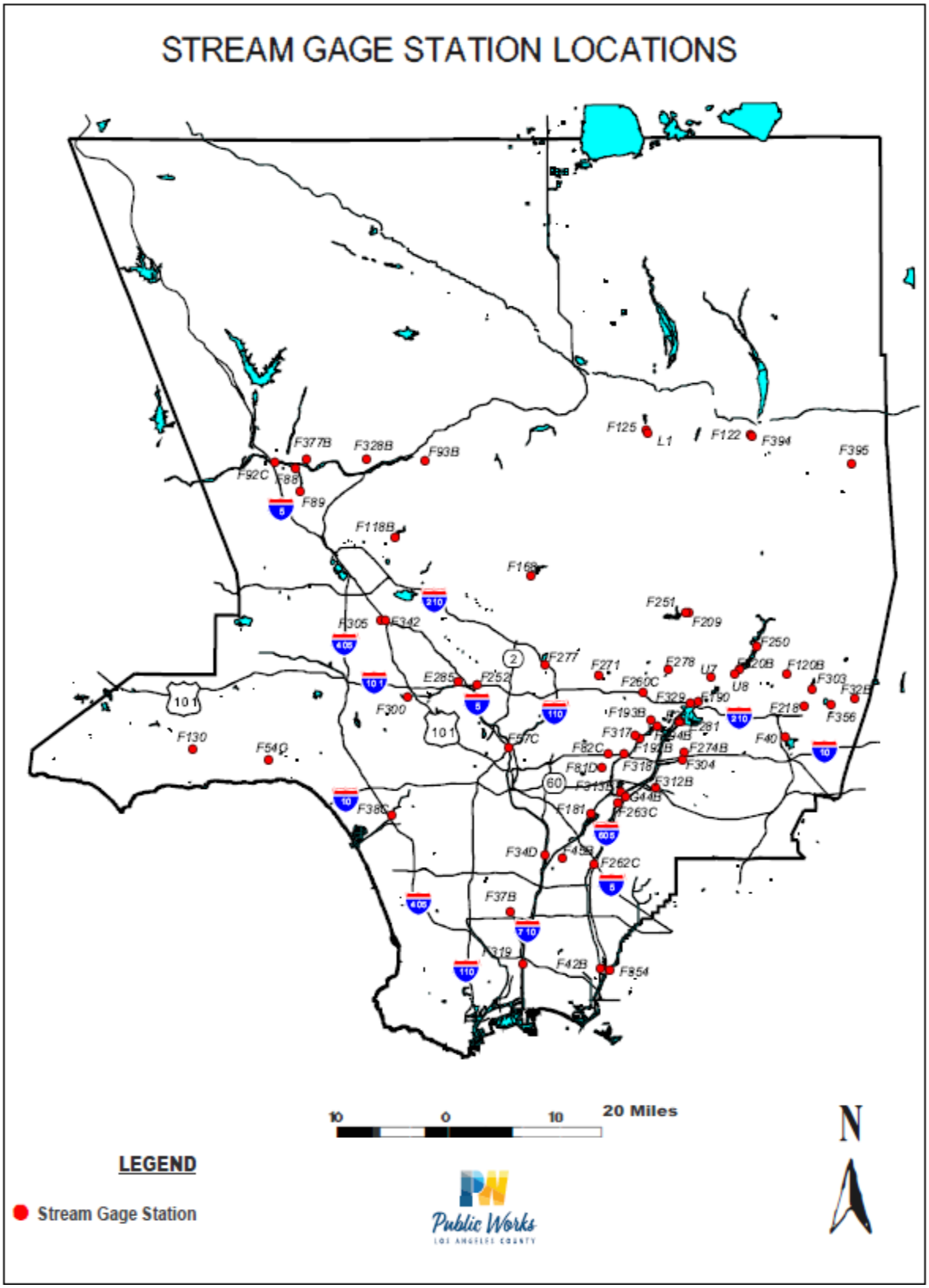



**Figure 6-7.** Stream Gage Locations in Los Angeles County

*Source: https://water.weather.gov/ahps2/hydrograph.php?gage=blnc1&wfo=lox*

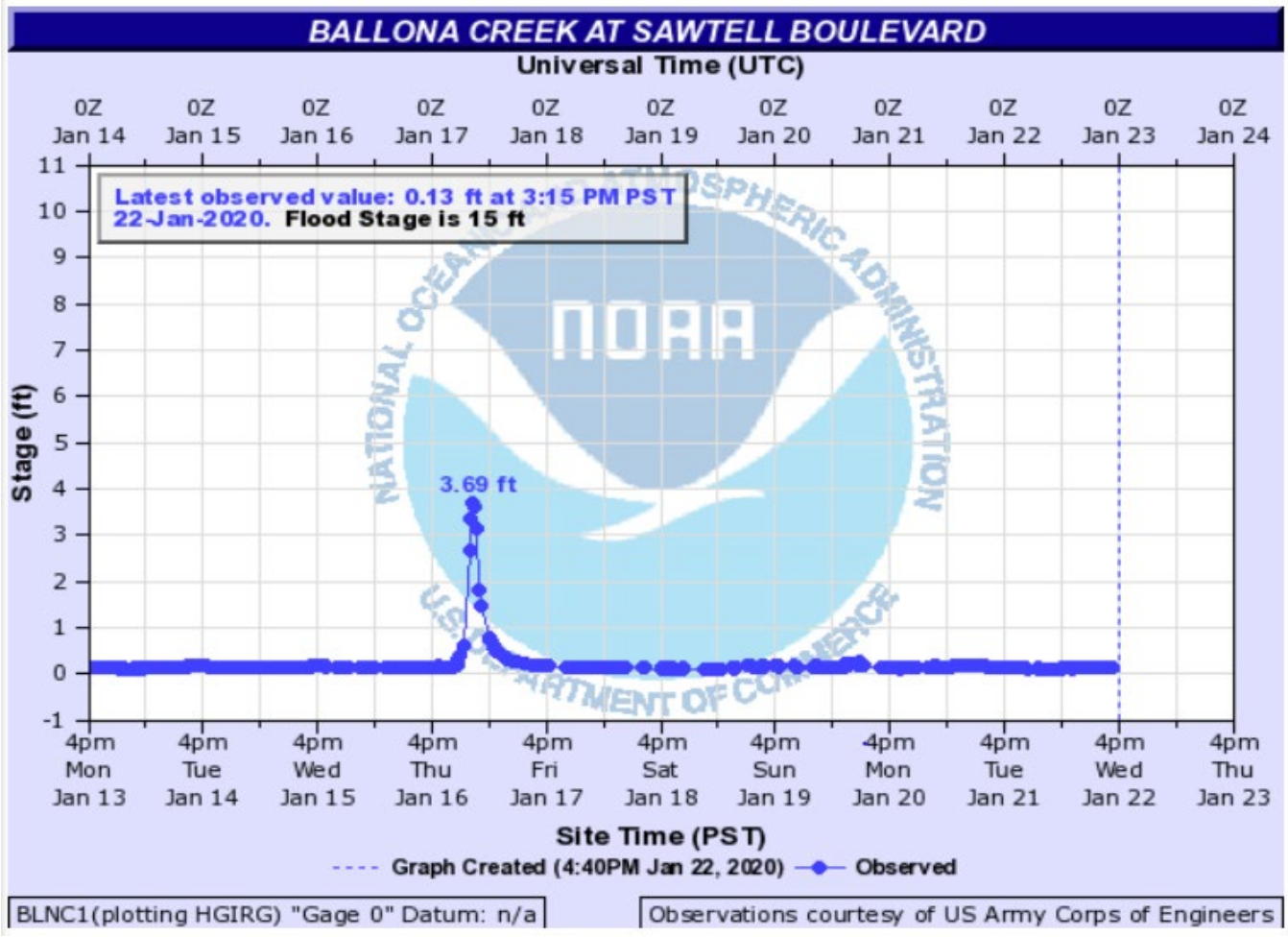



**Figure 6-8.** Ballona Creek Hydrograph at Sawtelle Boulevard

## 6.10.1 Debris Basins

Debris basins, found at the mouth of canyons, trap debris carried by floodwaters, leaving water to flow unimpeded in downstream channels. In addition to those built by the Corps, the County has constructed or accepted for maintenance and operation over 100 debris basins within the upper watershed areas of the LACDA system. Almost 30 of the debris basins in the LACDA system are in unincorporated areas; a significant number of these provide debris protection to incorporated communities.

## 6.10.2 Flood Control Reservoirs

Flood control reservoirs control and reduce stream flow so that downstream main channel capacities are not exceeded. The Army Corps operates five major reservoirs:

- Hansen Dam—25,446 acre-feet (located in the City of Los Angeles)
- Lopez Dam—441 acre-feet (located in the City of Los Angeles)
- Santa Fe Dam—30,887 acre-feet (located in the City of Irwindale)
- Sepulveda Dam—17,425 acre-feet (located in the City of Los Angeles)
- Whittier Narrows Dam—34,947 acre-feet (located in unincorporated area near the Cities of El Monte, Montebello and Pico Rivera)

County-operated facilities include 15 flood control and stormwater capture reservoirs in the upper watershed areas of the LACDA system. Combined, these local reservoirs have a maximum combined capacity of 109,146 acre-feet. The City of Los Angeles has built and operates recreational facilities at the Hansen Dam and Sepulveda Dam (golf courses, riding and hiking trails, picnic, etc.). The County and a state conservancy have built and operate recreational facilities at Whittier Narrows Dam (sports fields, riding and hiking trails, picnic areas, etc.).

### 6.10.3 Improved Tributary Channels

Improved tributary channels speed the passage of flood flows through local communities and into the main stem river system. Table 6-6 lists the major such channels in the County.

### 6.10.4 Improved Main Channels

Main channel improvements pass controlled or partially controlled flows to the ocean. The Los Angeles River is improved for most of its length below Sepulveda Dam. Its sides and bottom are generally lined with concrete or grouted rock, although reaches between the Burbank Western System outlet and Interstate 5 have no concrete bottoms due to underlying geology that causes groundwater to rise to the surface during storms. Sepulveda and Hansen Dams regulate flows to the main channel of the Los Angeles River. The Los Angeles River goes through the unincorporated area of East Compton.

The San Gabriel River is improved from the mouth of San Gabriel Canyon to the ocean; from the canyon mouth to Firestone Boulevard the channel's sides are lined with concrete or grouted rock and its bottom is unpaved, except for drop structures installed to decrease flow velocity and channel erosion. From Firestone Boulevard to Interstate 405, the channel bottom is concrete. The remaining reaches to the ocean are earthen. The San Gabriel River goes through an unincorporated area in the vicinity of Whittier and Santa Fe Springs.

## 6.11 OTHER SYSTEMS

### 6.11.1 Dominguez Channel

Dominguez Channel was built by the Flood Control District, west of the Los Angeles River. Its watershed includes the unincorporated area of West Carson. Also within the watershed are the Cities of Carson, Gardena, Hawthorne, Lawndale, Torrance and Wilmington. The channel has earthen or clay-lined bottoms and stone-lined sides.

### 6.11.2 Los Cerritos Channel

Los Cerritos Channel was built by the Flood Control District, west of the San Gabriel River. Its watershed includes an unincorporated area in northeast Long Beach. Also within the watershed are the Cities of Bellflower, Downey, Lakewood, Long Beach and Signal Hill. The channel upstream of Atherton Street has concrete-lined sides and bottom; downstream, the channel has an earthen bottom and stone-lined sides.

### 6.11.3 Malibu Creek

Malibu Creek is a natural watercourse in the Santa Monica Mountains. Its watershed includes the unincorporated areas of Cornell, Las Virgenes Canyon, Medea Creek, Monte Nido, Seminole Hot Springs, Stokes Canyon, Triunfo Canyon, and an area west of Hidden Hills, as well as the Cities of Agoura Hills, Calabasas, Malibu and Westlake Village. The watershed also includes Malibu Creek State Park, the Santa Monica Mountains National Recreational Area, Century Dam, Las Virgines Reservoir Dam, Lake Sherwood Dam, Malibou Lake Dam, and Westlake Dam. None of the dams were intended to serve a flood control function in their design.

**Table 6-6.** Major Improved Tributary Channels

| | Built by: | Affected Unincorporated Areas |
|---|---|---|
| **Los Angeles River Tributaries** | | |
| **Burbank Western System** | Corps of Engineers | |
| **Caballero Creek** | Corps of Engineers | |
| **Compton Creek** | Corps of Engineers | Dominguez Hills, Dominguez Junction and Rancho Dominguez |
| **A reach of Pacoima Wash** | Corps of Engineers | |
| **Rio Hondo** | Corps of Engineers | |
| **Sycamore Wash** | Corps of Engineers | |
| **Tujunga Wash** | Corps of Engineers | Big Tujunga, Little Tujunga, Kagel and Lopez Canyons |
| **Lower reaches of Verdugo Wash** | Corps of Engineers | |
| **Aliso Creek** | County | |
| **Arroyo Seco** | County | West Altadena |
| **Bell Creek** | County | Areas in Los Angeles' West Hills |
| **Browns Creek** | County | Browns Canyon |
| **Bull Creek** | County | |
| **Calabasas Creek** | County | |
| **Dayton Creek** | County | Areas in Los Angeles' West Hills |
| **Several reaches of Pacoima Wash** | County | |
| **Upper reaches of Verdugo Wash** | County | La Crescenta, Montrose and Verdugo Woods |
| **Rio Hondo Tributaries** | | |
| **Arcadia Wash** | Corps of Engineers | Areas south of Arcadia, Monrovia and Duarte |
| **Alhambra Wash** | Corps of Engineers | |
| **Eaton Wash** | Corps of Engineers | East Altadena, Chapman Woods and areas near San Gabriel and Temple City |
| **Several reaches of Rubio Wash** | Corps of Engineers | East Altadena, Chapman Woods and areas near San Gabriel and Temple City |
| **Santa Anita Wash** | Corps of Engineers | Areas south of Arcadia, Monrovia and Duarte |
| **Sawpit Wash** | Corps of Engineers | Areas south of Arcadia, Monrovia and Duarte |
| **San Gabriel River Tributaries** | | |
| **Big Dalton Wash** | Corps of Engineers | Areas near Azusa and Covina |
| **Coyote Creek** | Corps of Engineers | Areas near La Mirada, Santa Fe Springs and Whittier |
| **Little Dalton Wash** | Corps of Engineers | |
| **San Dimas Wash** | Corps of Engineers | Areas near Covina and Glendora |
| **San Jose Creek** | Corps of Engineers | Hacienda Heights, Rowland Heights, Sycamore Canyon and Turnbull Canyon |
| **Walnut Creek** | Corps of Engineers | Areas near Covina, San Dimas, Walnut and West Covina |
| **Bassett Channel** | County | Avocado Heights |
| **Charter Oak Wash** | County | |
| **Leffingwell Creek** | County | |
| **Puente Creek** | County | Areas near La Puente and West Covina |
| **Ballona Creek Tributaries** | | |
| **Benedict Canyon Channel** | Corps of Engineers | |
| **Centinela Creek** | Corps of Engineers | |
| **Sawtelle Channel** | Corps of Engineers | |

Improved tributary channels in the watershed in communities along U.S. Highway 101 include Chesboro Canyon, Liberty Canyon, Medea Creek, Russel Creek, and Triunfo Creek. These channels are concrete-lined. Chesboro Channel and some reaches of Medea Creek were constructed by the Flood Control District. The others were built by developers and transferred to the District for operation and maintenance. The watershed also contains over 20 debris basins that were built by developers and transferred to the District for operation and maintenance.

### 6.11.4 Other Major Santa Monica Mountain Drainages

Most of the other drainages in the Santa Monica Mountains do not contain major flood control facilities. There is a concrete-lined District flood control channel in Trancas Canyon in the City of Malibu, and District debris basins in Marie Canyon at Pepperdine University and in the unincorporated area of Parker Mesa.

### 6.11.5 Santa Clara River

Reaches of the Santa Clara River in developed areas west of Agua Dulce have earthen bottoms and sides consisting of concrete, grouted rock or riprap. Many reaches have levees maintained by the District or the City of Santa Clarita. Major improved channels tributary to the river include Bouquet Canyon, Dry Canyon, Hasley Canyon, Mint Canyon, Newhall Creek, Pico Canyon, Rye Canyon, San Martinez Chiquito Canyon, South Fork Santa Clara River, and Violin Canyon. The watershed contains 28 District debris basins, several of which are in unincorporated areas. The District's channels and debris basins were primarily built by developers and transferred to the District for operation and maintenance.

### 6.11.6 Wilmington Drain

Wilmington Drain was built by the Los Angeles County Flood Control District, west of Dominguez Channel. Its watershed includes the unincorporated area of West Carson and the Cities of Carson, Lomita and Los Angeles. The channel is concrete-lined from its inlet at Sepulveda Boulevard to Interstate 110. From Interstate 110 to its outlet at State Route 1, the channel is a natural watercourse.

### 6.11.7 Antelope Valley

The unincorporated areas of Antelope Valley do not contain flood control dams or extensive flood control systems. However, there are three Los Angeles County Flood Control District debris basins and two flood control channels in the City of Palmdale vicinity. Two of the debris basins and one channel are in unincorporated area. The channel in the City is concrete-lined. The channel in the unincorporated area is concrete-lined for some reaches, earthen with pipe and wire revetment for the others.

## 6.12 SECONDARY HAZARDS

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or storm sewers. Potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

## 6.13 FUTURE TRENDS

The County of Los Angeles has established a commitment to mitigating natural hazards and improving community resilience to hazards, in order to protect life and property and preserve natural systems. The County

links hazard mitigation to County of Los Angeles 2035 General Plan development goals to ensure that the County's continued development is managed as sustainably and efficiently as possible (Los Angeles County, 2014b). The General Plan identifies goals and initiatives for natural hazard planning, including, but not limited to, the following (Los Angeles County, 2019):

- Goal LU 3: A development pattern that discourages sprawl, and protects and conserves areas with natural resources and significant ecological areas.
- Goal LU 5: Vibrant, livable, and healthy communities with a mix of land uses, services, and amenities.
- Goal LU 7: Compatible land uses that complement neighborhood character and the natural environment.
- Goal M 7: Transportation networks that minimize negative impacts to the environment and communities.
    - Policy M 7.1: Minimize roadway runoff through the use of permeable surface materials, and other low impact designs, wherever feasible.
- Goal C/NR 3: Permanent, sustainable preservation of genetically and physically diverse biological resources and ecological systems including: habitat linkages, forests, coastal zone, riparian habitats, streambeds, wetlands, woodlands, alpine habitat, chaparral, shrublands, and significant ecological areas.
- Goal S 2: An effective regulatory system that prevents or minimizes personal injury, loss of life, and property damage due to flood and inundation hazards.

The County has several other plans and initiatives designed to promote healthy watersheds, maintain coastal zones, and manage stormwater. These plan components strive to steer future trends in development away from increasing flood risks in Los Angeles County's unincorporated areas. Additionally, Los Angeles County participates in both the NFIP and CRS programs (Class 7). It has adopted flood damage prevention regulations in response to those requirements. The County is committed to maintaining its good standing under the NFIP through actions identified in this plan.

The County forecasts that the unincorporated areas will continue to see substantial population growth, with a projected population of 1,399,500 by 2035 (Los Angeles County, 2019). This is a 33 percent increase from the 2008 population of 1,052,800. As the County targets increased local industry and businesses, new houses, and other opportunities, it will do so in a way that carefully regulates development and redevelopment in critical and flood-prone areas. The cumulative implementation of these plans and regulations will reduce the impacts of future growth in the floodplains and high-risk unincorporated areas of Los Angeles County, and will lessen the impacts of flooding on future development.

## 6.14 SCENARIO

The primary water courses in the planning area have the potential to flood at regular intervals (disaster declarations for flooding have been issued an average of once every 3.5 years), generally in response to a succession of intense winter rainstorms or other seasonal short-duration, high-intensity storms. Storm patterns of warm, moist air usually occur between early November and late March. A series of such weather events can cause severe flooding in the planning area. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time or that lead to coastal flooding in addition to riverine or flash flooding. This could overwhelm response and floodplain management capabilities within the planning area. Major roads could be blocked, preventing critical access for many residents and critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems. In the case of multi-basin flooding, Los Angeles County would not be able to make repairs quickly enough to restore critical facilities and infrastructure. The floodplains mapped and identified by Los Angeles County will continue to take the brunt of these floods. Additionally, as the ground becomes saturated, groundwater flooding typical of the planning area would be significant.

## 6.15 ISSUES

Important issues associated with flood hazards in the planning area include but are not limited to the following issues identified by the Steering Committee:

- Programs to sustain efforts to gather historical damage data (such as high-water marks on structures and damage reports) to measure the cost-effectiveness of future mitigation projects are lacking within the planning area.
- Current County codes and standards, such as the Subdivision, Health and Safety – Water Hazards, and Flood Control District Property and Facilities ordinances, are complex and difficult to interpret.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the County.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The potential impact of climate change on flood conditions needs to be better understood.
- The County's adaptive capacity to address impacts of climate change should be evaluated.
- Floodplain compatible uses such as low-impact development, open-space preservation and low-density development should be considered where feasible and both publicly and politically supported.
- The capability for prediction/forecast modeling needs to be enhanced.
- Flood warning capability should be tied to flood phases.
- There needs to be enhanced modeling to better understand the true flood risk.
- Floodplain restoration/reconnection opportunities should be identified as a means to reduce flood risk.
- Post-flood disaster response and recovery actions need to be solidified.
- Staff capacity is required to maintain the existing level of floodplain management.
- The approximate mapping on FEMA's current effective Flood Insurance Rate Maps has been found to have significant inaccuracies.
- The increasing cost of flood insurance is shifting the public's perception of flood risk.
- Certification/accreditation of levees is inconsistent within the planning area.
- The stormwater/urban drainage flooding risk has not been mapped, which makes it difficult to assess this hazard, other than looking at historical loss data.
- A lack of awareness about flood risk by property owners and other stakeholders can translate to a lack of political will to make changes.
- With a large percentage of pre-FIRM flood insurance policies in force, the County can expect to see significant increases in the costs of flood insurance to its residents. This will create challenges in the promotion of flood insurance and residents' ability to afford flood insurance.

# 7. FLOOD HAZARD EXPOSURE

Hazus was used to assess exposure to flooding in the planning area (the unincorporated areas of Los Angeles County). For the exposure analysis, the 100-year floodplain includes the County's mapped and regulated floodways. These were included with the 100-floodplain because they represent what the County is regulating with its floodplain management regulations.

## 7.1 POPULATION

To estimate populations living in the 10-, 50-, 100- and 500-year FEMA-mapped floodplains, the total planning area population was multiplied by the ratio of the number of structures in the floodplain to the total number in the planning area. Using this approach, exposed populations were estimated as follows:

- 10-year floodplain— 217 (less than 0.1 percent of the planning area population)
- 50-year floodplain—401 (less than 0.1 percent of the planning area population)
- 100-year floodplain—4,733 (less than 0.5 percent of the planning area population)
- 500-year floodplain—45,524 (4.4 percent of the planning area population).

## 7.2 PROPERTY

### 7.2.1 Structures in the Floodplain

Hazus estimates of structures within the floodplain are as follows:

- 64 structures in the 829 acres of 10-year floodplain within the planning area (84 percent residential):
  - 4 in the Amargosa Creek watershed
  - 2 in the Big Sycamore Canyon-Frontal Santa Monica Bay Watershed
  - 8 in the Big Tujunga Creek Watershed
  - 29 in the Garapito Creek-Frontal Santa Monica Bay Watershed
  - 21 in the Malibu Creek Watershed.
- 124 structures in the 1,303 acres of 50-year floodplain within the planning area (81 percent residential):
  - 7 in the Amargosa Creek Watershed
  - 2 in the Big Sycamore Canyon-Frontal Santa Monica Bay Watershed
  - 16 in the Big Tujunga Creek Watershed
  - 49 in the Garapito Creek-Frontal Santa Monica Bay Watershed
  - 50 in the Malibu Creek Watershed.
- 1,712 structures in the 88,438 acres of 100-year floodplain within the planning area (76 percent residential), as detailed in Table 7-1.
- 12,266 structures in the 222,959 acres of 500-year floodplain within the planning area (90 percent residential), as detailed in Table 7-2.

**Table 7-1.** Area and Structures Within the 100-Year Floodplain in Unincorporated Areas

| Watershed | Area (acres) | Number of Structures | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Residential | Commercial | Industrial | Agriculture | Religion | Government | Education | Total |
| Amargosa Creek | 8,564 | 30 | 39 | 0 | 1 | 0 | 14 | 0 | **84** |
| Ballona Creek | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Big Rock Creek-Big Rock Wash | 5,054 | 22 | 6 | 0 | 1 | 0 | 6 | 3 | **38** |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 351 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| Big Tujunga Creek | 207 | 16 | 8 | 0 | 0 | 0 | 5 | 0 | **29** |
| Bouquet Canyon | 1,139 | 15 | 2 | 0 | 0 | 0 | 1 | 0 | **18** |
| Calleguas Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Castaic Creek | 4,333 | 164 | 32 | 5 | 5 | 0 | 7 | 0 | **213** |
| Chino Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Cottonwood Creek-Tylerhorse Canyon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Dalton Wash | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Dominguez Channel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Frontal Santa Monica Bay-San Pedro Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Garapito Creek-Frontal Santa Monica Bay | 769 | 39 | 6 | 4 | 0 | 0 | 3 | 0 | **52** |
| Grapevine Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Headwaters Santa Clara River | 3,900 | 222 | 75 | 1 | 4 | 3 | 8 | 1 | **314** |
| Lake Palmdale-Piute Ponds | 2,452 | 8 | 2 | 0 | 6 | 0 | 4 | 0 | **20** |
| Le Montaine Creek-Eller Slough | 1,210 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| Little Rock Wash | 4,739 | 3 | 2 | 0 | 0 | 0 | 20 | 0 | **25** |
| Lower Los Angeles River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Lower Piru Creek | 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Lower San Gabriel River | 214 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | **27** |
| Malibu Creek | 1,105 | 84 | 5 | 0 | 1 | 0 | 9 | 0 | **99** |
| Mescal Creek-Rocky Buttes | 8,026 | 97 | 0 | 0 | 3 | 0 | 9 | 0 | **109** |
| Rio Hondo | 10 | 24 | 2 | 0 | 0 | 0 | 0 | 0 | **26** |
| Rock Creek-Buckhorn Lake | 15,992 | 80 | 8 | 0 | 7 | 0 | 4 | 0 | **99** |
| Rogers Lake | 171 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Rosamond Lake | 10,881 | 93 | 6 | 0 | 10 | 0 | 2 | 0 | **111** |
| Sacatara Creek-Kings Canyon | 3,965 | 22 | 2 | 0 | 7 | 0 | 0 | 0 | **31** |
| San Jose Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| San Nicholas Island-Santa Catalina Island | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Sheep Creek-El Mirage Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Town of Pearblossom | 9,513 | 51 | 5 | 2 | 12 | 0 | 1 | 0 | **71** |
| Upper Los Angeles River | 65 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| Upper Piru Creek | 2,113 | 2 | 4 | 0 | 2 | 0 | 1 | 0 | **9** |
| Upper San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| Upper Santa Clara River | 3,533 | 305 | 17 | 0 | 1 | 0 | 9 | 0 | **332** |
| West Fork San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **Total** | **88,438** | **1309** | **221** | **12** | **60** | **3** | **103** | **4** | **1712** |

**Table 7-2.** Area and Structures Within the 500-Year Floodplain in Unincorporated Areas

| Watershed | Area (acres) | Number of Structures | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Residential | Commercial | Industrial | Agriculture | Religion | Government | Education | Total |
| Amargosa Creek | 34,117 | 1,360 | 71 | 1 | 3 | 6 | 23 | 0 | 1,464 |
| Ballona Creek | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Big Rock Creek-Big Rock Wash | 5,054 | 22 | 6 | 0 | 1 | 0 | 6 | 3 | 38 |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 360 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Big Tujunga Creek | 220 | 23 | 8 | 0 | 0 | 0 | 7 | 0 | 38 |
| Bouquet Canyon | 1,296 | 20 | 2 | 0 | 1 | 0 | 1 | 0 | 24 |
| Calleguas Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Castaic Creek | 4,478 | 423 | 39 | 5 | 5 | 6 | 7 | 0 | 485 |
| Chino Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado Lagoon-Frontal Alamitos Bay | 23,086 | 542 | 1 | 0 | 0 | 0 | 0 | 0 | 543 |
| Cottonwood Creek-Tylerhorse Canyon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dalton Wash | 49 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| Dominguez Channel | 3,481 | 103 | 28 | 13 | 0 | 0 | 0 | 0 | 144 |
| Frontal Santa Monica Bay-San Pedro Bay | 2,706 | 0 | 34 | 15 | 0 | 0 | 2 | 0 | 51 |
| Garapito Creek-Frontal Santa Monica Bay | 818 | 66 | 8 | 4 | 0 | 0 | 4 | 0 | 82 |
| Grapevine Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Headwaters Santa Clara River | 4,106 | 229 | 76 | 1 | 4 | 3 | 8 | 1 | 322 |
| Lake Palmdale-Piute Ponds | 19,563 | 46 | 14 | 5 | 6 | 0 | 15 | 0 | 86 |
| Le Montaine Creek-Eller Slough | 1,210 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Little Rock Wash | 7,031 | 1,007 | 52 | 1 | 10 | 7 | 36 | 0 | 1,113 |
| Lower Los Angeles River | 20,348 | 2,714 | 290 | 111 | 1 | 15 | 9 | 5 | 3,145 |
| Lower Piru Creek | 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower San Gabriel River | 15,210 | 2,760 | 42 | 2 | 0 | 18 | 17 | 10 | 2,849 |
| Malibu Creek | 1,246 | 98 | 5 | 0 | 1 | 0 | 10 | 0 | 114 |
| Mescal Creek-Rocky Buttes | 8,026 | 97 | 0 | 0 | 3 | 0 | 9 | 0 | 109 |
| Rio Hondo | 1,973 | 24 | 2 | 0 | 0 | 0 | 1 | 0 | 27 |
| Rock Creek-Buckhorn Lake | 15,992 | 80 | 8 | 0 | 7 | 0 | 4 | 0 | 99 |
| Rogers Lake | 171 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rosamond Lake | 17,996 | 164 | 6 | 0 | 11 | 0 | 7 | 0 | 188 |
| Sacatara Creek-Kings Canyon | 14,673 | 216 | 7 | 0 | 15 | 0 | 1 | 0 | 239 |
| San Jose Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Nicholas Island-Santa Catalina Island | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheep Creek-El Mirage Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Town of Pearblossom | 13,720 | 461 | 23 | 2 | 13 | 7 | 7 | 2 | 515 |
| Upper Los Angeles River | 75 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Upper Piru Creek | 2,124 | 4 | 5 | 0 | 2 | 0 | 1 | 0 | 12 |
| Upper San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Santa Clara River | 3,699 | 533 | 20 | 1 | 1 | 0 | 10 | 0 | 565 |
| West Fork San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **222,959** | **11,006** | **747** | **161** | **84** | **62** | **185** | **21** | **12,266** |

### 7.2.2 Land Use in the Floodplain

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Table 7-3 shows the present land use of all parcels in the 100-year and 500-year floodplains within the planning area based on County Assessor data, including vacant parcels and parcels in public/open space uses.

**Table 7-3.** Present Land Use Within the Floodplain in Unincorporated Areas

| | 100-Year Floodplain | | 500-Year Floodplain | |
|---|---|---|---|---|
| Land Use | Area (acres) | % of Floodplain Total Area | Area (acres) | % of Floodplain Total Area |
| Commercial | 495.5 | 0.6% | 863.7 | 0.7% |
| Industrial | 2,054.8 | 2.6% | 4,022.9 | 3.4% |
| Mixed Use | 230.0 | 0.3% | 290.6 | 0.2% |
| Natural Resources | 10,073.2 | 12.5% | 10,319.1 | 8.6% |
| Other | 26.1 | <0.1% | 30.4 | <0.1% |
| Public and Semi-Public | 6,728.3 | 8.4% | 13,126.0 | 11.0% |
| Residential | 1,801.9 | 2.2% | 3,130.3 | 2.6% |
| Rural Land | 57,791.1 | 71.8% | 86,620.4 | 72.4% |
| Specific Plan | 1,245.0 | 1.5% | 1,245.0 | 1.0% |
| **Total** | **80,446.0** | **100.0%** | **119,648.5** | **100.0%** |

Source: Summarized from Los Angeles County General Plan 2035 and Community/Area Plan land use data.

### 7.2.3 Exposed Value

The Hazus analysis estimated the exposed value of buildings and contents as follows:

- $60.4 million of building-and-contents exposure to the 10-year flood, representing less than 1 percent of the planning area total replacement value
- $104.9 million of building-and-contents exposure to the 50-year flood, representing less than 1 percent of the planning area total replacement value
- $3.94 billion of building-and-contents exposure to the 100-year flood, representing 2.0 percent of the planning area total replacement value (see Table 7-4)
- $16.78 billion of building and contents exposure to the 500-year flood, representing 8.6 percent of the planning area total replacement value (see Table 7-5)

## 7.3 CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities must remain operable during flood events to maintain essential services. Hazus identified exposed critical facilities and infrastructure as follows:

- Three transportation facilities in the 10-year floodplain, in the Malibu Creek watershed.
- Nine critical infrastructure features in the 50-year floodplain:
  - One wastewater facility and six bridges in the Malibu Creek watershed
  - Two bridges in the Garapito Creek-Frontal Santa Monica Bay watershed
- 100-year floodplain exposure as detailed in Table 7-6
- 500-year floodplain exposure as detailed in Table 7-7.

**Table 7-4.** Value of Buildings Within 100-Year Floodplain in Unincorporated Areas by Watershed

| Watershed | Estimated Flood Exposure[a] | | | % of Total Replacement Value |
|---|---|---|---|---|
| | Structure | Contents | Total | |
| Amargosa Creek | $608,376,009 | $604,703,945 | $1,213,079,954 | 14.1% |
| Ballona Creek | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | $94,656,162 | $92,296,984 | $186,953,147 | 22.5% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | $374,834 | $187,417 | $562,251 | 0.0% |
| Big Tujunga Creek | $49,676,461 | $48,499,353 | $98,175,814 | 12.1% |
| Bouquet Canyon | $7,490,033 | $5,291,279 | $12,781,312 | 5.6% |
| Calleguas Creek | $0 | $0 | $0 | 0.0% |
| Castaic Creek | $181,474,737 | $188,967,155 | $370,441,892 | 4.9% |
| Chino Creek | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | $0 | $0 | $0 | 0.0% |
| Cottonwood Creek-Tylerhorse Canyon | $0 | $0 | $0 | 0.0% |
| Dalton Wash | $0 | $0 | $0 | 0.0% |
| Dominguez Channel | $0 | $0 | $0 | 0.0% |
| Frontal Santa Monica Bay-San Pedro Bay | $0 | $0 | $0 | 0.0% |
| Garapito Creek-Frontal Santa Monica Bay | $21,876,884 | $17,447,070 | $39,323,955 | 1.5% |
| Grapevine Creek | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | $392,498,177 | $365,530,199 | $758,028,377 | 8.7% |
| Lake Palmdale-Piute Ponds | $47,059,168 | $46,144,061 | $93,203,229 | 5.8% |
| Le Montaine Creek-Eller Slough | $159,662 | $79,831 | $239,492 | 0.0% |
| Little Rock Wash | $68,518,758 | $67,479,099 | $135,997,856 | 6.2% |
| Lower Los Angeles River | $0 | $0 | $0 | 0.0% |
| Lower Piru Creek | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | $5,241,720 | $2,620,860 | $7,862,580 | 0.0% |
| Malibu Creek | $54,046,357 | $37,384,053 | $91,430,410 | 2.6% |
| Mescal Creek-Rocky Buttes | $38,508,533 | $30,189,749 | $68,698,282 | 2.2% |
| Rio Hondo | $35,891,084 | $32,843,942 | $68,735,026 | 0.5% |
| Rock Creek-Buckhorn Lake | $103,092,777 | $97,179,429 | $200,272,207 | 68.6% |
| Rogers Lake | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | $105,330,651 | $94,741,940 | $200,072,591 | 33.8% |
| Sacatara Creek-Kings Canyon | $38,361,164 | $36,198,799 | $74,559,963 | 10.4% |
| San Jose Creek | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | $48,522,284 | $42,517,597 | $91,039,881 | 3.6% |
| Upper Los Angeles River | $382,631 | $191,316 | $573,947 | 0.0% |
| Upper Piru Creek | $27,606,024 | $27,365,899 | $54,971,923 | 10.5% |
| Upper San Gabriel River | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | $100,419,141 | $71,233,284 | $171,652,425 | 2.4% |
| West Fork San Gabriel River | $0 | $0 | $0 | 0.0% |
| Total | $2,029,563,251 | $1,909,093,261 | $3,938,656,514 | 2.0% |

a. Exposure estimates from Hazus analysis

**Table 7-5.** Value of Buildings Within 500-Year Floodplain in Unincorporated Areas by Watershed

| | Estimated Flood Exposure[a] | | | % of Total Replacement Value |
|---|---|---|---|---|
| | Structure | Contents | Total | |
| Amargosa Creek | $1,096,424,537 | $875,587,447 | $1,972,011,984 | 23.0% |
| Ballona Creek | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | $94,656,162 | $92,296,984 | $186,953,147 | 22.5% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | $619,247 | $309,624 | $928,871 | 0.1% |
| Big Tujunga Creek | $54,259,273 | $52,701,624 | $106,960,897 | 13.1% |
| Bouquet Canyon | $10,226,202 | $7,124,897 | $17,351,099 | 7.6% |
| Calleguas Creek | $0 | $0 | $0 | 0.0% |
| Castaic Creek | $298,963,146 | $270,492,824 | $569,455,970 | 7.5% |
| Chino Creek | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | $125,432,847 | $74,132,973 | $199,565,820 | 100.0% |
| Cottonwood Creek-Tylerhorse Canyon | $0 | $0 | $0 | 0.0% |
| Dalton Wash | $4,204,405 | $2,102,203 | $6,306,608 | 0.1% |
| Dominguez Channel | $374,681,164 | $435,147,416 | $809,828,580 | 3.9% |
| Frontal Santa Monica Bay-San Pedro Bay | $520,750,678 | $549,034,401 | $1,069,785,078 | 21.6% |
| Garapito Creek-Frontal Santa Monica Bay | $30,935,689 | $23,796,911 | $54,732,600 | 2.0% |
| Grapevine Creek | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | $394,202,514 | $366,411,983 | $760,614,496 | 8.7% |
| Lake Palmdale-Piute Ponds | $135,154,407 | $135,374,805 | $270,529,212 | 16.9% |
| Le Montaine Creek-Eller Slough | $159,662 | $79,831 | $239,492 | 0.0% |
| Little Rock Wash | $519,809,466 | $411,342,955 | $931,152,421 | 42.3% |
| Lower Los Angeles River | $2,831,008,310 | $3,045,061,026 | $5,876,069,336 | 16.2% |
| Lower Piru Creek | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | $1,140,049,891 | $877,633,215 | $2,017,683,106 | 11.8% |
| Malibu Creek | $63,163,482 | $42,906,656 | $106,070,139 | 3.0% |
| Mescal Creek-Rocky Buttes | $38,508,533 | $30,189,749 | $68,698,282 | 2.2% |
| Rio Hondo | $37,784,734 | $34,737,592 | $72,522,326 | 0.5% |
| Rock Creek-Buckhorn Lake | $103,092,777 | $97,179,429 | $200,272,207 | 68.6% |
| Rogers Lake | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | $137,708,711 | $115,624,919 | $253,333,631 | 42.8% |
| Sacatara Creek-Kings Canyon | $117,386,469 | $97,857,799 | $215,244,268 | 30.0% |
| San Jose Creek | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | $368,064,393 | $316,035,764 | $684,100,158 | 26.7% |
| Upper Los Angeles River | $382,631 | $191,316 | $573,947 | 0.0% |
| Upper Piru Creek | $36,699,498 | $32,419,956 | $69,119,454 | 13.2% |
| Upper San Gabriel River | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | $154,686,720 | $108,724,985 | $263,411,705 | 3.6% |
| West Fork San Gabriel River | $0 | $0 | $0 | 0.0% |
| **Total** | **$**8,689,015,548 | **$**8,094,499,284 | **$**16,783,514,834 | **8.6%** |

a. Exposure estimates from Hazus analysis

**Table 7-6.** Critical Facilities in the 100-Year Floodplain in Unincorporated Areas

| Watershed | Safety & Security | Food, Water & Sheltering | Health & Medical | Energy | Communi-cations | Transpor-tation | Haz Mat | Total |
|---|---|---|---|---|---|---|---|---|
| Amargosa Creek | 0 | 1 | 0 | 0 | 0 | 6 | 0 | 7 |
| Ballona Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Big Rock Creek-Big Rock Wash | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Big Sycamore Cnyn-Frontal Santa Monica Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Big Tujunga Creek | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Bouquet Canyon | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 |
| Calleguas Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Castaic Creek | 0 | 1 | 0 | 1 | 0 | 8 | 0 | 10 |
| Chino Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood Creek-Tylerhorse Canyon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dalton Wash | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dominguez Channel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frontal Santa Monica Bay-San Pedro Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Garapito Creek-Frontal Santa Monica Bay | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Grapevine Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Headwaters Santa Clara River | 1 | 6 | 0 | 0 | 0 | 6 | 0 | 13 |
| Lake Palmdale-Piute Ponds | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| Le Montaine Creek-Eller Slough | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Little Rock Wash | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Lower Los Angeles River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower Piru Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower San Gabriel River | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Malibu Creek | 0 | 3 | 0 | 0 | 0 | 8 | 0 | 11 |
| Mescal Creek-Rocky Buttes | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Rio Hondo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rock Creek-Buckhorn Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rogers Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rosamond Lake | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Sacatara Creek-Kings Canyon | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| San Jose Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Nicholas Island-Santa Catalina Island | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheep Creek-El Mirage Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Town of Pearblossom | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Los Angeles River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Piru Creek | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| Upper San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Santa Clara River | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| West Fork San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **1** | **12** | **0** | **1** | **0** | **61** | **0** | **75** |

Note: Sources of data used in Hazus modeling are described in Table 5-1.

**Table 7-7.** Critical Facilities in The 500-Year Floodplain in Unincorporated Areas

| Watershed | Safety & Security | Food, Water & Sheltering | Health & Medical | Energy | Communica-tions | Transportation | Haz Mat | Total |
|---|---|---|---|---|---|---|---|---|
| Amargosa Creek | 1 | 4 | 0 | 0 | 1 | 8 | 0 | 14 |
| Ballona Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Big Rock Creek-Big Rock Wash | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Big Sycamore Cnyn -Frontal Santa Monica Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Big Tujunga Creek | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Bouquet Canyon | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 |
| Calleguas Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Castaic Creek | 0 | 1 | 0 | 1 | 0 | 9 | 0 | 11 |
| Chino Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood Creek-Tylerhorse Canyon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dalton Wash | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dominguez Channel | 0 | 2 | 0 | 0 | 0 | 2 | 6 | 10 |
| Frontal Santa Monica Bay-San Pedro Bay | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 5 |
| Garapito Creek-Frontal Santa Monica Bay | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| Grapevine Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Headwaters Santa Clara River | 1 | 6 | 0 | 0 | 0 | 6 | 0 | 13 |
| Lake Palmdale-Piute Ponds | 0 | 2 | 0 | 0 | 0 | 9 | 0 | 11 |
| Le Montaine Creek-Eller Slough | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Little Rock Wash | 0 | 3 | 1 | 0 | 0 | 2 | 0 | 6 |
| Lower Los Angeles River | 0 | 10 | 0 | 0 | 0 | 20 | 21 | 51 |
| Lower Piru Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower San Gabriel River | 0 | 10 | 0 | 0 | 0 | 17 | 0 | 27 |
| Malibu Creek | 0 | 3 | 0 | 0 | 0 | 8 | 0 | 11 |
| Mescal Creek-Rocky Buttes | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Rio Hondo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rock Creek-Buckhorn Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rogers Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rosamond Lake | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| Sacatara Creek-Kings Canyon | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| San Jose Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Nicholas Island-Santa Catalina Island | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheep Creek-El Mirage Lake | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Town of Pearblossom | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Upper Los Angeles River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Piru Creek | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| Upper San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upper Santa Clara River | 1 | 0 | 0 | 0 | 0 | 7 | 0 | 8 |
| West Fork San Gabriel River | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **4** | **44** | **1** | **1** | **2** | **110** | **30** | **192** |

Note: Sources of data used in Hazus modeling are described in Table 5-1.

## 7.3.1 Hazardous Materials Facilities

Hazardous materials facilities are those that use or store materials that can harm the environment if damaged by a flood. During a flood event, containers holding these materials can rupture and leak into the surrounding area, having a disastrous effect on the environment as well as residents. Thirty-seven businesses in the 500-year floodplain in the planning area report having hazardous materials under the Environmental Protection Agency's Toxic Release Inventory program. No facilities were identified in the 10-, 50- or 100-year floodplains.

## 7.3.2 Utilities and Infrastructure

Populations can be at risk if infrastructure is damaged by flooding. Roads or railroads that are blocked or damaged can isolate residents and prevent access, including for emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris also can cause isolation. Water and sewer systems can be flooded or backed up, causing health problems. Underground utilities can be damaged. Dikes can fail or be overtopped, inundating the land that they protect. The following sections describe exposure of specific types of critical infrastructure.

### Roads

The following major roads in the planning area pass through the 100-year floodplain and thus are exposed to flooding:

- Interstate 10
- Interstate 110
- Interstate 210
- Interstate 405
- Interstate 5
- State Highway 27
- Camino El Real
- Glendale Freeway
- Hollywood Freeway
- Marina Freeway
- Pacific Coastal Highway
- Ronald Reagan Freeway
- San Diego Freeway
- Topanga Canyon Blvd
- W Pomona Freeway
- U.S. Highway 101
- State Highway 118
- State Highway 1
- State Highway 2
- State Highway 47
- State Highway 90
- State Highway 110
- Foothill Freeway
- Golden State Freeway
- Lincoln Blvd
- N Santa Ana Freeway
- Pasadena Freeway
- S Santa Ana Freeway
- Santa Monica Freeway
- Ventura Freeway

Some of these roads are built above the flood level, and others function as levees to prevent flooding. Still, in severe flood events these roads can be blocked or damaged, preventing access to some areas.

### Bridges

Flooding can significantly impact road bridges, which provide the only ingress and egress to some areas. While most bridges within the planning area are sufficiently protected from the impacts of flooding, some may have support structures within the river channel that can be exposed to erosion and scour damage in high flow events, as evidenced by the Interstate 10 bridge collapse in Riverside County in July 2015. There are 106 bridges that are in or cross over the 100- or 500-year floodplain in the planning area.

### Water and Sewer Infrastructure

Floodwaters can back up drainage systems, causing localized flooding. Culverts and catch basins can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers and streams.

## 7.4 ENVIRONMENT

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Hazardous materials and roadway pollution such as oil can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

### 7.4.1 The Riparian Environment

Wildlife populations are limited by shelter, space, food and water. Many species of mammals, birds, reptiles, amphibians and fish live in Los Angeles County in plant communities that are dependent upon streams, wetlands and floodplains. Riparian areas are the zones along the edge of a river or stream that are influenced by or are an influence upon the water body. Since water supply is a major limiting factor for many animals, riparian communities are of special importance. Changes in hydrologic conditions can result in a change in the riparian plant community, and wildlife and fish are impacted when plant communities are eliminated or fundamentally altered.

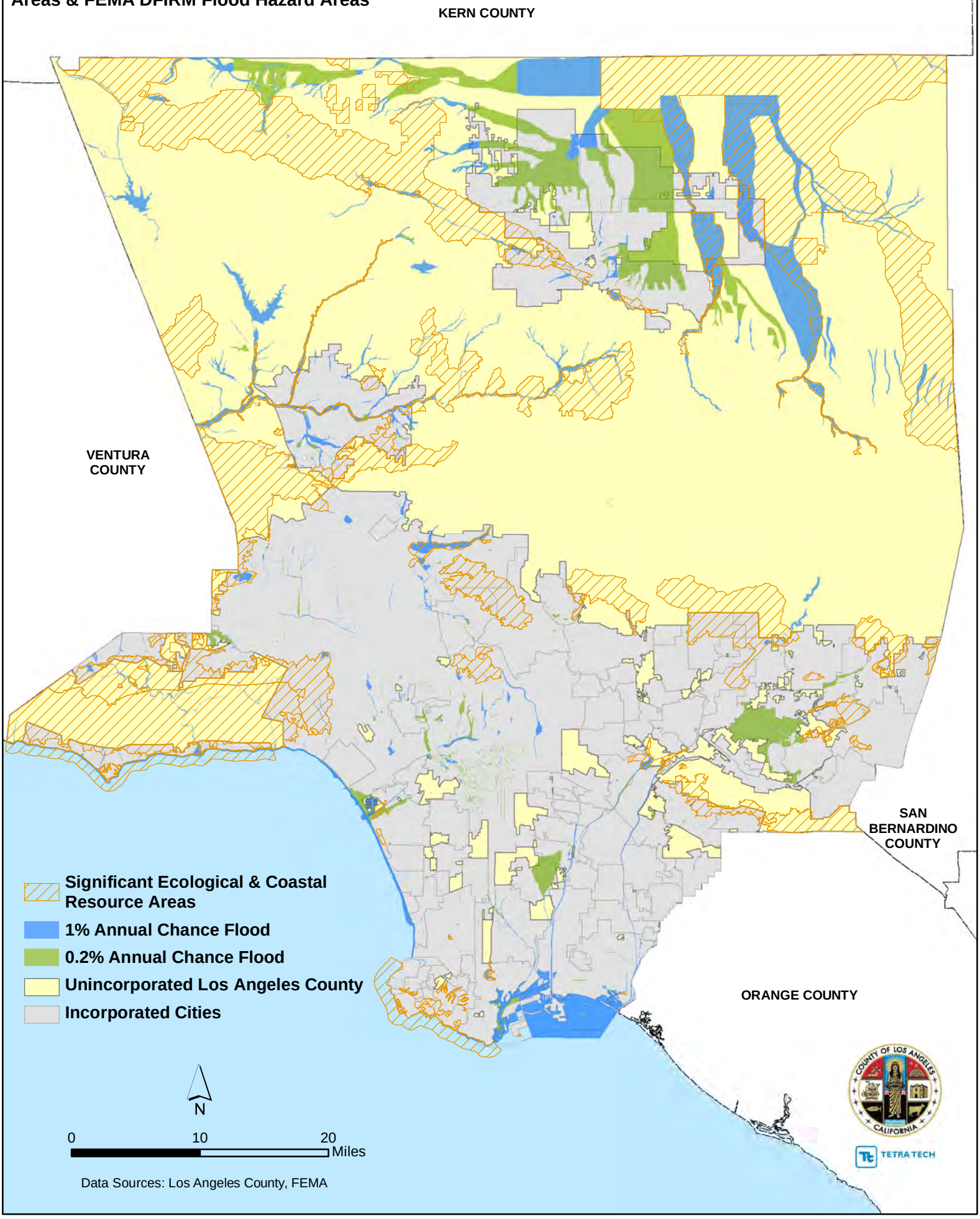
### 7.4.2 Significant Ecological Areas and Coastal Resource Areas

Protection of the biological resources of floodplains is important to Los Angeles County. Equipped with planning tools such as the Conservation and Natural Resource Element of the Los Angeles County General Plan, the Los Angeles River Master Plan and the Enhanced Watershed Management Plans, the County has established preserve areas that maintain the beneficial natural floodplain functions. The Los Angeles County General Plan identifies Significant Ecological Areas (SEAs) that have significant overlap with floodplains of the County (see Figure 7-1). The following excerpts from the County General Plan describe SEAs that overlap the regulated floodplain in the County. For more detailed descriptions of these areas, please refer to the descriptions provided in the General Plan.

#### Santa Clara River SEA

The Santa Clara River SEA extends along the entire County reach of the Santa Clara River, primarily within unincorporated areas of the County. The SEA encompasses a wide variety of topographic features and habitat types, as well as major tributaries—all of which contribute to this diversity. It is a major biotic corridor for the County (and Ventura County). The orientation and extent of the SEA depends upon the surface and subsurface hydrology of the Santa Clara River, from its headwaters, tributaries, and watershed basin, to the point at which it exits the County's jurisdiction. Nearly all of the SEA is designated by Audubon California as a Globally Important Bird Area (IBA). The Santa Clara River IBA extends beyond the SEA in both upstream and downstream directions (across Soledad Pass to the Barrel Springs area in the Antelope Valley and through Ventura County to the mouth of the River at the Pacific Ocean).

**Figure 7-1.**
**Significant Ecological Areas, Coastal Resource Areas & FEMA DFIRM Flood Hazard Areas**



### Santa Felicia SEA

The Santa Felicia SEA is located northwest of the City of Santa Clarita within unincorporated area of the County. Some of the SEA extends into the Angeles National Forest. The area is west of the Interstate 5 and north of State Route 126 and encompasses almost the entire County portion of the Santa Felicia watershed that drains into Lake Piru and Piru Creek. Piru Creek has the largest watershed of any tributary of the Santa Clara River. The SEA is largely composed of natural coastal slopes of the western San Gabriel Mountains, with south-facing slopes of coastal sage scrub and grasslands, north-facing slopes of oak woodland and chaparral, and canyons of riparian oak forest and other riparian habitats. This habitat has been diminished by development, and the SEA is one place in the County where the natural habitat remains.

### Antelope Valley SEA

The Antelope Valley SEA is in the central portion of the Antelope Valley, primarily east of the cities of Palmdale and Lancaster, within a predominantly unincorporated area of the County. The SEA is focused on the principal watercourses of the area: Little Rock Wash and Big Rock Wash and tributaries, such as Mescal Creek. Audubon California recognizes the area of Edwards Air Force Base as a Globally Important Bird Area, which is visited by tens of thousands of migrant birds during the spring and fall migratory seasons, and supports the breeding of rare and endangered birds during the spring and summer months.

### Puente Hills SEA

The Puente Hills SEA is located in the Puente Hills in the southeastern portion of the County. The Puente Hills are an inland topographical feature that separates the San Gabriel Valley to the north and the coastal plain to the south. The hills are oriented east-west and stretch from the San Gabriel River on the west approximately to the San Bernardino-Los Angeles County line to the east, where they transition into the Chino Hills. The SEA includes portions of the Whittier Narrows Dam Recreation Area and Flood Control Basin, and much of the undeveloped land throughout the Puente Hills. Nearly the entire SEA is designated as the Puente-Chino Hills State IBA by Audubon California. The main area hosts migrating and resident birds that use the extensive mosaic of lowland terrestrial habitats, and notable extensive areas of grassland and oak and walnut woodlands. This IBA extends well beyond the SEA into Orange and San Bernardino counties, and in general, goes beyond the SEA boundaries in most places. The northwestern disjunct area of the SEA is part of the Los Angeles Flood Control Basin IBA, which hosts many resident and migrating birds that use the wetlands. This IBA extends beyond the SEA on both the Rio Hondo and a long distance upstream along the San Gabriel River.

### Santa Monica Mountains SEA and Coastal Resource Area

The Santa Monica Mountains SEA is located within the Santa Monica Mountains in a mostly unincorporated area of the County. Much of the area is in the Santa Monica Mountains National Recreation Area, but is privately owned. Many of the federal lands under the jurisdiction of the National Park Service are included in the SEA designation. Many of the state parklands, notably Malibu Creek State Park and Topanga State Park, are also included in the SEA. The SEA includes nearly all of the canyons and ridges from the Ventura-Los Angeles County line, and east to Sullivan Canyon, which is near the communities of Pacific Palisades Brentwood to the south and Encino to the north. From south to north, the SEA extends from the Pacific Ocean shoreline or urban-wildland interface of Malibu, through the unincorporated area of the Santa Monica Mountains proper, to the northern edge of the SEA extending along the undeveloped southern edge of the San Fernando Valley or irregularly along the Ventura-Los Angeles County line. This SEA recognizes the rare habitat of a small regional mountain range with a high diversity of topography and moisture regimes, and with vegetation adapted to a Mediterranean climate, which is globally rare, existing elsewhere only along western portions of continents at 30- to 40-degree latitude. Although the habitats may seem common within the Santa Monica Mountains, in terms of limited indigenous global ranges of the constituent species, their special adaptations to climate, the relatively intact character of the habitats, and the plant assemblage of the Santa Monica Mountains are unique. Development

within the SEA that extends the nearby expansive urban development of the Los Angeles Basin and San Fernando Valley needs to be carefully considered to preserve these special resources.

### Ballona Wetlands Coastal Resource Area

The Ballona Wetlands Coastal Resource Area is located south of Marina del Rey, north of Playa Del Rey, and west and northwest of Playa Vista. One extending arm reaches north to the State Route 90 overcrossing and another reaches south to include the restored freshwater marsh adjacent to the Playa Del Rey and Playa Vista districts of the City of Los Angeles. The Ballona Wetlands are a remnant of what was the County's largest coastal lagoon. The Ballona watershed covers over 130 square miles, and the lagoon area was so large (about 11 to 12 square miles) that it included freshwater peripheries. Incorporated in the lagoon complex were 10 kinds of habitat that ranged from coastal saltwater marsh to grassy prairie to oak and willow woodland adjacent to freshwater areas. The lagoon connected via Ballona Creek, that sometimes was the Los Angeles River, to La Cienega, a large swampy area (about 13 to 14 square miles) that was north and east of the Baldwin Hills. The Coastal Resource Area lies at the base of the Ballona Creek watershed and includes part of the Ballona Creek flood control channel that drains 130 square miles, from what is now a highly urbanized area. While the Ballona Wetlands ecosystem has been substantially degraded over the years due to human activity and urban development, it is still a rich ecological system that bridges the gap between aquatic marine and freshwater land environments. It provides crucial habitat for hundreds of plant and animal species.

### Malibu Coastline Coastal Resource Area

The Malibu Coastline Coastal Resource Area is located in the shoreline and offshore coastal area of Malibu, which is adjacent to the Santa Monica Mountains. The Coastal Resource Area supports significant areas of aquatic plant and other subtidal communities, which provide habitat for a variety of fishes, birds, marine mammals, and other wildlife. Rocky outcrops intermixed with sandy spaces are found to a depth of 600 feet, and the nearshore area down to about 100 feet depth is considered the most productive and dynamic of all the marine communities outside the tropics. All of the many offshore rocks within 12 nautical miles of the coast are part of the California Coastal National Monument that is managed by the Bureau of Land Management in the U.S. Department of the Interior.

# 8. FLOOD HAZARD VULNERABILITY

Not all areas that are exposed to the flood risk experience actual flooding or serious damage during a flood event. Vulnerability refers to expected actual harm or damage from a flood. This chapter describes vulnerabilities of population, property, critical infrastructure and the environment. The analysis focuses on two areas of the regulated floodplain:

- The special flood hazard area depicted on the current Flood Insurance Rate Map for Los Angeles County
- The portions of the planning area (the unincorporated areas of Los Angeles County) for which the County has adopted floodway maps as described in Section 6.6.2. The County has not generated floodway data for all of the mapped SFHA. The vulnerability analysis focuses on the difference in flood depths where County floodway data is available.

Data output for these two different areas should be interpreted separately, not cumulatively. Loss values for County floodway areas are not in addition to those reflected in the SFHA; they are a subset of the total SFHA loss.

## 8.1 POPULATION

### 8.1.1 Vulnerable Populations

An analysis using Hazus model demographic data (based on 2010 U.S. Census data) identified populations vulnerable to the flood hazard as follows:

- Economically Disadvantaged Populations—An estimated 28.6 percent of the people within the households in the census blocks that intersect the 100-year floodplain are economically disadvantaged, defined as having household incomes of $20,000 or less.
- Population over 65 Years Old—An estimated 9.4 percent of the population in the census blocks that intersect the 100-year floodplain are over 65 years old. Approximately 28 percent of the over-65 population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable.
- Population under 16 Years Old—An estimated 23.9 percent of the population within census blocks located in or near that intersect the 100-year floodplain are under 16 years of age.
- In addition, persons with disabilities or others with access and functional needs are more likely to have difficulty responding to a flood or other hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability will allow emergency management personnel and first responders to have personnel available who can provide services needed by those with access and functional needs. According to the 2013 – 2017 Census estimates, there are 993,900 individuals in Los Angeles County with some form of disability, representing 9.9 percent of the county total. (U.S. Census, 2019c).

In addition to human populations, animals, specifically pets and livestock, may be vulnerable in flood events. Animals must be included in evacuation and sheltering plans for their protection and the protection of their owners, who may risk their own lives to ensure the safety of their animals.

## 8.1.2 Public Health and Safety

Floods present threats to public health and safety. Floodwater is generally contaminated by pollutants such as sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, and rusting building materials. The following health and safety risks are commonly associated with flood events:

- **Unsafe food—**Floodwaters contain disease-causing bacteria, dirt, oil, human and animal wastes, and farm and industrial chemicals. They carry away whatever lies on the ground and upstream. Their contact with food items, including food crops in agricultural lands, can make that food unsafe to eat and hazardous to human health. Power failures caused by floods damage stored food. Refrigerated and frozen foods are affected during the outage periods, and thus must be carefully monitored and examined prior to consumption. Foods kept inside cardboard, plastic bags, jars, bottles, and paper packaging are subject to disposal if contaminated by floodwaters. Even though the packages do not appear to be wet, they may be unhygienic with mold contamination and deteriorate rapidly.
- **Contaminated drinking and washing water and poor sanitation—**Flooding impairs clean water sources with pollutants and affects sanitary toilets. Direct and indirect contact with the contaminants—whether through direct food intake, vector insects such as flies, unclean hands, or dirty plates and utensils—can result in waterborne infectious disease. Wastewater treatment plants, if flooded and caused to malfunction, can be overloaded with polluted runoff waters and sewage beyond their disposal capacity, resulting in backflows of raw sewage to homes and low-lying grounds. Private wells can be contaminated or damaged severely by floodwaters, while private sewage disposal systems can become a cause of infection and illnesses if they are broken or overflow. Unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to disease outbreaks, including life-threatening cholera, typhoid, dysentery and some forms of hepatitis.
- **Mosquitoes and animals—**Prolonged rainfall and floods provide new breeding grounds for mosquitoes—wet areas and stagnant pools—and can lead to an increase in the number of mosquito-borne diseases such as malaria and dengue and West Nile fevers. Rats and other rodents and wild animals also can carry viruses and diseases. The public should avoid such animals and should dispose of dead animals in accordance with guidelines issued by local animal control authorities.
- **Molds and mildews—**Excessive exposure to molds and mildews can cause flood victims—especially those with allergies and asthma—to contract upper respiratory diseases and to trigger cold-like symptoms such as sore throat, watery eyes, wheezing and dizziness. Molds grow in as short a period as 24 to 48 hours in wet and damp areas of buildings and homes that have not been cleaned after flooding, such as water-infiltrated walls, floors, carpets, toilets and bathrooms. Very small mold spores can be easily inhaled by human bodies and, in large enough quantities, cause allergic reactions, asthma episodes, and other respiratory problems. Infants, children, older adults and pregnant women are considered most vulnerable to mold-induced health problems.
- **Carbon monoxide poisoning—**Carbon monoxide poisoning is as a potential hazard after major floods. Carbon monoxide can be found in combustion fumes, such as those generated by small gasoline engines, stoves, generators, lanterns and gas ranges, or by burning charcoal or wood. In the event of power outages following floods, flood victims tend to use alternative sources of fuels for heating, cooling, or cooking inside enclosed or partly enclosed houses, garages or buildings without an adequate level of air ventilation. Carbon monoxide builds up from these sources and poisons the people and animals inside.
- **Hazards when reentering and cleaning flooded homes and buildings—**Flooded buildings can pose health hazards after floodwaters recede. Electrical power systems can become hazardous. People should avoid turning on or off the main power while standing in floodwater. Gas leaks from pipelines or propane

tanks can trigger explosion when entering and cleaning damaged buildings or working to restore utility service. Flood debris—such as broken bottles, wood, stones and walls—may cause wounds and injuries when cleaning damaged buildings. Containers of hazardous chemicals, including pesticides, insecticides, fertilizers, car batteries, propane tanks and other industrial chemicals, may be hidden or buried under flood debris. A health hazard can also occur when hazardous dust and mold in ducts, fans and ventilators of air-conditioning and heating equipment are circulated through a building and inhaled by those engaged in cleanup.

- **Mental stress and fatigue—**Exposure to extreme disaster events can cause psychological distress. Having experienced a devastating flood, seen loved ones lost or injured, and homes damaged or destroyed, flood victims can experience long-term psychological impact. The expense and effort required to repair flood-damaged homes places severe financial and psychological burdens on the people affected, in particular the unprepared and uninsured. Post-flood recovery—especially when prolonged—can cause anxiety, anger, depression, lethargy, hyperactivity, sleeplessness, and, in an extreme case, suicide. Behavior changes may also occur in children. There is also a long-term concern among the affected that their homes can be flooded again in the future.

Current loss estimation models such as Hazus are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

### 8.1.3 Impacts on People

Table 8-1 summarizes Hazus-estimated impacts on the planning area population for each flood scenario.

**Table 8-1.** Estimated Flood Impact on Persons in Unincorporated Areas

| | Number of Displaced Persons[a] | Number of Persons Requiring Publicly Provided Short-Term Shelter[a, b] |
|---|---|---|
| **10-Year Flood** | 10 | 1 |
| **50-Year Flood** | 28 | 1 |
| **100-Year Flood** | 969 | 15 |
| **500-Year Flood** | 30,910 | 1,806 |

a. Results shown are not precise, but are estimates of damage that may occur as the result of the modeled flood.
b. The number of persons requiring publicly provided shelter is less than the number of displaced persons because not all households will require public assistance to find short-term shelter.

Note: Sources of data used in Hazus modeling are described in Table 5-1.

## 8.2 PROPERTY

### 8.2.1 Loss Estimates

Hazus calculates flood losses to structures based on flooding depth and structure type. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, local, user-defined data on facilities was used instead of the default inventory data provided with Hazus. The results of these analyses for the scenario flood events are summarized in Table 8-2 through Table 8-5.

**Table 8-2.** Loss Estimates for 10-Year Flood Event in Unincorporated Areas

| Watershed | Structures Impacted[a] | Estimated Loss Associated with Flood | | | % of Total Replacement Cost |
|---|---|---|---|---|---|
| | | Structure | Contents | Total | |
| Amargosa Creek | 3 | $19,164 | $12,007 | $31,171 | 0.0% |
| Ballona Creek | 0 | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | 0 | $0 | $0 | $0 | 0.0% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 2 | $185,371 | $98,843 | $284,214 | 0.0% |
| Big Tujunga Creek | 4 | $687,957 | $4,046,338 | $4,734,295 | 0.6% |
| Bouquet Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Calleguas Creek | 0 | $0 | $0 | $0 | 0.0% |
| Castaic Creek | 0 | $0 | $0 | $0 | 0.0% |
| Chino Creek | 0 | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | $0 | $0 | $0 | 0.0% |
| Cottonwood Creek-Tylerhorse Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Dalton Wash | 0 | $0 | $0 | $0 | 0.0% |
| Dominguez Channel | 0 | $0 | $0 | $0 | 0.0% |
| Frontal Santa Monica Bay-San Pedro Bay | 0 | $0 | $0 | $0 | 0.0% |
| Garapito Creek-Frontal Santa Monica Bay | 12 | $615,987 | $1,893,173 | $2,509,159 | 0.1% |
| Grapevine Creek | 0 | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | 0 | $0 | $0 | $0 | 0.0% |
| Lake Palmdale-Piute Ponds | 0 | $0 | $0 | $0 | 0.0% |
| Le Montaine Creek-Eller Slough | 0 | $0 | $0 | $0 | 0.0% |
| Little Rock Wash | 0 | $0 | $0 | $0 | 0.0% |
| Lower Los Angeles River | 0 | $0 | $0 | $0 | 0.0% |
| Lower Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Malibu Creek | 14 | $1,039,962 | $3,359,599 | $4,399,561 | 0.1% |
| Mescal Creek-Rocky Buttes | 0 | $0 | $0 | $0 | 0.0% |
| Rio Hondo | 0 | $0 | $0 | $0 | 0.0% |
| Rock Creek-Buckhorn Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rogers Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | 0 | $0 | $0 | $0 | 0.0% |
| Sacatara Creek-Kings Canyon | 0 | $0 | $0 | $0 | 0.0% |
| San Jose Creek | 0 | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | 0 | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | 0 | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | 0 | $0 | $0 | $0 | 0.0% |
| Upper Los Angeles River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Upper San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | 0 | $0 | $0 | $0 | 0.0% |
| **Total** | **35** | **$2,548,441** | **$9,409,960** | **$11,958,400** | **< 1** |

a. Impacted structures are those structures with finished floor elevations below the Hazus-estimated 10-year water surface elevation. These structures are the most likely to receive damage in a 10-year flood event

Notes: Values in this table are only for purposes of comparison among results. See Section 5.2.5 for a discussion of data limitations. Sources of data used in Hazus modeling are described in Table 5-1.

**Table 8-3.** Loss Estimates for 50-Year Flood Event in Unincorporated Areas

| Watershed | Structures Impacted[a] | Estimated Loss Associated with Flood | | | % of Total Replacement Cost |
|---|---|---|---|---|---|
| | | Structure | Contents | Total | |
| Amargosa Creek | 6 | $170,653 | $98,877 | $269,530 | 0.0% |
| Ballona Creek | 0 | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | 0 | $0 | $0 | $0 | 0.0% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 2 | $215,582 | $112,473 | $328,055 | 0.0% |
| Big Tujunga Creek | 9 | $977,619 | $4,851,211 | $5,828,830 | 0.7% |
| Bouquet Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Calleguas Creek | 0 | $0 | $0 | $0 | 0.0% |
| Castaic Creek | 0 | $0 | $0 | $0 | 0.0% |
| Chino Creek | 0 | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | $0 | $0 | $0 | 0.0% |
| Cottonwood Creek-Tylerhorse Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Dalton Wash | 0 | $0 | $0 | $0 | 0.0% |
| Dominguez Channel | 0 | $0 | $0 | $0 | 0.0% |
| Frontal Santa Monica Bay-San Pedro Bay | 0 | $0 | $0 | $0 | 0.0% |
| Garapito Creek-Frontal Santa Monica Bay | 28 | $1,376,883 | $3,101,243 | $4,478,126 | 0.2% |
| Grapevine Creek | 0 | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | 0 | $0 | $0 | $0 | 0.0% |
| Lake Palmdale-Piute Ponds | 0 | $0 | $0 | $0 | 0.0% |
| Le Montaine Creek-Eller Slough | 0 | $0 | $0 | $0 | 0.0% |
| Little Rock Wash | 0 | $0 | $0 | $0 | 0.0% |
| Lower Los Angeles River | 0 | $0 | $0 | $0 | 0.0% |
| Lower Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Malibu Creek | 42 | $4,027,408 | $9,741,970 | $13,769,378 | 0.4% |
| Mescal Creek-Rocky Buttes | 0 | $0 | $0 | $0 | 0.0% |
| Rio Hondo | 0 | $0 | $0 | $0 | 0.0% |
| Rock Creek-Buckhorn Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rogers Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | 0 | $0 | $0 | $0 | 0.0% |
| Sacatara Creek-Kings Canyon | 0 | $0 | $0 | $0 | 0.0% |
| San Jose Creek | 0 | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | 0 | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | 0 | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | 0 | $0 | $0 | $0 | 0.0% |
| Upper Los Angeles River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Upper San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | 0 | $0 | $0 | $0 | 0.0% |
| West Fork San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| **Total** | **87** | **$6,768,145** | **$17,905,774** | **$24,673,919** | **< 1** |

a. Impacted structures are those structures with finished floor elevations below the Hazus-estimated 50-year water surface elevation. These structures are the most likely to receive damage in a 50-year flood event

Notes: Values in this table are only for purposes of comparison among results. See Section 5.2.5 for a discussion of data limitations. Sources of data used in Hazus modeling are described in Table 5-1.

**Table 8-4.** Loss Estimates for 100-Year Flood Event in Unincorporated Areas

| Watershed | Structures Impacted[a] | Estimated Loss Associated with Flood | | | % of Total Replacement Cost |
|---|---|---|---|---|---|
| | | Structure | Contents | Total | |
| Amargosa Creek | 80 | $65,197,324 | $111,886,098 | $177,083,422 | 2.1% |
| Ballona Creek | 0 | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | 33 | $27,752,596 | $30,871,141 | $58,623,737 | 7.1% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 2 | $223,526 | $119,471 | $342,997 | 0.0% |
| Big Tujunga Creek | 17 | $5,004,498 | $12,184,247 | $17,188,745 | 2.1% |
| Bouquet Canyon | 16 | $562,428 | $1,309,643 | $1,872,070 | 0.8% |
| Calleguas Creek | 0 | $0 | $0 | $0 | 0.0% |
| Castaic Creek | 181 | $18,657,648 | $29,869,438 | $48,527,086 | 0.6% |
| Chino Creek | 0 | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | 0 | $0 | $0 | $0 | 0.0% |
| Cottonwood Creek-Tylerhorse Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Dalton Wash | 0 | $0 | $0 | $0 | 0.0% |
| Dominguez Channel | 0 | $0 | $0 | $0 | 0.0% |
| Frontal Santa Monica Bay-San Pedro Bay | 0 | $0 | $0 | $0 | 0.0% |
| Garapito Creek-Frontal Santa Monica Bay | 29 | $2,216,277 | $5,698,596 | $7,914,873 | 0.3% |
| Grapevine Creek | 0 | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | 262 | $110,119,890 | $129,209,867 | $239,329,758 | 2.7% |
| Lake Palmdale-Piute Ponds | 20 | $4,416,721 | $8,753,969 | $13,170,691 | 0.8% |
| Le Montaine Creek-Eller Slough | 1 | $6,999 | $4,307 | $11,306 | 0.0% |
| Little Rock Wash | 23 | $7,177,992 | $25,461,999 | $32,639,992 | 1.5% |
| Lower Los Angeles River | 0 | $0 | $0 | $0 | 0.0% |
| Lower Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | 17 | $30,563 | $20,375 | $50,938 | 0.0% |
| Malibu Creek | 92 | $9,570,903 | $18,612,899 | $28,183,801 | 0.8% |
| Mescal Creek-Rocky Buttes | 98 | $3,099,059 | $7,233,081 | $10,332,141 | 0.3% |
| Rio Hondo | 15 | $4,451,189 | $6,323,330 | $10,774,519 | 0.1% |
| Rock Creek-Buckhorn Lake | 95 | $6,692,151 | $11,405,686 | $18,097,838 | 6.2% |
| Rogers Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | 107 | $10,745,836 | $17,963,122 | $28,708,957 | 4.9% |
| Sacatara Creek-Kings Canyon | 26 | $3,476,468 | $7,316,244 | $10,792,712 | 1.5% |
| San Jose Creek | 0 | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | 0 | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | 0 | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | 68 | $4,471,560 | $8,263,325 | $12,734,886 | 0.5% |
| Upper Los Angeles River | 1 | $27,836 | $17,467 | $45,303 | 0.0% |
| Upper Piru Creek | 8 | $11,039,313 | $15,244,879 | $26,284,192 | 5.0% |
| Upper San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | 286 | $10,483,033 | $16,528,486 | $27,011,519 | 0.4% |
| West Fork San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| **Total** | **1477** | **$305,423,810** | **$464,297,670** | **$769,721,483** | **< 1** |

a. Impacted structures are those structures with finished floor elevations below the Hazus-estimated 100-year water surface elevation. These structures are the most likely to receive damage in a 100-year flood event

Notes: Values in this table are only for purposes of comparison among results. See Section 5.2.5 for a discussion of data limitations. Sources of data used in Hazus modeling are described in Table 5-1. Results in this table include the County identified floodways.

**Table 8-5.** Loss Estimates for 500-Year Flood Event in Unincorporated Areas

| Watershed | Structures Impacted[a] | Estimated Loss Associated with Flood | | | % of Total Replacement Cost |
|---|---|---|---|---|---|
| | | Structure | Contents | Total | |
| Amargosa Creek | 1,355 | $118,830,276 | $151,541,163 | $270,371,440 | 3.1% |
| Ballona Creek | 0 | $0 | $0 | $0 | 0.0% |
| Big Rock Creek-Big Rock Wash | 17 | $26,942,845 | $27,870,037 | $54,812,883 | 6.6% |
| Big Sycamore Canyon-Frontal Santa Monica Bay | 3 | $258,061 | $139,101 | $397,162 | 0.0% |
| Big Tujunga Creek | 22 | $5,275,486 | $14,681,265 | $19,956,751 | 2.4% |
| Bouquet Canyon | 21 | $1,344,537 | $2,350,075 | $3,694,612 | 1.6% |
| Calleguas Creek | 0 | $0 | $0 | $0 | 0.0% |
| Castaic Creek | 417 | $53,943,210 | $62,980,385 | $116,923,595 | 1.5% |
| Chino Creek | 0 | $0 | $0 | $0 | 0.0% |
| Colorado Lagoon-Frontal Alamitos Bay | 543 | $16,077,939 | $13,916,254 | $29,994,193 | 15.0% |
| Cottonwood Creek-Tylerhorse Canyon | 0 | $0 | $0 | $0 | 0.0% |
| Dalton Wash | 7 | $503,275 | $309,707 | $812,982 | 0.0% |
| Dominguez Channel | 138 | $31,645,440 | $56,305,265 | $87,950,705 | 0.4% |
| Frontal Santa Monica Bay-San Pedro Bay | 51 | $42,856,889 | $90,768,359 | $133,625,248 | 2.7% |
| Garapito Creek-Frontal Santa Monica Bay | 52 | $3,925,327 | $7,278,422 | $11,203,749 | 0.4% |
| Grapevine Creek | 0 | $0 | $0 | $0 | 0.0% |
| Headwaters Santa Clara River | 272 | $111,322,332 | $130,438,719 | $241,761,051 | 2.8% |
| Lake Palmdale-Piute Ponds | 46 | $11,613,590 | $25,441,316 | $37,054,907 | 2.3% |
| Le Montaine Creek-Eller Slough | 1 | $6,999 | $4,307 | $11,306 | 0.0% |
| Little Rock Wash | 1,063 | $56,846,911 | $91,130,531 | $147,977,443 | 6.7% |
| Lower Los Angeles River | 3,130 | $248,855,279 | $449,715,774 | $698,571,053 | 1.9% |
| Lower Piru Creek | 0 | $0 | $0 | $0 | 0.0% |
| Lower San Gabriel River | 2,769 | $109,553,390 | $172,977,481 | $282,530,871 | 1.7% |
| Malibu Creek | 102 | $14,404,254 | $21,499,367 | $35,903,620 | 1.0% |
| Mescal Creek-Rocky Buttes | 33 | $1,287,588 | $4,286,737 | $5,574,325 | 0.2% |
| Rio Hondo | 16 | $4,545,872 | $6,891,425 | $11,437,297 | 0.1% |
| Rock Creek-Buckhorn Lake | 40 | $4,745,848 | $7,024,725 | $11,770,572 | 4.0% |
| Rogers Lake | 0 | $0 | $0 | $0 | 0.0% |
| Rosamond Lake | 58 | $8,984,551 | $13,564,869 | $22,549,420 | 3.8% |
| Sacatara Creek-Kings Canyon | 119 | $10,452,519 | $18,912,589 | $29,365,107 | 4.1% |
| San Jose Creek | 0 | $0 | $0 | $0 | 0.0% |
| San Nicholas Island-Santa Catalina Island | 0 | $0 | $0 | $0 | 0.0% |
| Sheep Creek-El Mirage Lake | 0 | $0 | $0 | $0 | 0.0% |
| Town of Pearblossom | 382 | $32,041,120 | $59,793,270 | $91,834,389 | 3.6% |
| Upper Los Angeles River | 1 | $27,836 | $17,467 | $45,303 | 0.0% |
| Upper Piru Creek | 11 | $12,392,535 | $17,833,902 | $30,226,436 | 5.8% |
| Upper San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| Upper Santa Clara River | 511 | $54,846,346 | $50,266,682 | $105,113,028 | 1.5% |
| West Fork San Gabriel River | 0 | $0 | $0 | $0 | 0.0% |
| **Total** | **11,180** | **$983,530,255** | **$1,497,939,194** | **$2,481,469,448** | **1.3%** |

a. Impacted structures are those structures with finished floor elevations below the Hazus-estimated 500-year water surface elevation. These structures are the most likely to receive damage in a 500-year flood event

Notes: Values in this table are only for purposes of comparison among results. See Section 5.2.5 for a discussion of data limitations. Sources of data used in Hazus modeling are described in Table 5-1.

## 8.2.2 National Flood Insurance Program Statistics

### Countywide Statistics

Table 8-6 lists flood insurance statistics that help identify vulnerability in Los Angeles County inclusive of all of the cities and the Unincorporated County. These Countywide statistics were obtained from the FEMA Open Data Source website (FEMA, 2020) and are statistics as of July 31, 2017. Based on these statistics, the County and 85 municipalities within it participate in the NFIP, with 19,525 flood insurance policies providing $5.93 billion in coverage. According to FEMA statistics, 8,442 flood insurance claims were paid between January 1, 1978 and June 30, 2014, for a total of $62 million, an average of $7,298 per claim. Figure 8-1 shows the location of flood-insured properties in unincorporated Los Angeles County.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before a FIRM is adopted are more vulnerable to flooding because they do not meet code or are located in hazardous areas. The first FIRM for Los Angeles County was available in 1980. The following information from flood insurance statistics is relevant to reducing flood risk:

- The use of flood insurance in the planning area is above the national average, with 65.3 percent of insurable planning area buildings in the SFHA having flood insurance. According to an NFIP study, only 49 percent of single-family homes in SFHAs nationwide are covered by flood insurance.
- The average cost of a flood insurance policy in Los Angeles County is $921. The average cost of a flood insurance policy in the unincorporated area is $1,065—16 percent higher than the County average.
- The average cost of a flood insurance policy in the SFHA is $1,438 per year.
- The average cost of a policy outside the SFHA is $653.
- 78 percent of the policies in force are for residences.
- 69.3 percent of the policies are for pre-FIRM construction.
- The amount of insurance in force represents 35.3 percent of the total value of the assets exposed within the SFHA.
- The high percentage of flood insurance policies in force outside the SFHA (roughly 50.4 percent of the policies) suggests that the currently effective mapping does not reflect the total flood risk.
- The average claim paid in the planning area ($7,298) represents about one percent of the 2019 average replacement cost value of structures in the floodplain. This correlates to a flood depth damage function of less than 1 foot for a 1-story structure with no basement using the U.S. Army Corps of Engineers generic flood-depth/damage curves.

### Unincorporated Los Angeles County Statistics

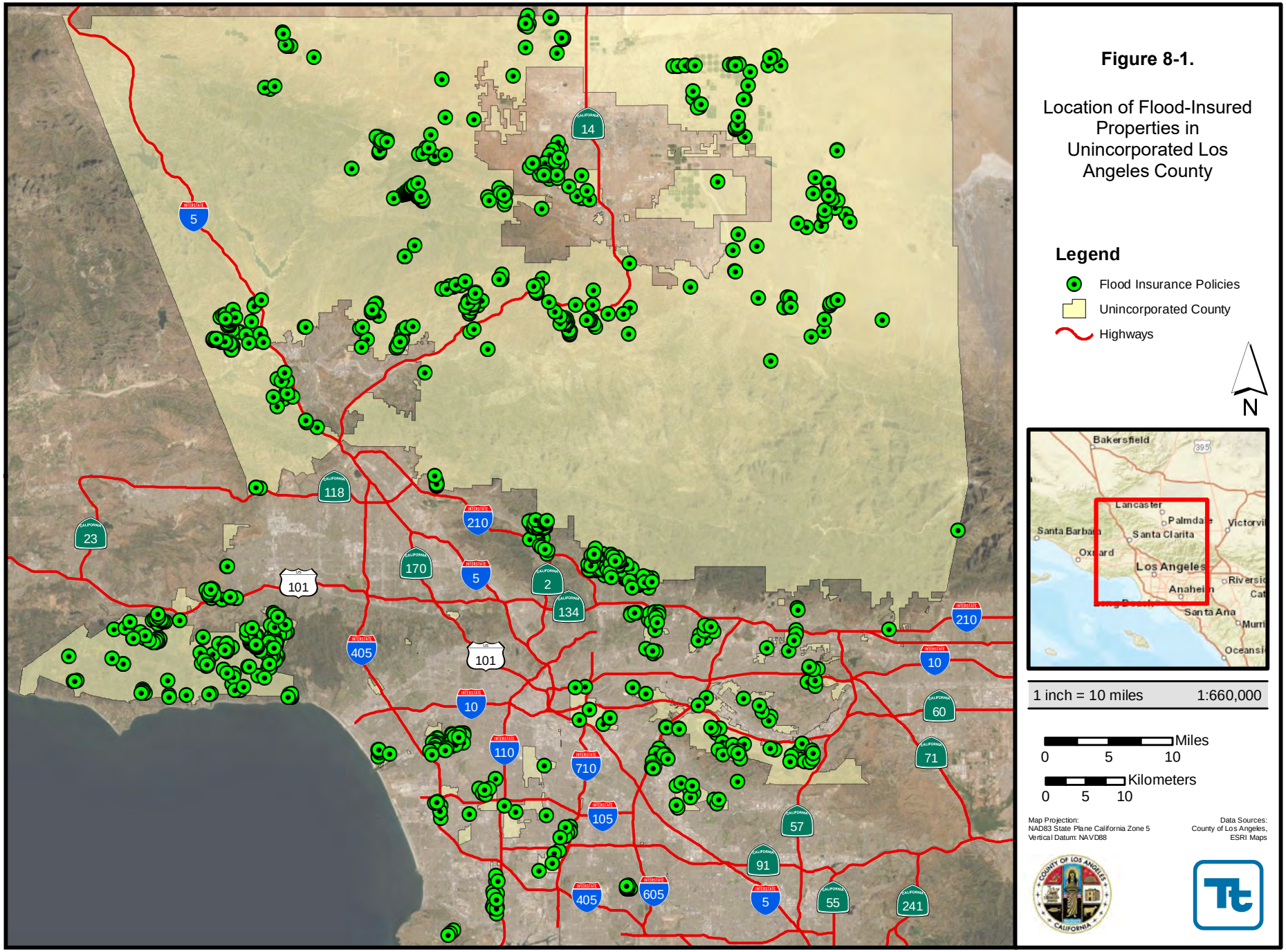
A more detailed analysis of insurance policy coverage in the unincorporated areas of Los Angeles was conducted using the data provided to the County by the Insurance Services Office (ISO) in September 2018 as part of its ongoing support for helping the County meet its Category C Repetitive Loss Status requirements. Up until 2018, ISO would provide updated repetitive loss statistics to all identified repetitive loss communities that participate in the CRS program to support their annual participation prerequisites under Section 502 of the *CRS Coordinators' Manual*. ISO is no longer providing this information, so the 2018 data is the best data available for this analysis.

A statistical analysis for unincorporated Los Angeles County was performed in conformance with the CRS Activity 370 requirements specified for the flood insurance coverage assessment element under Section 372.a of the *CRS Coordinators Manual*. The County will revisit this analysis with every subsequent revision to this FMP, based on the best available, most accessible data at the time of the update.

**Table 8-6.** Flood Insurance Statistics for Los Angeles County

| Jurisdiction | Date of Entry Initial FIRM Effective Date | # of Flood Insurance Policies as of 7/31/2019 | Insurance In Force ($) | Total Annual Premium ($) | Claims, 11/1978 to 6/30/2014 | Value of Claims paid, 11/1978 to 6/30/2014 ($) |
|---|---|---|---|---|---|---|
| ***Unincorporated County*** | ***2/12/80*** | ***1,410*** | ***$386,197,000*** | ***$1,502,311*** | ***3,029*** | ***$26,025,376*** |
| Agoura Hills | 4/3/86 | 126 | $40,922,000 | $69,890 | 64 | $580,041 |
| Alhambra | 9/26/08 | 10 | $3,010,000 | $3,708 | 8 | $17,162 |
| Arcadia | 9/26/08 | 16 | $6,250,000 | $11,515 | 8 | $5,885 |
| Artesia | 9/26/08 | 3 | $742,000 | $935 | 0 | $0 |
| Avalon | 9/29/78 | 56 | $15,842,000 | $127,314 | 5 | $56,471 |
| Azusa | 9/26/08 | 8 | $1,757,000 | $2,710 | 1 | $750 |
| Baldwin Park | 5/26/78 | 9 | $2,900,000 | $3,685 | 2 | $47,602 |
| Bell | 9/26/08 | 1 | $280,000 | $351 | 0 | $0 |
| Bell Gardens | 9/26/08 | 0 | $0 | $0 | 0 | $0 |
| Bellflower | 6/7/98 | 37 | $11,464,000 | $16,887 | 9 | $27,385 |
| Beverly Hills | 9/26/08 | 207 | $71,374,000 | $96,971 | 233 | $1,525,797 |
| Bradbury | 9/26/08 | 3 | $728,000 | $884 | 8 | $20,721 |
| Burbank | 3/16/81 | 154 | $50,131,000 | $178,125 | 35 | $139,603 |
| Calabasas | 2/12/80 | 145 | $39,837,000 | $86,399 | 22 | $179,653 |
| Carson | 6/7/98 | 75 | $26,634,000 | $57,446 | 46 | $63,977 |
| Cerritos | 9/26/08 | 64 | $21,600,000 | $31,537 | 4 | $3,886 |
| Claremont | 11/20/00 | 45 | $13,210,000 | $15,750 | 5 | $6,485 |
| Commerce | 9/26/08 | 4 | $1,850,000 | $6,414 | 1 | $5,444 |
| Compton | 6/7/98 | 43 | $13,623,000 | $24,179 | 16 | $139,855 |
| Covina | 10/22/71 | 6 | $2,302,000 | $2,930 | 5 | $729 |
| Cudahy | 9/26/08 | 5 | $1,750,000 | $2,005 | 1 | $125 |
| Culver City | 1/2/80 | 99 | $34,221,000 | $93,900 | 27 | $95,816 |
| Diamond Bar | 9/26/08 | 21 | $6,447,000 | $7,619 | 3 | $6,806 |
| Downey | 6/7/98 | 109 | $37,020,000 | $58,042 | 15 | $76,916 |
| Duarte | 9/26/08 | 30 | $9,224,000 | $16,951 | 3 | $1,726 |
| El Monte | 6/16/99 | 0 | $0 | $0 | 0 | $0 |
| El Segundo | 9/26/08 | 16 | $4,676,000 | $7,986 | 3 | $3,772 |
| Gardena | 6/7/98 | 18 | $5,260,000 | $6,551 | 5 | $4,417 |
| Glendale | 9/26/08 | 148 | $47,030,000 | $80,679 | 64 | $297,842 |
| Glendora | 9/26/08 | 60 | $18,511,000 | $33,555 | 9 | $239,267 |
| Hawaiian Gardens | 5/14/71 | 10 | $3,505,000 | $7,504 | 2 | $11,271 |
| Hawthorne | 4/12/79 | 10 | $3,170,000 | $4,589 | 2 | $580 |
| Hermosa Beach | 9/26/08 | 81 | $27,225,000 | $36,077 | 10 | $10,003 |
| Hidden Hills | 7/9/84 | 50 | $15,425,000 | $61,736 | 39 | $391,044 |
| Industry | 9/26/08 | 3 | $2,000,000 | $5,849 | 0 | $0 |
| Inglewood | 9/26/08 | 29 | $8,183,000 | $13,788 | 22 | $10,855 |
| Irwindale | 9/26/08 | 1 | $350,000 | $399 | 0 | $0 |
| La Canada Flintridge | 9/26/08 | 99 | $32,180,000 | $46,380 | 44 | $1,575,650 |
| La Habra Heights | 9/26/08 | 6 | $1,750,000 | $2,166 | 3 | $3,443 |
| La Mirada | 2/7/80 | 27 | $8,455,000 | $14,609 | 4 | $12,900 |
| La Puente | 9/26/08 | 2 | $700,000 | $772 | 5 | $7,942 |
| La Verne | 9/26/08 | 17 | $3,752,000 | $5,610 | 6 | $21,908 |

| Jurisdiction | Date of Entry Initial FIRM Effective Date | # of Flood Insurance Policies as of 7/31/2019 | Insurance In Force ($) | Total Annual Premium ($) | Claims, 11/1978 to 6/30/2014 | Value of Claims paid, 11/1978 to 6/30/2014 ($) |
|---|---|---|---|---|---|---|
| Lakewood | 6/7/98 | 104 | $33,668,000 | $38,791 | 11 | $26,321 |
| Lancaster | 6/1/82 | 97 | $31,167,000 | $51,568 | 11 | $25,520 |
| Lawndale | 9/26/08 | 8 | $2,462,000 | $4,204 | 1 | $5,431 |
| Lomita | 9/26/08 | 10 | $2,730,000 | $3,454 | 4 | $13,289 |
| Long Beach | 9/15/83 | 3,025 | $817,851,000 | $3,814,286 | 337 | $2,567,098 |
| Los Angeles | 2/12/80 | 9,801 | $3,003,027,000 | $6,102,259 | 3,663 | $20,202,264 |
| Lynwood | 4/15/80 | 92 | $22,471,000 | $97,569 | 17 | $114,207 |
| Malibu | 9/26/08 | 1,043 | $382,432,000 | $3,466,850 | 143 | $3,029,822 |
| Manhattan Beach | 9/26/08 | 136 | $44,263,000 | $52,874 | 15 | $134,619 |
| Maywood | 9/26/08 | 0 | $0 | $0 | 0 | $0 |
| Monrovia | 9/26/08 | 32 | $11,117,000 | $20,075 | 12 | $17,416 |
| Montebello | 3/18/80 | 17 | $5,810,000 | $7,900 | 2 | $3,935 |
| Monterey Park | 9/26/08 | 25 | $8,455,000 | $10,778 | 27 | $22,536 |
| Norwalk | 9/26/08 | 31 | $10,342,000 | $11,505 | 3 | $8,167 |
| Palmdale | 6/1/82 | 146 | $44,118,000 | $98,876 | 20 | $395,192 |
| Palos Verdes Estates | 11/21/01 | 54 | $17,528,000 | $42,711 | 11 | $22,390 |
| Paramount | 6/7/98 | 18 | $6,165,000 | $10,337 | 14 | $30,123 |
| Pasadena | 9/26/08 | 151 | $47,677,000 | $64,887 | 58 | $180,309 |
| Pico Rivera | 6/7/98 | 77 | $24,605,000 | $49,234 | 14 | $18,872 |
| Pomona | 9/26/08 | 13 | $6,546,000 | $16,345 | 5 | $16,430 |
| Rancho Palos Verdes | 9/26/08 | 61 | $18,122,000 | $22,655 | 8 | 261,095 |
| Redondo Beach | 9/15/83 | 79 | $24,505,000 | $74,517 | 31 | $2,113,236 |
| Rolling Hills Estates | 9/26/08 | 17 | $5,028,000 | $6,038 | 9 | $12,344 |
| Rolling Hills | 9/26/08 | 13 | $4,550,000 | $5,151 | 1 | $125 |
| Rosemead | 9/26/08 | 5 | $1,590,000 | $1,954 | 2 | $582 |
| San Dimas | 1/4/77 | 8 | $2,516,000 | $5,437 | 8 | $5,130 |
| San Fernando | 11/2/76 | 2 | $420,000 | $612 | 14 | $37,153 |
| San Gabriel | 11/27/70 | 7 | $3,250,000 | $5,714 | 2 | $5,640 |
| San Marino | 9/26/08 | 14 | $4,900,000 | $5,648 | 1 | $125 |
| Santa Clarita | 9/29/89 | 502 | $139,568,000 | $765,709 | 79 | $286,751 |
| Santa Fe Springs | 4/15/80 | 23 | $10,860,000 | $27,438 | 0 | $0 |
| Santa Monica | 9/26/08 | 250 | $85,693,000 | $138,185 | 40 | $119,195 |
| Sierra Madre | 9/26/08 | 33 | $10,239,000 | $13,493 | 24 | $73,729 |
| Signal Hill | 9/26/08 | 12 | $3,113,000 | $4,046 | 6 | $45,610 |
| South El Monte | 9/26/08 | 3 | $1,269,000 | $4,463 | 0 | $0 |
| South Gate | 6/7/98 | 12 | $3,017,000 | $4,056 | 5 | $4,669 |
| South Pasadena | 4/14/72 | 34 | $10,842,000 | $15,476 | 14 | $122,828 |
| Torrance | 12/18/79 | 91 | $28,699,000 | $39,037 | 12 | $10,089 |
| Walnut | 9/26/08 | 5 | $1,510,000 | $4,924 | 6 | $1,371 |
| West Covina | 2/4/12 | 30 | $8,179,000 | $25,016 | 2 | $16,866 |
| West Hollywood | 6/18/87 | 57 | $20,299,000 | $31,137 | 26 | $23,977 |
| Westlake Village | 9/26/08 | 85 | $26,726,000 | $47,820 | 3 | $567 |
| Whittier | 1/16/81 | 39 | $13,704,000 | $33,946 | 13 | $17,990 |
| **Total** | | **19,525** | **$5,932,520,000** | **$17,993,683** | **8,442** | **$61,612,118** |


Figure 8-1.
Location of Flood-Insured Properties in Unincorporated Los Angeles County
Legend
Flood Insurance Policies
Unincorporated County
Highways
N
Bakersfield
Lancaster
Palmdale
Victorville
Santa Barbara
Santa Clarita
Oxnard
Los Angeles
Riverside
Anaheim
Santa Ana
Oceanside
1 inch = 10 miles
1:660,000
Miles
0 5 10
Kilometers
0 5 10
Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Data Sources:
County of Los Angeles,
ESRI Maps
5
14
118
23
210
170
2
134
101
405
10
110
710
105
605
91
57
55
241
60
71

The ISO data was in a spreadsheet format suitable for conversion to a geospatial format that was the basis for this analysis. Figure 8-1 shows the location of flood-insured properties in unincorporated Los Angeles County. Findings from this analysis are as follows:

- As of September 24, 2018, there were 1,539 flood insurance policies in force in the unincorporated area of Los Angeles County, with a total annual premium of $1,604,033 providing $427,976,700 in insurance coverage.
- The average premium for that time frame was $1,069, and the average coverage was $278,088 per policy for both structure and contents.
- Over 97 percent of the policies were for residential occupancy; fewer than 3 percent were non-residential policies. Table 7-1 shows that 76.5 percent of identified structures in the floodplain are residential. Over 65 percent of non-residential policies are located outside the SFHA.
- There were 698 flood insurance policies in force within the SFHA as of September 2018. This represents 41 percent of the total structures in the SFHA, which is below the national average of 49 percent. The breakdown of the 1,539 policies by flood zone is as follows:

  - Unnumbered A zones—222 policies, or 14.4 percent
  - AE, A1-99—111 policies, or 7.2 percent
  - Unnumbered V Zones—6 policies, or 0.4 percent
  - VE, V1-99 zones—16 policies, or 1.04 percent
  - AH, AO zones—344 policies, or 22.4 percent

- Over 54 percent of all policies in force were for properties outside the SFHA.
- The average replacement cost (structure and contents) for structures in the SFHA is $2,300,617. The average amount of insurance coverage in force ($278,088) will cover only 12 percent of this value. Flood insurance policies have coverage limits that impact how much coverage can be provided by structure and policy type.
- Hazus estimated that 86.3 percent of the buildings in the SFHA would be impacted, with an average structure and contents loss of $521,138 (see Table 8-5). The average amount of insurance coverage in force ($278,088), will cover only 53.4 percent of that estimated damage.

Based on these findings, the following recommendations are provided for the County to consider in the implementation of its Program for Public Involvement (PPI) contained in Chapter 14 of this plan:

- The high percentage of flood insurance policies outside the SFHA supports the findings of this plan that there are flood impacts in the County outside of areas mapped by FEMA, likely due to post-fire flood impacts, and the "Gaps in the Map" program identified in Chapter 14. The County should continue and/or enhance its outreach efforts targeting post-fire burn areas and "Gaps in the Map" area.
- With the average costs of homes in the SFHA exceeding $2 million, it is likely that there is a high percentage of rental properties in the floodplain. The County should continue is messaging about flood insurance coverage options for rental properties identified in Chapter 14.

## Flood Insurance Reform

The NFIP is currently $24 billion in debt and taxpayers will be forced to pay for any additional payouts until that situation is solved. The Biggert-Waters Flood Insurance Reform Act of 2012 changed the NFIP to make it more sustainable. It requires the NFIP to raise rates to reflect true flood risk, make the program more financially stable, and change how FIRM updates impact policyholders. The new law eliminates some artificially low rates and discounts, as well as subsidies to certain pre-FIRM policyholders. Most flood insurance rates will move to reflect

full risk, and flood insurance rates will rise on some policies. There are investments property owners and communities can make to reduce the impact of rate changes.

The Homeowner Flood Insurance Affordability Act of 2014 delays the increases in flood insurance premiums mandated under the Biggert–Waters Flood Insurance Reform Act of 2012 for four years. During that time, FEMA is supposed to come up with a plan to make the premiums cheaper and reassess its maps of areas that are likely to flood and therefore require flood insurance. The 2014 law also allows those who sell their homes to pass lower flood insurance premiums on to the next homeowner.

These laws will have profound impacts on the costs of flood insurance and implementation of the NFIP. How changes will impact local communities is not yet known. However, 69 percent of current policies in force in the planning area are the pre-FIRM subsidized policies that the legislation is targeting.

## Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses in excess of $1,000
- Two paid losses in excess of $1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

A severe repetitive loss property is further defined as follows:

- Four or more paid losses in excess of $5,000 each, with the cumulative amount of such claim payments exceeding $20,000
- At least two separate claim payments made, with the cumulative amount of the building portion of such claims exceeding the market value of the building
- At least two of the above referenced claims occurring within any rolling 10-year period and more than 10 days apart.

Repetitive loss properties make up only 1 to 2 percent of flood insurance policies in force nationally, yet they account for 40 percent of the nation's flood insurance claim payments. The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. A report on repetitive losses by the National Wildlife Federation found that 20 percent of these properties are outside any mapped 100-year floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

FEMA-sponsored programs, such as the CRS, require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that are at risk but are not on FEMA's list of repetitive loss structures because no flood insurance policy was in force at the time of loss. As part of this floodplain management plan update, Los Angeles County has prepared a repetitive loss area analysis pursuant to the CRS Activity 510 requirements (Section 512.b). The repetitive loss area analysis represents an enhanced look at these FEMA-identified repetitive loss properties and identifies strategies for addressing issues that are incorporated into this plan. It is considered to be a functional annex to this floodplain management plan and can be found in Appendix I.

## 8.3 CRITICAL FACILITIES AND INFRASTRUCTURE

Hazus assesses the potential damage to critical facilities from flooding using depth/damage function curves. Based on historical averages, these curves indicate potential damage amounts as a percentage of the value of structures or contents. Actual damage to facilities may be less than these conservative estimates. For critical buildings, Hazus also estimates functional down-time, which is the time it might take to restore a facility to 100 percent of its functionality after flood damage occurs. Results for the 100-year and 500-year flood events are summarized in Table 8-7 and Table 8-8.

**Table 8-7.** Estimated Damage to Critical Facilities in Unincorporated Areas from 100-Year Flood

| | Number of Facilities Affected | Average % of Total Value Damaged | |
|---|---|---|---|
| | | Structure | Content |
| **Safety & Security** | 1 | 7.56 | 10.24 |
| **Food, Water & Sheltering** | 9 | 6.72 | 18.73 |
| **Health & Medical** | 0 | N/A | N/A |
| **Energy** | 1 | 23.90 | 47.79 |
| **Communications** | 0 | N/A | N/A |
| **Transportation** | 59 | 1.41 | 8.86 |
| **Hazardous Materials** | 0 | N/A | N/A |
| **Total/Average** | **70** | **9.90** | **21.40** |

Note: Sources of data used in Hazus modeling are described in Table 5-1.

**Table 8-8.** Estimated Damage to Critical Facilities in Unincorporated Areas from 500-Year Flood

| | Number of Facilities Affected | Average % of Total Value Damaged | |
|---|---|---|---|
| | | Structure | Content |
| **Safety & Security** | 4 | 28.39 | 37.56 |
| **Food, Water & Sheltering** | 41 | 7.73 | 27.01 |
| **Health & Medical** | 0 | N/A | N/A |
| **Energy** | 1 | 23.90 | 47.79 |
| **Communications** | 2 | 5.00 | 16.00 |
| **Transportation** | 107 | 3.38 | 19.74 |
| **Hazardous Materials** | 30 | 10.00 | 15.00 |
| **Total/Average** | **185** | **13.07** | **27.18** |

Note: Sources of data used in Hazus modeling are described in Table 5-1.

The assessment shows that the percentage of the nearly 2,000 critical facilities and infrastructure in the planning area (see Table 3-5) that is expected to experience any damage at all is small, as is the estimated amount of damage for affected facilities:

- Only 75 are within the 100-year floodplain (see Table 7-6) and only 70 are predicted to experience any damage from a 100-year event (see Table 8-7). At those 70 facilities, the Hazus worst-case estimate of building damage averages less than 10 percent of the total building value.
- Only 192 are within the 500-year floodplain (see Table 7-7) and only 185 are predicted to experience any damage from a 500-year event (see Table 8-8). At those 185 facilities, the Hazus worst-case estimate of building damage averages 13 percent of the total building value.

## 8.4 ENVIRONMENT

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. The principle environment impact from flood is the loss of aquatic habitat. One possible measure of environmental impacts from flooding is by looking at the amount of debris that that would be generated by each scenario flood event. Hazus includes a debris estimation component. These estimates can provide local governments feedback for not only what they need to deal with through recovery, but also what the potential exposure is to debris that could be carried by floodwaters. The Hazus debris estimates for each of the scenario flood events for the planning area are shown in Table 8-9.

**Table 8-9.** Estimated Flood -Caused Debris in Unincorporated Areas

| | Debris[a] to Be Removed (tons) | Truckloads[b] |
|---|---|---|
| **10-Year Flood Event** | 2,303 | 92 |
| **50-Year Flood Event** | 6,388 | 256 |
| **100-Year Flood Event** | 19,563 | 783 |
| **500-Year Flood Event** | 53,028 | 2,121 |

a. The Hazus flood debris model focuses on building-related debris, and does not address contents removal or additional debris loads such as vegetation and sediment. The Los Angeles County Department of Public Work's Sediment Management Strategy lists the estimated amounts of sediment produced in a Design Debris Event.
b. Based on an estimate of 25 tons per truckload

# 9. CLIMATE CHANGE CONSIDERATIONS FOR FLOODPLAIN MANAGEMENT

This chapter presents an overview of current understandings of how climate change will affect the Los Angeles region and implications for floodplain management. Information on climate change is being continually updated, and the information presented here is a snapshot of the best available information at the time this document was written.

## 9.1 WHAT IS CLIMATE CHANGE?

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time. Worldwide, average temperatures have increased 1.4ºF since 1880 (NASA, 2015). Although this change may seem small, it can lead to large changes in climate and weather.

The warming trend and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth's atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production and changes in land use. According to the U.S. Environmental Protection Agency (EPA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen 43 percent since then, reaching 399 ppm in 2014 (see Figure 9-1). The EPA attributes almost all of this increase to human activities (U.S. EPA, 2015).

If greenhouse gas emission are not reduced, the following changes are projected for Los Angeles County (C-Change.LA, 2015):

- By the middle of this century, the region will experience temperatures similar to current temperatures only about 75 to 80 percent of the time (274 to 292 days per year), with temperatures hotter than those currently experienced mostly in late summer and early fall.
- By the end of this century, the percentage of temperatures similar to current temperatures will decrease to only 50 to 65 percent of the time (183-243 days per year), with the greatest increases in December to January and July to August.

## 9.2 HOW CLIMATE CHANGE AFFECTS FLOODPLAIN MANAGEMENT

An essential aspect of floodplain management is predicting the likelihood of flooding in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of flood events remains essentially unchanged over time. Thus, averages based on the past frequencies of floods are used to estimate future frequencies: if a river has flooded an average of once every five years for the past 100 years, then it can be expected to continue to flood an average of once every five years. But the assumption that future flooding behavior will be equivalent to past behavior is not valid if climate conditions are changing.

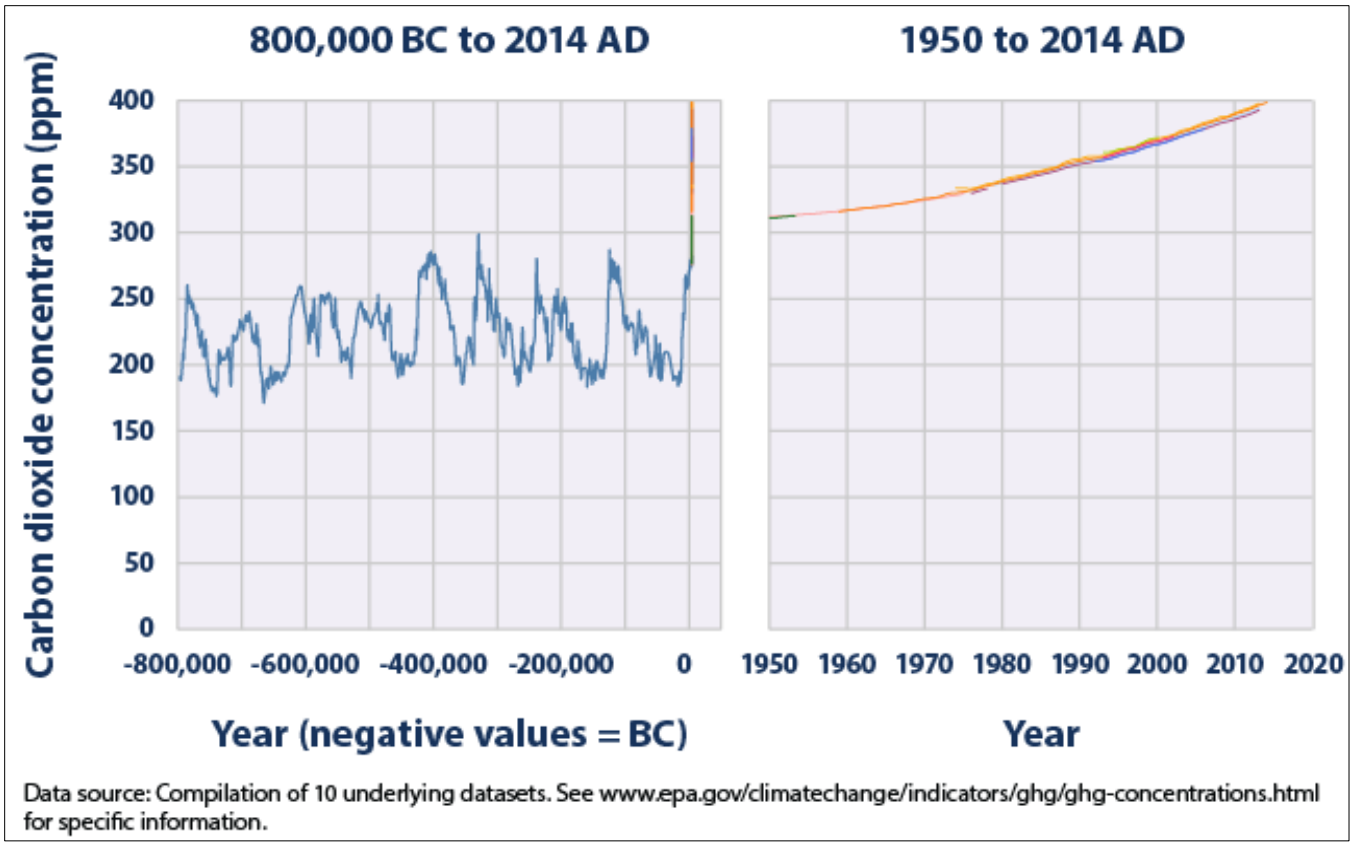



**Figure 9-1.** Global Carbon Dioxide Concentrations Over Time

Climate involves not only average temperature and precipitation but also the frequency and intensity of extreme weather events. According to studies by the University of California, Los Angeles and the U.S. Bureau of Reclamation, the average amount of precipitation that the Los Angeles Region receives in a typical year may be affected only slightly by climate change or not at all; however, there is potential for significant change in the intensity of individual storms, the amount of precipitation during the rainy season, or rainfall amounts in years of extreme wet weather or extreme dry weather. The frequency of flooding will not remain constant if broad precipitation patterns change over time. While predicting changes in flood events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society and the environment. For this reason, an understanding of climate change is pertinent to floodplain management activities. Information about how climate patterns are changing provides insight on the reliability of future flooding projections used in mitigation analysis.

Climate change will affect the people, property, economy and ecosystems of Los Angeles County in a variety of ways. Its impacts are most frequently associated with negative consequences and increased risk, such as increased flooding or increased heat-related public health concerns. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of flooding. This chapter summarizes current understandings about climate change in order to provide a context for the recommendation and implementation of flood hazard mitigation measures in Los Angeles.

## 9.3 CURRENT GLOBAL INDICATIONS OF CLIMATE CHANGE

The major scientific agencies of the United States—including the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA)—agree that climate change is

occurring. Multiple temperature records from all over the world have shown a warming trend, and the Intergovernmental Panel on Climate Change (IPCC) has stated that the warming of the climate system is unequivocal (IPCC, 2014). Of the 10 warmest years in the 134-year record, all but one (1998) occurred since 2000, and 2015 was the warmest year on record (NASA, 2016). Worldwide, average temperatures have increased 1.4ºF since 1880 (NASA, 2016).

Rising global temperatures have been accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (IPCC, 2014). The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising (NASA, 2016). Global sea level has risen approximately 6.7 inches, on average, in the last 100 years (NASA, 2016). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk (USGCRP, 2009).

## 9.4 PROJECTED FUTURE IMPACTS

### 9.4.1 Global Projections

Scientists project that Earth's average surface temperature will continue to rise between 0.5ºF and 8.6ºF by 2100 (IPCC, 2014). Some research has concluded that every increase of 2ºF in average global average temperature can have the following impacts (NRC, 2011b):

- 3 to 10 percent increases in the amount of rain falling during the heaviest precipitation events, which can increase flooding risks
- 5 to 10 percent decreases in stream flow in some river basins.

The amount of sea level rise expected to occur as a result of climate change will increase the risk of coastal flooding for millions to hundreds of millions of people around the world, many of whom would have to permanently leave their homes (IPCC, 2014). By 2100, sea level is expected to rise another 1 to 4 feet, with an uncertainty range of 0.66 to 6.6 feet (Melillo et al., 2014). Rising seas will make coastal storms and the associated storm surges more frequent and destructive. Flooding may also become more intense even in areas where precipitation is expected to decline (Melillo et al., 2014). What is currently termed a once-in-a-century coastal flooding event could occur more frequently.

### 9.4.2 Projections for the County of Los Angeles

#### Temperature

In the Los Angeles region by 2050, the frequency of heat waves and hot days (i.e., days on which the temperature exceeds 95ºF) is expected to increase. The frequency may triple in coastal areas and central Los Angeles, quadruple in the San Fernando Valley and San Gabriel Valley, and increase five- or six-fold in desert and mountainous regions. Temperature changes are already occurring, as the 2013-2014 winter season was the warmest winter on record in the County. Each of the past three decades has been recorded as the hottest on record (Los Angeles County Department of Public Health, 2014).

Figure 9-2 illustrates projections of temperature changes in the County of Los Angeles over the next several decades. The brown dot shows average present-day temperatures in August, the blue dot shows predicted future average August temperatures under a scenario where greenhouse gas emission reductions are accomplished on a global scale, and the red dot shows predicted future average August temperatures if no major mitigation activities occur. Without mitigation, temperatures could increase as much as 7ºF by 2100 (C-Change.LA, 2015).

*Source: C-Change.LA, 2014*

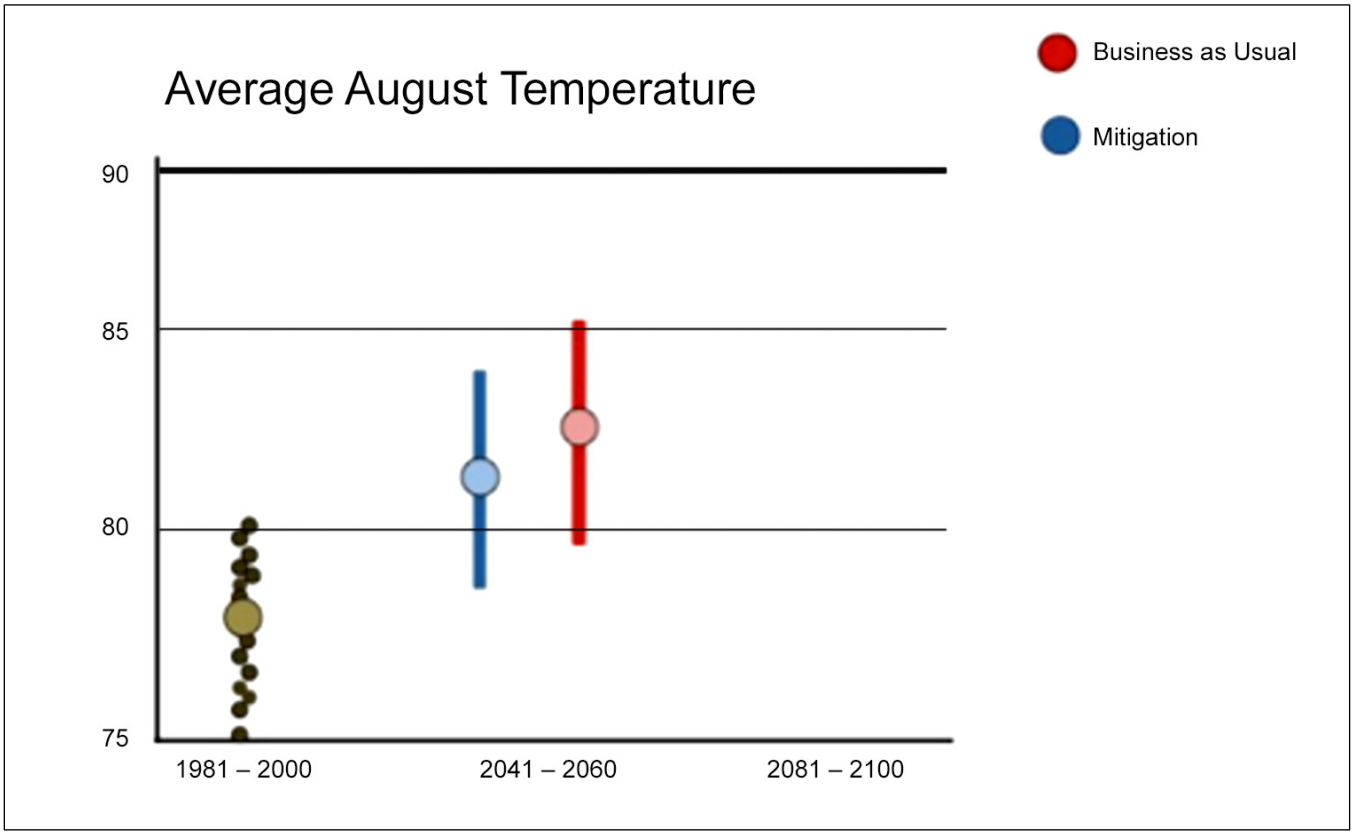



**Figure 9-2.** Current and Predicted Rising Temperatures in the Los Angeles Region

Temperature studies indicate that coastal areas will be less warm than the inland areas, while mountain peaks will experience the greatest amount of warming, due to loss of snow cover and resulting loss of reflection of the sun's heat (C-Change.LA 2014).

## Precipitation

The total amount of precipitation in the Los Angeles region over the coming century is expected to be similar to that of recent decades, with wide swings from year to year. However, a higher percentage of precipitation is expected to be in the form of rain rather than snow. This could increase the risk of flooding and decrease windows of time to capture local water (KCET 2016).

## Snow and Runoff

Annual snowfall could decrease by as much as 42 percent in the region's mountains by 2050, and snowpack could melt more than two weeks earlier in the season if greenhouse gas emissions are not reduced globally (KCET n.d.; C-Change.LA 2015). By the end of the century, two-thirds of present day snowfall is expected to be lost (C-Change.LA 2015). This not only would impact the County's potential for snowmelt floods, but it also could reduce freshwater supplies. Such significant changes in climate could lead to more frequent, intense, and longer severe weather events. A rising frequency of winter storms would also impact stream flows and increase flood rates (Los Angeles County Department of Public Health 2014).

### Sea Level

Sea levels are expected to rise in the Los Angeles region over the next century. Current estimates indicate an increase of 5 to 24 inches between 2000 and 2050 and 17 to 66 inches from 2000 to 2100 (USC, n.d.). A 55-inch sea level rise would cause Los Angeles County coastal areas subject to inundation from a 100-year flood to increase 46 percent, from 3,952 acres to 7,293 acres (California Energy Commission, 2015). The population vulnerable to such flooding would increase from 86,000 to 149,300, a 73-percent increase (Cal EMA, 2012).

Given these vulnerabilities, a team of regional partners from local, state and regional agencies are working to develop a comprehensive shoreline change and coastal erosion model (Coastal Storm Modeling System) that will provide "region-specific flood hazard projections at a detailed parcel scale from Point Conception to the Mexican border" (USC, n.d.). This project, known as *Regional AdaptLA: Coastal Impacts Planning in the Los Angeles Region,* will also work with local jurisdictions toward climate adaptation capacity building, so that the model results can be effectively used in local planning (USC, n.d.). Forty sea level rise and coastal storm scenarios will be modeled, providing projections for coastal flooding, waves, currents, beach change, cliff retreat, and river discharge. These model results should aid communities in identifying specific vulnerabilities related to coastal storms and sea level rise (USC, n.d.).

## 9.5 RESPONSES TO CLIMATE CHANGE

### 9.5.1 Mitigation and Adaptation

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Generally, climate change discussions encompass two separate but inter-related considerations: mitigation and adaptation. The term "mitigation" can be confusing, because its meaning changes across disciplines:

- Mitigation in restoration ecology and related fields generally refers to policies, programs or actions that are intended to reduce or to offset the negative impacts of human activities on natural systems. Generally, mitigation can be understood as avoiding, minimizing, rectifying, reducing or eliminating, or compensating for known impacts (CEQ, 1978).
- Mitigation in climate change discussions is defined as "a human intervention to reduce the impact on the climate system." It includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks (U.S. EPA, 2013g).
- Mitigation in emergency management is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters (FEMA, 2013).

In this chapter, mitigation is used as defined by the climate change community. In the other chapters of this floodplain management plan, mitigation is primarily used in an emergency management context.

Adaptation refers to adjustments in natural or human systems in response to the actual or anticipated effects of climate change and associated impacts. These adjustments may moderate harm or exploit beneficial opportunities (U.S. EPA, 2013g).

Mitigation and adaptation are related, as the world's ability to reduce greenhouse gas emissions will affect the degree of adaptation that will be necessary. Some initiatives can both reduce greenhouse gas emissions and support adaptation to likely future conditions. One subset of this type of strategy is known as ecosystem-based adaptation. Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services. In terms of floodplain management, many such actions are related to preserving or enhancing the natural beneficial functions of floodplain systems.

Riparian forests can bind soils and hold large volumes of water during periods of significant precipitation, releasing it through the year. Floodplains can absorb large volumes of water during peak flows. Coastal ecosystems can hold out against storms, attenuating waves and reducing erosion.

The County of Los Angeles has already begun implementing progressive mitigation actions, and this plan is one way in which the County intends to identify and achieve more mitigation projects. The County's Community Climate Action Plan, an element of the General Plan, was developed to reduce greenhouse gas emissions associated with activities in unincorporated communities. The Community Climate Action Plan establishes a greenhouse gas reduction target that is consistent with state efforts. Potential solutions were developed in five areas: green building and energy; land use and transportation; water conservation and wastewater; waste reduction, reuse and recycling; and land conservation and tree planting. Although many of these actions are not directly tied to flood mitigation, most will indirectly serve to reduce future flood-related hazard events by reducing sea level rise and promoting green space and conservation of resources (Los Angeles County Department of Regional Planning 2015a).

### 9.5.2 Future Modeling Efforts

Most current modeling efforts are unable to assess climate change at a resolution small enough to determine specific impacts for individual communities. Typically, generalized assessments of larger climatic regions have been used to determine impacts that are most likely to affect these communities. Climate researchers worldwide are working to improve modeling efforts at more refined scales. At the University of California, Los Angeles, for example, research efforts are being conducted to model impacts for the greater Los Angeles region (C-Change.LA, 2015). As such models are developed in the future, the risk assessment presented in this floodplain management plan may be enhanced to better measure these impacts.

### 9.5.3 Response To Climate Change in California

California Assembly Bill 32, The California Global Warming Solutions Act, addresses greenhouse gas emissions. This law focuses on reducing greenhouse emissions rather than adapting to likely climate impacts. The success of implementing such reductions in California and worldwide will affect the degree to which flood management systems will need to be adapted to changing conditions.

## 9.6 POTENTIAL CLIMATE CHANGE IMPACT ON FLOOD HAZARDS

Developing projections of future climate change for a specific region is challenging, especially longer term projections. The further out a prediction reaches, the more subject to changing dynamics it becomes. Modeling that is currently available is limited in its ability to produce quantitative estimates of the effect of climate change on flood hazard risks; however, an understanding of the basic features of climate change allows for the following qualitative assessments of impacts on flood-related hazards. This overview serves as a basis for evaluating how risk will change as a result of future climate change impacts.

### 9.6.1 Coastal Erosion

Coastal areas may be impacted by climate change in different ways. Coastal areas are sensitive to sea-level rise, changes in the frequency and intensity of storms, increases in precipitation, and warmer ocean temperatures. According to NASA, warmer temperatures may lead to an increase in frequency of storms, thus leading to more weather events that cause coastal erosion (NASA, no date).

A study on increased storm wave heights from climate change indicated that sea level rise alone could double rates of coastal erosion and flooding and that increased frequency of major El Niño events (up to double the current frequency) could quadruple the rates of coastal erosion and flooding. Sea level rise and increased El Niño

frequency combined could cause up to an order of magnitude increase in coastal erosion and flood frequency. While erosion rates would still be partially dependent on beach slopes and dune crest elevations, this possibility highlights the importance of incorporating climate change and climate control into mitigation practices (Ruggiero 2008 ).

## 9.6.2 Dam Failure

With numerous dams located throughout the Los Angeles region, the possibility of dam failure based on climate change is a key consideration, especially due to the densely populated areas downstream of most dams. In Los Angeles County there are generally two major types of dams—water supply and flood control. Water supply dams typically have stormwater diversions that direct stormwater away from their reservoirs due to water quality measures. Flood control dams, like those owned and operated by Los Angeles County Flood Control District, have reservoir water levels that are largely dependent on the weather. The design of these dams account for multiple factors, including the anticipated rainfall and runoff flows that could be expected within the tributary canyons. This rainfall and runoff, often portrayed on hydrograph plots as a function of varying time periods, can be significantly impacted by changes in the weather patterns. If the reservoir water surface elevations behind a dam increase more quickly or more frequently because of changing weather patterns, operations at the dam may be impacted and downstream communities may experience larger flows more frequently.

To protect against failures related to extreme rainfall runoff or water inflows from other sources, all dams have spillways that serve to release large amounts of reservoir water whenever the water surface elevations reach the spillway height. For flood control dams, spillway flows generally occur when rainfall runoff flow rates (reservoir inflows) exceed the capacity of the outlet control valves that release reservoir water into the downstream river or channel. Spillways significantly decrease the probability of dam overtopping and minimize the possibility of structural failure of a dam and erosion of the side slopes above the downstream water course. The State Department of Water Resources has jurisdiction over all non-federal dams that are over a certain height and/or storage. As a result, the state requires all dams within its jurisdiction to have spillways sized to pass the "probable maximum flood" event, which is the theoretical largest flood that could occur at a location based on the tributary watershed and probable maximum precipitation. The Los Angeles County Flood Control District is modifying its dams to meet the latest design standards to safely pass the probable maximum flood. As a result, dam overtopping scenarios in even the most extreme events are unlikely. Though spillway events can result in above-average discharges downstream, such events are not considered failures but rather part of the intended design. Climate change may increase the probability of spillway events and therefore could warrant corresponding design changes to downstream infrastructure, but is unlikely to increase the probability of dam failure.

## 9.6.3 Flood

### Changes in Hydrology

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.

- Extreme climatic events will become more frequent, necessitating improvement in flood protection and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain area to contribute to peak storm runoff. High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding (USGCRP, 2009). Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams reducing reservoir capacities, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts (Jin et al., 2015).

As hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities already exposed to flood hazards at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

#### Changes in Precipitation

A 2014 study on precipitation by the University of California, Los Angeles found that Los Angeles County can expect approximately the same amount of total precipitation this century as it experienced the previous century, but that yearly precipitation amounts can vary significantly. Similar results were found in a 2013 study by the U.S. Bureau of Reclamation (U.S. Bureau of Reclamation, 2013). Therefore, even though total rates of precipitation should remain constant, Southern California could have an increased risk of flooding and smaller time to capture local water. This is a result of most of the precipitation falling in the form of rain, not snow, thus increasing winter flow rates (C-Change.LA, 2014).

### 9.6.4 Storm Surge

Storm surges are generated by the strong winds and intense low pressure associated with tropical cyclones, hurricanes, and severe storms. While not all severe storms create significant levels of storm surge, the surge index record shows a significant positive correlation between warmer years and extreme events (i.e., Hurricane Katrina-level events). Figure 9-3 correlates temperature with the past and projected future number of Hurricane Katrina-magnitude surge events per decade (separate lines on the figure represent results based on different modeling techniques and data sources). The results show an overall positive correlation between temperature increase and storm surge frequency (Grinsted et al., 2013).

### 9.6.5 Sea Level Rise

Changes in global temperatures, hydrologic cycles, coverage of glaciers and ice sheets, and storm frequency and intensity are captured in long-term sea level records. Sea levels provide a key to understanding the impact of climate change (NOAA 2012). Warmer temperatures result in the melting of glaciers and ice sheets. This melting means that less water is stored on land, so there is a greater volume of water in the oceans. Water also expands as it warms, and the heat content of the world's oceans has been increasing over the last several decades.

Sea level rise increases the risks coastal communities face from coastal hazards (floods, storm surges, and chronic erosion), and related hazards like flooding near the mouths of streams and channels, landslides, and seawater well intrusion. It may also lead to the loss of important coastal habitats, wetlands, and estuaries. In fact, sea level rise may have a stronger influence on hazard occurrences than an increase in El Niño events (Ruggiero 2008).

*Source: Grinsted et al., 2013*

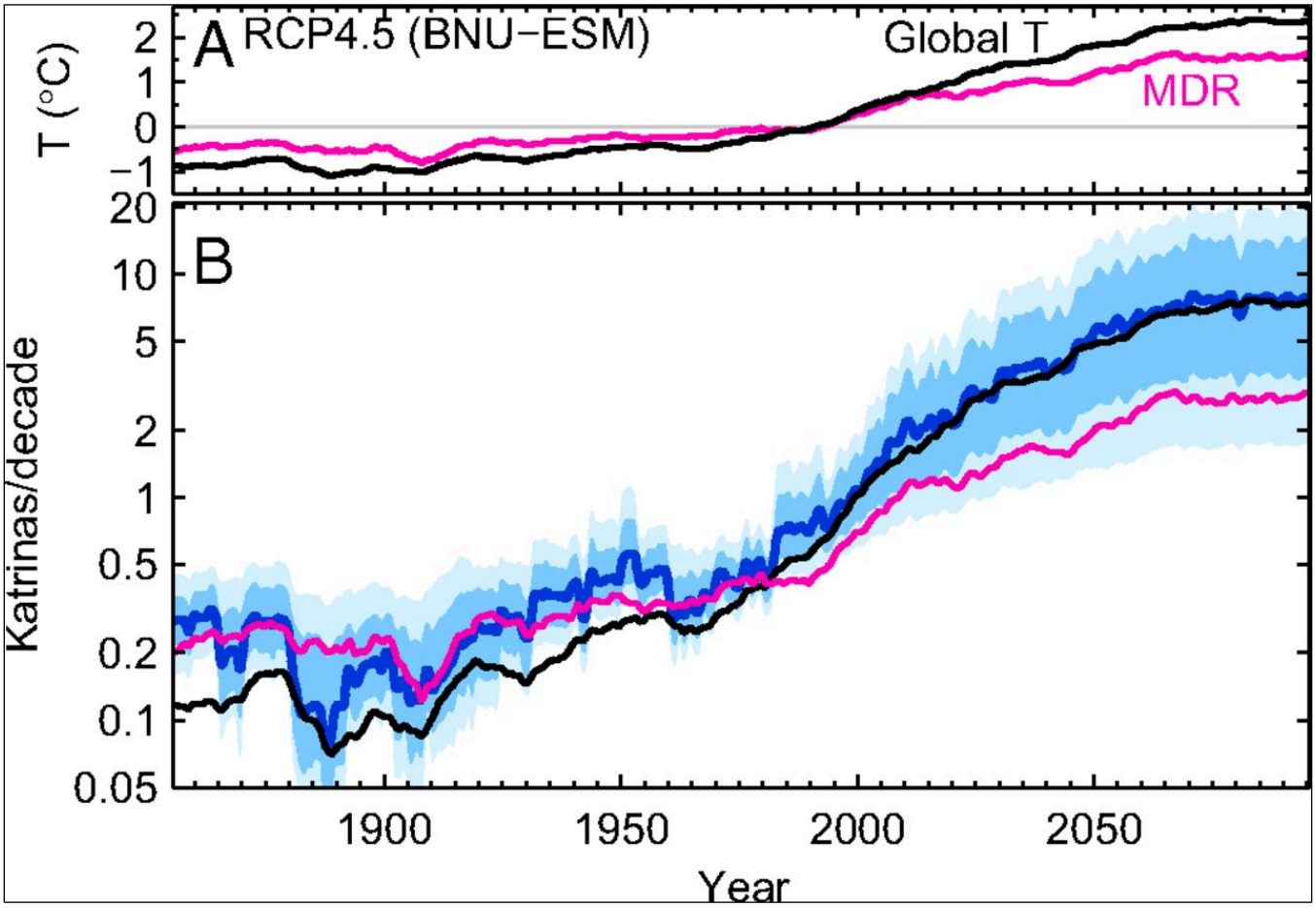



**Figure 9-3.** Surge Event Frequency over Time and Climate Changes

# PART 3—MITIGATION STRATEGY

# 10. GUIDING PRINCIPLE, GOALS AND OBJECTIVES

This chapter identifies goals for reducing long-term vulnerabilities to flooding (CRS Step 6). After reviewing the goals and objectives identified for the 2015 plan and for other locally relevant planning documents, the Steering Committee developed updated goals and objectives and a mission statement. This work was completed through facilitated discussions over several meetings. Goals were selected that support the mission statement. Objectives were selected that meet multiple goals.

## 10.1 MISSION STATEMENT

A mission statement focuses the range of objectives and actions to be considered. The mission statement for the 2020 floodplain management plan is as follows:

> *Protect life, property, the economy and the environment of unincorporated Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards and thus enhance community resilience.*

## 10.2 GOALS

The effectiveness of a mitigation strategy is assessed by determining how well its goals are achieved. The Steering Committee established the following updated goals for the 2020 floodplain management plan:

- Enhance community resilience to the impacts of flood hazards
- Protect life, safety, property and economy.
- Communicate to residents and stakeholders what the flood risk are, based on best available data and science.
- Increase resilience of infrastructure and critical facilities from flood hazards.
- Account for flood risk in land use and planning.
- Preserve, enhance or restore the natural environment's floodplain functions.
- Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.

## 10.3 OBJECTIVES

The following objectives were selected that meet multiple goals:

1. Work cooperatively with public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
2. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
3. Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
4. Create a public outreach strategy.

5. Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.
6. Consider open space land uses within known flood hazard areas.
7. Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.
8. Retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
9. Provide flood protection by maintaining flood control systems.
10. Sustain reliable local emergency operations and facilities during and after a flood event.
11. Consider climate change implications in planning for flood and inundation hazards.
12. Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.

# 11. MITIGATION INITIATIVES

## 11.1 ALTERNATIVES ANALYSIS

During the Steering Committee session on November 13, 2019, a core capability exercise was performed by the SC to assess local strengths, weaknesses, obstacles and opportunities related to floodplain management (see Section 2.5). The results of this exercise served as the basis for identifying the range of alternatives the County could consider as floodplain management actions. The planning team used the results of this exercise to refresh the "flood hazard mitigation catalog" of alternatives that was created for the 2015 floodplain management planning effort. This catalog represents the range of floodplain management alternatives that were considered by the County in compliance with Step 7 of the CRS 10-step process. It presents a wide range of activities to ensure that all possible measures are explored, not just traditional approaches such as flood control, acquisition, and land use regulation. The Steering Committee's input on the County's core capabilities informed the alternatives review process. The planning team also used findings of public outreach efforts, the risk assessment results, and the actions identified in the 2015 plan to finalize the catalog for the 2020 update. The resulting catalog includes alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
  - Public sector (people who live and work in Los Angeles County)
  - Private sector (non-governmental organizations and business sectors)
  - Government sector (federal, state and local entities that possess regulatory authorities).
- By what the alternative would do:
  - Manipulate the flooding hazard
  - Reduce exposure to the flooding hazard
  - Reduce vulnerability to the flooding hazard
  - Increase the ability to respond to or be prepared for the flooding hazard.

The catalog provides a baseline of mitigation alternatives that are backed by a planning process and are consistent with the goals and objectives of this plan. However, not all the alternatives meet all the selection criteria considered by the Steering Committee. The purpose of this catalog is to provide the Steering Committee and the County a range of alternatives to consider for actions to be recommended in this plan. This list and the capabilities of the County to implement these alternatives was fully vetted by the Steering Committee. This catalog served as the baseline for actions considered by the County. Decisions not to carry over any actions into the action plan were based on the following criteria:

- The action is not feasible.
- The action is already being implemented.
- The County lacks the current capability to implement the action.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support

## 11.1.1 Alternatives to Mitigate the Flood Hazard

Table 11-1 presents the catalog of flood hazard alternatives considered by the County.

**Table 11-1.** Alternatives to Mitigate the Flooding Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>❖ Clear storm drains and culverts<br>• **Reduce exposure to the hazard:**<br>❖ Locate outside of hazard area<br>❖ Elevate utilities above base flood elevation<br>• **Reduce vulnerability to the hazard:**<br>❖ Raise structures above base flood elevation<br>❖ Elevate items within house above base flood elevation<br>❖ Build new homes above base flood elevation<br>❖ Flood-proof structures<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Buy flood insurance<br>❖ Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event | • **Manipulate the hazard:**<br>❖ Clear storm drains and culverts<br>• **Reduce exposure to the hazard:**<br>❖ Locate critical facilities or functions outside hazard area<br>• **Reduce vulnerability to the hazard:**<br>❖ Build redundancy for critical functions or retrofit critical buildings<br>❖ Provide flood-proofing when new critical infrastructure must be located in floodplains<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Keep cash reserves for reconstruction<br>❖ Support and implement hazard disclosure for sale of property in risk zones.<br>❖ Solicit cost-sharing through partnerships with others on projects with multiple benefits. | • **Manipulate the hazard:**<br>❖ Maintain drainage system<br>❖ Dredging, levee construction, and providing regional retention areas<br>❖ Structural flood control, levees, channelization, or revetments.<br>❖ Stormwater management regulations and master planning<br>❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• **Reduce exposure to the hazard:**<br>❖ Locate or relocate critical facilities outside of hazard area<br>❖ Acquire or relocate identified repetitive loss properties<br>❖ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks.<br>❖ Adopt land development criteria such as planned unit developments, density transfers, clustering<br>❖ Institute low impact development techniques on property<br>❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>❖ Preserve undeveloped and vulnerable shoreline<br>❖ Restore existing flood control and riparian corridors<br>• **Reduce vulnerability to the hazard:**<br>❖ Harden infrastructure, bridge replacement program<br>❖ Provide redundancy for critical functions and infrastructure<br>❖ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions.<br>❖ Stormwater management regulations and master planning.<br>❖ Adopt "no-adverse impact" floodplain management policies to not increase flood risk on downstream communities<br>❖ Facilitate managed retreat from, or upgrade of, the most at-risk areas<br>❖ Require accounting of sea level rise in all applications for new development in shoreline areas<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Produce better hazard maps<br>❖ Provide technical information and guidance<br>❖ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information)<br>❖ Incorporate retrofitting or replacement of critical system elements in capital improvement plan<br>❖ Develop strategy to take advantage of post-disaster opportunities<br>❖ Warehouse critical infrastructure components<br>❖ Develop and adopt a continuity of operations plan<br>❖ Consider participation in the Community Rating System<br>❖ Maintain and collect data to define risks and vulnerability<br>❖ Train emergency responders<br>❖ Create an elevation inventory of structures in the floodplain<br>❖ Develop and implement a public information strategy<br>❖ Charge a hazard mitigation fee<br>❖ Integrate floodplain management policies into other planning mechanisms within the planning area.<br>❖ Consider the probable impacts of climate change on the risk associated with the flood hazard<br>❖ Consider the residual risk associated with structural flood control in future land use decisions<br>❖ Enforce National Flood Insurance Program requirements<br>❖ Adopt a Stormwater Management Master Plan<br>❖ Develop an adaptive management plan to address the long-term impacts of sea level rise |

### 11.1.2 Alternatives to Mitigate the Dam Failure Hazard

Table 11-2 presents the catalog of Dam Failure alternatives considered by the County.

**Table 11-2.** Alternatives to Mitigate the Dam Failure Hazard

| Personal-Scale | Corporate-Scale | Government-Scale |
|---|---|---|
| • **Manipulate the hazard:**<br>❖ None<br>• **Reduce exposure to the hazard:**<br>❖ Relocate out of dam failure inundation areas<br>• **Reduce vulnerability to the hazard:**<br>❖ Elevate home to appropriate levels<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Learn about risk reduction for the dam failure hazard<br>❖ Learn the evacuation routes for a dam failure event<br>❖ Educate yourself on early warning systems and the dissemination of warnings | • **Manipulate the hazard:**<br>❖ Remove dams<br>❖ Harden dams<br>• **Reduce exposure to the hazard:**<br>❖ Replace earthen dams with hardened structures<br>• **Reduce vulnerability to the hazard:**<br>❖ Flood-proof facilities within dam failure inundation areas<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Educate employees on the probable impacts of a dam failure<br>❖ Develop a continuity of operations plan | • **Manipulate the hazard:**<br>❖ Remove dams<br>❖ Harden dams<br>• **Reduce exposure to the hazard:**<br>❖ Replace earthen dams with hardened structures<br>❖ Relocate critical facilities out of dam failure inundation areas<br>❖ Consider open space land use in designated dam failure inundation areas<br>• **Reduce vulnerability to the hazard:**<br>❖ Adopt higher floodplain standards in mapped dam failure inundation areas<br>❖ Retrofit critical facilities within dam failure inundation areas<br>• **Build local capacity to respond to or prepare for the hazard:**<br>❖ Map dam failure inundation areas<br>❖ Enhance emergency operations plan to include a dam failure component<br>❖ Institute monthly communications checks with dam operators<br>❖ Inform the public on risk reduction techniques<br>❖ Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas<br>❖ Consider the probable impacts of climate change in assessing the risk associated with the dam failure hazard<br>❖ Establish early warning capability downstream of listed high hazard dams<br>❖ Consider the residual risk associated with protection provided by dams in future land use decisions |

## 11.2 SELECTED MITIGATION ACTIONS

The planning team and Steering Committee determined that some actions from the flood hazard mitigation catalog could be implemented to provide flood hazard mitigation benefits. Table 11-3 lists the recommended actions, the lead agency for each, and the proposed timeline. The parameters for the timeline are as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

The Repetitive Loss Area Analysis in Appendix I provides a detailed assessment of which areas in unincorporated Los Angeles County that have experienced repeated flood damage in the past will benefit from each of the recommended actions to mitigate flooding.

**Table 11-3.** Action Plan—Flood Mitigation Actions

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **1—Promote awareness of flood hazards to residents in flood hazard areas.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Building and Safety Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; County Regional Planning Department | Low | Ongoing | 1, 3, 4, 12 | Yes-1 |
| **2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Community & Government Relations Group, Building and Safety Division, Land Development Division, Program for Public Information)<br>***Funding Source:*** Public Works | Low | Ongoing | 3, 4, 12 | Yes-2 |
| **3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Los Angeles County Chief Executive Office/Office of Emergency Management (CEO OEM), Public Works (Disaster Services Group)<br>***Funding Source:*** Public Works; CEO OEM | Low | Ongoing | 1, 3 | Yes-3 |
| **4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties:**<br>• **Annually notify owners regarding local flood hazards and proper protection activities**<br>• **Provide technical advice regarding flood protection and flood preparedness**<br>• **Distribute a revised questionnaire to new Repetitive Loss Properties.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Program for Public Information)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 2, 3, 4, 12 | Yes-4 |
| **5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials.**<br>***Lead Agency:*** Fire Department, Public Works (Administrative Services Division, Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Community & Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; Fire Department; Public Works | Low | Ongoing | 3, 4, 10 | Yes-5 |
| **6—Provide public education about maintaining the stormwater system free of debris.**<br>***Lead Agency:*** Public Works (Stormwater Quality Division)<br>***Support Agencies:*** Public Works (Community & Government Relations Group, Stormwater Engineering Division, Stormwater Maintenance Division, Stormwater Planning Division, Road Maintenance Division, Program for Public Information)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 4, 10 | Yes-6 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Maintenance Division, Stormwater Planning Division, Transportation Planning and Programs Division, Community & Government Relations Group, Program for Public Information)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 3, 4, 5, 7, 9 | Yes-7 |
| **8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Community & Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Low | Ongoing | 1, 3, 4, 12 | Yes-8 |
| **9—Provide emergency preparedness and flood protection information to the general public.**<br>***Lead Agency:*** CEO OEM<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Program for Public Information, Stormwater Planning Division, Community & Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works; USC Sea Grant | Low | Ongoing | 1, 4, 10, 12 | Yes-9 |
| **10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.**<br>***Lead Agency:*** CEO OEM, Public Works (Disaster Services Group)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community & Government Relations Group, Program for Public Information)<br>***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works | Low | Ongoing | 1, 4, 10, 12 | Yes-10 |
| **11—Develop and maintain a list of priority maintenance-related problem sites.**<br>***Lead Agency:*** Public Works (Stormwater Maintenance Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Road Maintenance Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 9 | Yes-11 |
| **12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Road Maintenance Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 9 | Yes-12 |
| **13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management.**<br>***Lead Agency:*** Public Works (Stormwater Maintenance Division)<br>***Support Agencies:*** Public Works (Stormwater Planning Division, Stormwater Engineering Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 2, 9 | Yes-13 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **14—Evaluate storm drain, open channel, and flood retention basin facilities for future improvements.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division)<br>***Support Agencies:*** Public Works (Design Division, Stormwater Maintenance Division, Stormwater Engineering Division, Stormwater Quality Division) Stakeholders<br>***Funding Source:*** Public Works | Low | Ongoing | 2, 9 | Yes-14 |
| **15—Pursue appropriate flood hazard mitigation grant funding.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Disaster Services Group, Stormwater Planning Division), CEO OEM<br>***Funding Source:*** Public Works; CEO OEM | Low | Ongoing | 1, 8, 9 | Yes-15 |
| **16—Consider the conversion of high-risk properties into open space.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Parks and Recreation<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department; County Parks and Recreation | High | Ongoing | 5, 6, 8 | Yes-16 |
| **17—Refine the plan check system to track properties in the flood zone and address drainage.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 2, 5, 9 | Yes-17 |
| **18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 5, 8, 9 | Yes-18 |
| **19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Chief Information Office)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 2, 5 | Yes-19 |
| **20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Engineering Division), Stakeholders<br>***Funding Source:*** FEMA, U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department | Low | Ongoing | 1, 7, 11 | Yes-20 |
| **21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division, Stormwater Quality Division)<br>***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Stormwater Engineering Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works | High/ Medium | Long term | 1, 2, 3, 6, 7 | Yes-21 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits.**<br>***Lead Agency:*** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Environmental Programs Division, Stormwater Quality Division, Stormwater Planning Division, Stormwater Engineering Division, Project Management Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; Public Works | Low | Ongoing | 1, 2, 7 | Yes-22 |
| **23—Maintain the Operational Area Emergency Response Plan.**<br>***Lead Agency:*** CEO OEM<br>***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Engineering Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM | Low | Ongoing | 1, 3, 10 | Yes-23 |
| **24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution.**<br>***Lead Agency:*** Public Works (Building and Safety Division, Design Division, Land Development Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Quality Division, Stormwater Planning Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 2, 5, 8, 9 | Yes-24 |
| **25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development.**<br>***Lead Agency:*** Regional Planning Department<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Transportation Planning and Programs Division, Land Development Division)<br>***Funding Source:*** Public Works; County Regional Planning Department | Low | Ongoing | 5, 7 | Yes-25 |
| **26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Transportation Planning and Programs Division)<br>***Funding Source:*** FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; Public Works; CEO OEM; County Regional Planning Department; County Parks and Recreation | Low | Ongoing | 5, 6, 8 | Yes-26 |
| **27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan.**<br>***Lead Agency:*** Regional Planning Department<br>***Support Agencies:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** County Regional Planning Department; Public Works | Low | Short term | 1, 2, 3 | Yes-27 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division, Stormwater Maintenance Division), Regional Planning Department<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 3, 4, 5, 7, 9 | Yes-28 |
| **29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; USC Sea Grant | Low | Long term | 2, 3, 6, 11 | Yes-29 |
| **30—Identify flood-warning systems for properties where such systems can be beneficially employed.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** CEO OEM, Sheriff's Department, Public Works (Stormwater Maintenance Division, Disaster Services Group)<br>***Funding Source:*** FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; Public Works; CEO OEM | Low | Ongoing | 1, 9, 10 | Yes-30 |
| **31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** CEO OEM, Public Works (Disaster Services Group)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM | Medium/ Low | Long term | 1, 10 | Yes-31 |
| **32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties.**<br>***Lead Agency:*** Public Works (Building and Safety Division, Land Development Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 5, 9, 12 | Yes-32 |
| **33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** : Public Works (Stormwater Planning Division, Design Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Medium/ Low | Ongoing | 1, 2, 3 | Yes-33 |
| **34—Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Low | Ongoing | 1, 3 | Yes-34 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost[b] | Timeline | Objectives | In Previous Plan? Action # |
|---|---|---|---|---|
| **35—Continue County coordination with other agencies and stakeholders on issues of flood control.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division)<br>***Funding Source:*** Public Works | Low | Ongoing | 1, 3, 9 | Yes-35 |
| **36—Continue to identify and assess drainage needs.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division)<br>***Support Agencies:*** Public Works (Stormwater Maintenance Division)<br>***Funding Source:*** Public Works | Medium/Low | Ongoing | 1, 2, 12 | No |
| **37—Once FEMA establishes its Building Resilient Infrastructure and Communities (BRIC) program, consider updating this plan accordingly to meet the BRIC program guidelines.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Planning Division, Stormwater Maintenance Division)<br>***Funding Source:*** Public Works; FEMA | Low | Long Term | 1, 12 | No |

a. Numbering of actions is for identification only and does not indicate rank or priority. See Section 11.5 for prioritization
b. See Section 11.4 for description of estimated project cost.

## 11.3 STATUS OF ACTIONS FROM PREVIOUS PLAN

All actions from the 2015 Los Angeles County Floodplain Management Plan were reviewed annually through the progress reporting protocol defined in the 2015 plan's maintenance strategy. For this update, the County reviewed the progress reports to determine assess the status of each action. The review determined that all actions are still relevant and feasible actions, so all have been carried over to the current update. This includes any action that had shown no progress completed in the progress reports. No actions were identified as no longer feasible.

## 11.4 BENEFIT/COST ANALYSIS

The action plan is prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (CRS Step 8). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program and Pre-Disaster Mitigation grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases). Costs are estimated to be greater than $5 million.
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years. Costs are estimated to be between $500,000 and $5 million.

- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program. Costs are estimated to be less than $500,000.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, Los Angeles County may seek financial assistance under the FEMA Hazard Mitigation Grant Program or Hazard Mitigation Assistance programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, Los Angeles County reserves the right to define "benefits" according to parameters that meet the goals and objectives of this plan.

## 11.5 ACTION PLAN PRIORITIZATION

Table 11-4 lists the priority of each action as assigned by the planning team, using the same parameters used in selecting the actions. A qualitative benefit-cost review was performed for each of these actions. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for a grant program. High priority projects can be completed in the short term (1 to 5 years). The key factors for high priority projects are that they have funding secured and can be completed in the short term.
- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured. The key factors for medium priority projects are that they are eligible for funding, but do not yet have funding secured, and they can be completed within the short term.
- **Low Priority**—A project that will mitigate the risk of the flood hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for FEMA grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for grant funding from other programs. Low priority projects are "blue-sky" projects. How they will be financed is unknown, and they can be completed over a long term.

**Table 11-4.** Prioritization of Mitigation Actions

| # of Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is Project Grant Eligible? | Can Project be Funded Under Existing Programs/ Budgets? | Priority (High, Medium, Low) |
|---|---|---|---|---|---|---|
| 1—Promote awareness of flood hazards to residents in flood hazard areas. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. | | | | | | |
| 2 | High | Low | Yes | No | Maybe | High |
| 4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties:<br>• Annually notify owners regarding local flood hazards and proper protection activities<br>• Provide technical advice regarding flood protection and flood preparedness<br>• Distribute a revised questionnaire to new Repetitive Loss Properties. | | | | | | |
| 4 | High | Low | Yes | No | Yes | High |
| 5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. | | | | | | |
| 3 | High | Low | Yes | Yes | Yes | High |
| 6—Provide public education about maintaining the stormwater system free of debris. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. | | | | | | |
| 6 | Medium | Low | Yes | No | Yes | High |
| 8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Maybe | High |
| 9—Provide emergency preparedness and flood protection information to the general public. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 11—Develop and maintain a list of priority maintenance-related problem sites. | | | | | | |
| 2 | Low | Low | Yes | No | Yes | High |
| 12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |
| 14—Evaluate storm drain, open channel, and flood retention basin facilities for future improvements. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 15—Pursue appropriate flood hazard mitigation grant funding. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |
| 16—Consider the conversion of high-risk properties into open space. | | | | | | |
| 3 | High | High | Yes | Yes | No | Medium |
| 17—Refine the plan check system to track properties in the flood zone and address drainage. | | | | | | |
| 4 | Medium | Low | Yes | No | Maybe | Medium |
| 18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. | | | | | | |
| 3 | Medium | Low | Yes | No | Maybe | High |

| # of Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is Project Grant Eligible? | Can Project be Funded Under Existing Programs/ Budgets? | Priority (High, Medium, Low) |
|---|---|---|---|---|---|---|
| 20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects. | | | | | | |
| 3 | Low | Low | Yes | Yes | Yes | High |
| 21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. | | | | | | |
| 5 | Medium | High/ Medium | No | Yes | No | Medium |
| 22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 23—Maintain the Operational Area Emergency Response Plan. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. | | | | | | |
| 4 | Medium | Low | Yes | No | Yes | High |
| 25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. | | | | | | |
| 3 | High | Low | Yes | Yes | Yes | High |
| 27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |
| 28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. | | | | | | |
| 6 | Medium | Low | Yes | No | Yes | High |
| 29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. | | | | | | |
| 4 | Medium | Low | Yes | Yes | Maybe | High |
| 30—Identify flood-warning systems for properties where such systems can be beneficially employed. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Maybe | Medium |
| 31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. | | | | | | |
| 2 | Medium | Medium/ Low | Yes | Yes | Maybe | High |
| 32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. | | | | | | |
| 3 | Low | Medium/ Low | No | Yes | Maybe | Medium |
| 34—Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners. | | | | | | |
| 2 | Medium | Low | Yes | Yes | Maybe | High |
| 35—Continue County coordination with other agencies and stakeholders on issues of flood control. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | Medium |
| 36—Continue to identify and assess drainage needs. | | | | | | |
| 3 | Medium | Medium/Low | Yes | Yes | Yes | High |
| 37—Once FEMA establishes its Building Resilient Infrastructure and Communities (BRIC) program, consider updating this plan accordingly to meet the BRIC program guidelines. | | | | | | |
| 2 | Medium | Medium | Yes | Yes | No | Medium |

## 11.6 ANALYSIS OF MITIGATION ACTIONS

Each recommended action was classified based on the type of mitigation it involves. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform residents and elected officials about flood hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

Table 11-5 presents the results of this analysis.

**Table 11-5.** Analysis of Mitigation Actions

| Mitigation Type | Applicable Mitigation Actions |
|---|---|
| Prevention | 1, 3, 4, 5, 7, 8, 15, 17, 18, 19, 22, 23, 27, 28, 29, 31, 32, 33, 34, 35, 37 |
| Property Protection | 2, 3, 5, 11, 12, 13, 18, 19, 24, 26, 32 |
| Structural Projects | 11, 12, 13, 14, 15, 16, 17, 19, 20, 22, 24, 25, 26, 28, 30, 32,36 |
| Natural Resource Protection | 16, 20, 22, 21, 24, 25 |
| Public Education and Awareness | 1, 2, 3, 4, 5, 6, 8, 9, 10, 17, 18, 28, 34, 35 |
| Emergency Services | 3, 5, 9, 10, 23, 30, 31 |

# PART 4—PLAN MAINTENANCE

# 12. PLAN ADOPTION

This chapter documents formal adoption of the *Los Angeles County Comprehensive Floodplain Management Plan* by the Los Angeles County Board of Supervisors (CRS Step 9). This plan was submitted for a pre-adoption review to the Insurance Services Office (ISO) prior to adoption. Once pre-adoption approval was provided, Los Angeles County formally adopted the plan. A copy of the resolution is provided on the following pages.

Insert Adoption Resolution, 3 pages

# 13. PLAN MAINTENANCE STRATEGY

This chapter presents a plan maintenance process (CRS Step 10) that includes the following:

- Implementing the recommended action plan
- Monitoring, evaluating and updating the floodplain management plan over a 5-year cycle
- Maintaining public participation in the plan maintenance process
- Incorporating the requirements of the floodplain management plan into other local government planning mechanisms, such as comprehensive, capital improvement or all-hazard mitigation plans, when appropriate.

The plan maintenance strategy is the formal process that will ensure that the floodplain management plan remains active and relevant and that Los Angeles County maintains its eligibility for applicable funding. The *Los Angeles County Repetitive Loss Area Analysis*, prepared in conjunction with this plan, also outlines procedures for maintaining its recommendations into the future.

## 13.1 IMPLEMENTING THE PLAN

The effectiveness of the floodplain management plan depends on its implementation and incorporation of its action items into existing local plans, policies and programs. The action items provide a framework for activities that Los Angeles County can implement over the next five years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs.

The Los Angeles County Public Works Stormwater Engineering Division will have lead responsibility for overseeing the plan implementation and maintenance. Plan implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan. Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

## 13.2 MONITORING, EVALUATING AND UPDATING THE PLAN

### 13.2.1 Steering Committee

The Steering Committee is a total volunteer body that oversaw the development of the plan and made recommendations on key elements of it, including this maintenance strategy (see Section 2.3). It was the Steering Committee's position that an oversight committee with representation similar to that of the Steering Committee should have an active role in the plan maintenance strategy. Therefore, it is recommended that a steering committee remain a viable body involved in key elements of the plan maintenance strategy. The new steering committee should include representation from stakeholders in the planning area (the unincorporated areas of Los Angeles County).

The principal role of a steering committee in this plan maintenance strategy will be to review the annual progress report and provide input to the Los Angeles County Public Works Stormwater Engineering Division on possible enhancements to be considered at the next update. Future plan updates will be overseen by a steering committee

similar to the one that participated in this plan development process, so keeping an interim steering committee intact will provide a head start for future updates. It will be the new steering committee's role to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

### 13.2.2 Annual Progress Report

The minimum task of the ongoing annual steering committee meeting will be the evaluation of the progress of its individual action plan during a 12-month performance period. This review will include the following:

- Summary of any flood hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or actions that involve flood hazard mitigation.

The planning team has created a template for preparing a progress report (see Appendix G). The plan maintenance steering committee will provide feedback to the planning team on items included in the template. The planning team will then prepare a formal annual report on the progress of the plan. This report should be used as follows:

- Posted on the Los Angeles County Public Works' web page dedicated to the floodplain management plan
- Provided to the local media through social media or other method
- Presented to the County Executive to report on the progress of mitigation actions implemented during the reporting period
- Provided as part of the CRS annual re-certification package. The CRS requires an annual recertification to be submitted by October 1 of every calendar year for which the community has not received a formal audit. To meet this recertification timeline, the planning team will strive to complete progress reports between June and September each year.

Annual progress reporting is credited under CRS Step 10.

### 13.2.3 Plan Update

The information on flood hazard, risk, vulnerability, and mitigation contained in this floodplain management plan is based on the best science and technology available at the time this plan was prepared. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant. Los Angeles County intends to update the floodplain management plan on a 5-year cycle from the date of initial plan adoption (CRS Step 10). This cycle may be accelerated to less than 5 years based on the following triggers:

- A federal disaster declaration that impacts the planning area
- A flood event that causes loss of life
- A comprehensive update of Los Angeles County general plan, which is considered to be an integral part of this plan.

It will not be the intent of future updates to develop a complete new floodplain management plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The flood hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new policies identified under other planning mechanisms (such as the general plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The flood insurance coverage assessment (see Section 8.1) will be updated with the best available and most readily accessible insurance data available at the time of the plan update.
- The Los Angeles County Board of Supervisors will adopt the updated plan.

It is Los Angeles County's intention to fully integrate this floodplain management plan into the All-Hazards Mitigation Plan for Los Angeles County. This will allow for a uniform update cycle for both plans and eliminate redundant planning.

## 13.3 MAINTAINING PUBLIC INVOLVEMENT

The public will continue to be informed of the plan's progress through the floodplain management plan website and by copies of annual progress reports provided to the media. The website will not only house the final plan, it will become the one-stop shop for information regarding the plan and plan implementation. Copies of the plan will be distributed to the Los Angeles County library system. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of Los Angeles County at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

## 13.4 INCORPORATING THE PLAN INTO OTHER MECHANISMS

Los Angeles County, through adoption of a general plan and zoning ordinance, has planned for the impacts of flooding. The floodplain management plan development process provided the opportunity to review and expand on policies in these planning mechanisms. The Los Angeles County General Plan and the Floodplain Management Plan are complementary documents that work together to achieve the goal of reducing risk exposure. Los Angeles County has created a linkage between the Floodplain Management Plan and the General Plan by identifying a mitigation action as such and giving that action a high priority. Other planning processes and programs to be coordinated with the recommendations of the Floodplain Management Plan include the following:

- Local All-Hazards Mitigation Plan
- Emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments

As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

# 14. PROGRAM FOR PUBLIC INFORMATION

The Community Rating System (CRS) describes a Program for Public Information (PPI) as an ongoing local effort to identify, prepare, implement, and monitor a range of public information activities that meet specific local needs. The CRS awards credit for implementing public outreach projects that are identified in a PPI. Los Angeles County elected to incorporate a PPI into this update, using the seven-step planning process required by CRS:

- Step 1. Establish a committee
- Step 2. Assess the community's public information needs
- Step 3. Formulate messages
- Step 4. Identify outreach projects to convey the messages
- Step 5. Examine other public information initiatives
- Step 6. Prepare a PPI document
- Step 7. Implement, monitor and evaluate the PPI.

By integrating the PPI into the Comprehensive Floodplain Management Plan, the County can monitor the progress of both programs simultaneously, thus reducing unnecessary redundancy in County programs. This chapter describes the PPI process followed.

## 14.1 (STEP 1) THE PPI COMMITTEE

The planning team for the floodplain management plan update established a PPI committee by soliciting volunteers and recommendations from the Floodplain Management Plan steering committee and from Los Angeles County Public Works staff. The PPI committee meets the requirements set forth by CRS. It is a robust team able to identify and evaluate a comprehensive range of activities for flood-related outreach in the planning area. PPI committee members are listed in Table 14-1. The committee met two times in April 2020 to discuss and develop the PPI. Meeting summaries are available in Appendix C.

**Table 14-1.** PPI Committee Members

| Name | Affiliation |
|---|---|
| **Shannon Ggem** | Malibou Lake Mountain Club |
| **Debbie Sharpton** | Environmental Restoration Group |
| **Patricia Wood** | Public Works - Stormwater Engineering - CRS Coordinator/Floodplain Administrator |
| **Jalaine Q. Madrid** | Public Works – Community and Government Relations Group, Public Information Officer |
| **Neonika Walker** | Public Works – Community and Government Relations Group, Public Information Officer |
| **Joselito Garcia-Ruiz** | Red Cross of Greater Los Angeles |

## 14.2 (STEP 2) ASSESS THE COMMUNITY'S PUBLIC INFORMATION NEEDS

According to Activity 330 under the CRS program, before a community can develop a local program for raising public awareness about flood-related issues, the PPI committee needs to assess the flood problems in the community, identify those who need to be informed about these flood problems, and determine what projects are underway. The following sections describe the PPI committee's assessments of these factors.

## 14.2.1 Identify the Target Areas

Using information from the 2020 floodplain management plan update, the PPI committee identified target areas for flood problems in unincorporated Los Angeles County through the following activities:

- Review of the risk assessment presented in Chapters 6 through 8 of this plan
- Review of the Repetitive Loss Areas Analysis conducted as a companion process to the Floodplain Management Plan development
- Discussion among PPI committee members.

The sections below describe the four identified target areas.

### FEMA-Designated Floodplains

The December 21, 2018, Los Angeles County DFIRMs are FEMA's official delineation of Special Flood Hazard Areas (SFHAs) for Los Angeles County. Identified SFHAs include shallow flooding, floodway, alluvial fans, and coastal areas. The DFIRMs drew upon the following information:

- Statistical analysis of records of river flow, storm tides, and rainfall
- Information from the City of Los Angeles and the Los Angeles County Flood Control District
- Floodplain topographic surveys
- Hydrologic and hydraulic analyses.

The FEMA-designated floodplain mapping focused on the mapped 100-year floodplain (SFHA). FEMA's mapped flood zones for the County are shown on maps provided in Appendix F. According to the risk assessment in Chapter 7 of this document, there are 1,712 structures in the 88,438 acres of 100-year floodplain within the planning area (76 percent residential).

### County Floodplains and Floodways

The County also considers floodplains and floodways associated with the County's Capital Flood, which is the flood produced by a 50-year frequency rainfall falling on a saturated watershed; where the watershed is undeveloped, the effect of burned conditions is also factored in. The County floodway is an area immediately adjacent to a water course where floodwaters during a Capital Flood are deepest and fastest moving. Its hazardous nature requires that development in this area be carefully managed. The floodway must remain free of obstruction and construction unless engineering analysis demonstrates that the flood hazard on adjoining properties will not be increased. Ideally, development in the floodway should be restricted to uses that do not interrupt or excessively accelerate the natural flow of the water (tennis courts, swimming pools, etc.).

The limits of the County floodway are defined as the point where the velocity of flood flow is 10 feet per second, or the water surface elevation is 1 foot above the Capital floodplain water surface elevation. The first of either criteria reached controls the floodway width. Where the flow velocity exceeds 10 feet per second for the entire width of the floodplain, the floodplain lines and floodway lines are the same. Los Angeles County Public Works' Capital Flood Protection requirements apply to all unincorporated areas mapped as County floodways.

The County's mapped capital floodplains and floodways are shown in Appendix H. There are estimated to be 947 structures within the mapped Capital floodplains and floodways.

### Repetitive Loss Areas

A repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the NFIP within any given 10-year period since 1978. Repetitive loss areas include these repetitive loss properties and

nearby properties with similar flooding conditions. As of this plan's development, there are 54 FEMA-identified repetitive loss properties in the unincorporated areas of Los Angeles County, four of which have been determined to be mitigated. The 50 remaining properties were used to delineate 24 repetitive loss areas. Within these areas, 199 properties (including the 50 unmitigated repetitive loss properties) have been identified as at risk to similar flooding conditions. Information on flood conditions in these areas can be found in the Los Angeles County Repetitive Loss Area Analysis in Appendix I.

### Gaps in the Maps

In unincorporated areas of the County, many stream segments do not intersect with FEMA or County-mapped floodplains. These areas were identified from the "major water courses" shown on USGS quad maps. Buffers were delineated for 150 feet on each side of these segments to identify potential at-risk properties; 2,330 structures were counted in these areas. This methodology likely overestimates the number of properties at risk as it does not take elevation into account. A more detailed assessment of properties likely to be impacted should be conducted as time and resources allow. The location of gaps in the maps are shown in Figure 14-1.

## 14.2.2 Identify Target Audiences

After identifying the target areas, the PPI committee brainstormed and identified the following target audiences that need to be informed of flood hazards within the planning area:

- Residents, property owners and businesses in the regulated floodplains
- Residents, property owners and businesses in repetitive loss areas
- Property owners who need to maintain channels or other conveyance systems
- Residents and property owners along creeks
- Homeowners who have paid off mortgages or who did not have a mortgage
- Lake Los Angeles floodplain property owners and those with localized flood hazards
- Renters in flood-prone areas
- Property owners near recently burned areas
- Residents, property owners and businesses in 500-year floodplains
- Owners of properties with identified flood hazards on the County Assessor's parcel maps
- Homeowners applying for permits
- Countywide audience for a disaster preparedness message
- Countywide audience for a climate change message
- Motorists (sub-population may be in Antelope Valley, Topanga, Old Topanga and Agoura Hills)
- Cub Scouts or Boy Scouts
- Hikers and/or pedestrians
- Beachgoers near the mouths of rivers/creeks
- Hospitals, doctors' offices and other public health facilities in the floodplain (critical facility operators)
- People experiencing homelessness who are residing in channels
- People experiencing homelessness who are residing in or near streams in areas such as the Santa Monica Mountains
- Recreational campsites along streams (e.g., the Santa Clara River)
- People/children who bike through channels
- Antelope Valley residents
- Realtors, lenders and insurance agents
- Areas where there are significant instances of illegal dumping in conveyance systems

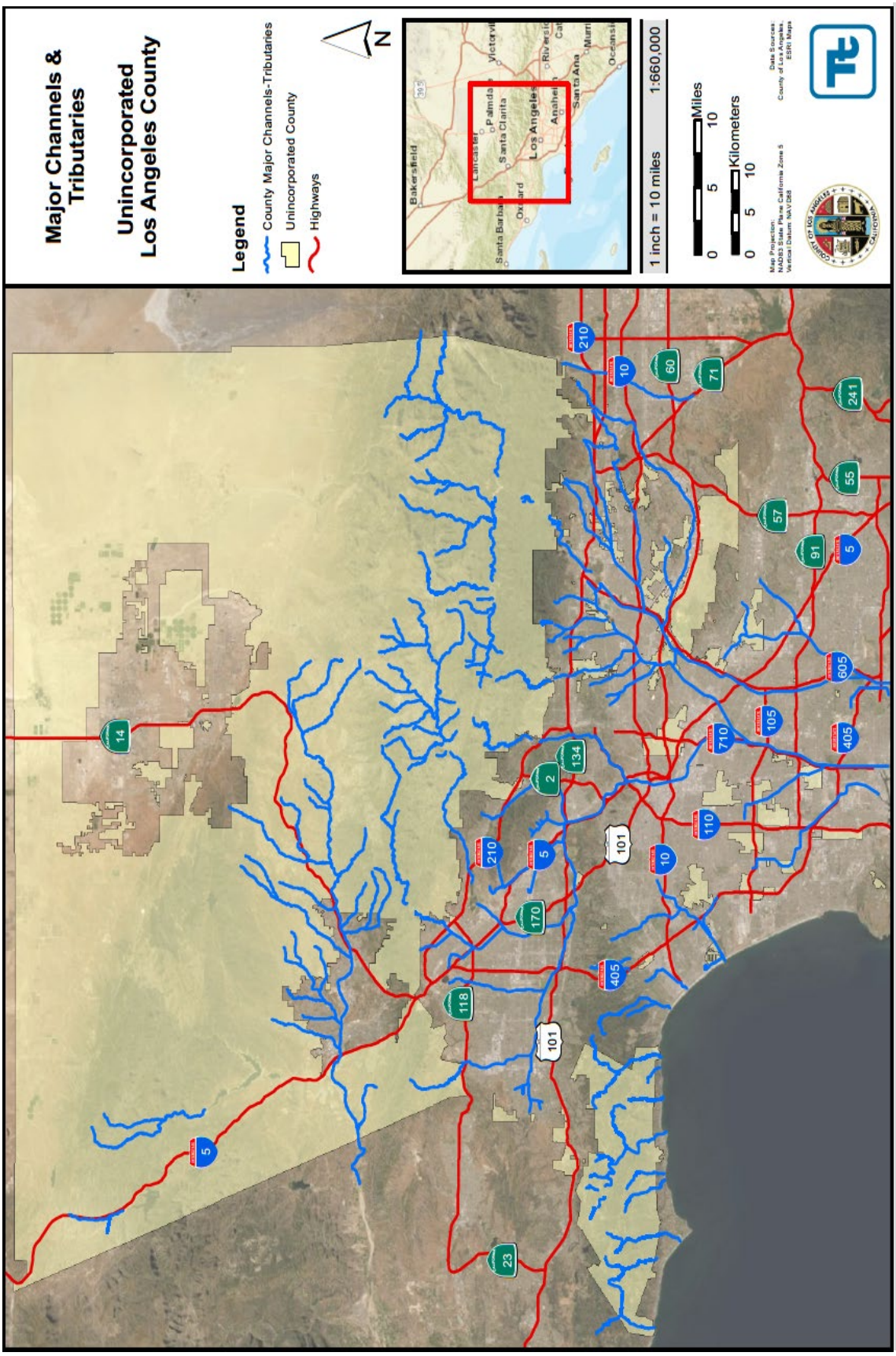



**Figure 14-1.** Gaps in the Map

Specific outreach projects will not be identified for all target audiences in the first year of the PPI implementation, but all are included to inform the annual review and update of the PPI. The committee also identified influencers and means of message delivery, as follows:

- Influencers:
  - Public libraries
  - County events (where the County is staffing a booth)
  - Equestrian centers, feed stores and associations
  - Trails Council
  - Sierra Club
- Means of message delivery:
  - Social media outlets (Facebook, Twitter, Instagram, Nextdoor)
  - School districts, for providing information to parents and students
  - The Los Angeles County embedded network
  - Specialty news agencies, for coverage of storms or swift-water rescues
  - Soup kitchens, the Salvation Army
  - Communities with active Nextdoor engagement and/or Facebook groups
  - Environmental consultants, building contractors and others involved in the permitting process, particularly in the Santa Monica Mountains
  - California Regional Environmental Education Community or other organizations that can disseminate information to teachers.

## 14.3 (STEP 3) FORMULATE MESSAGES

CRS identifies six priority floodplain management topics that should be addressed by messages developed and implemented in the PPI. The PPI committee elected to include an additional topic area to meet the needs of the local communities and target audiences. The seven topics are as follows:

- Know your flood hazard.
- Insure your property against your flood hazard.
- Protect people from the hazard.
- Protect your property from the hazard.
- Build responsibly.
- Protect natural floodplain functions.
- General preparedness (topic selected by the PPI Committee).

Using the information developed in Step 2, the PPI committee identified specific messages for each of these topic areas to meet the needs of the community, as shown in Table 14-2.

## 14.4 (STEP 4) IDENTIFY OUTREACH PROJECTS TO CONVEY THE MESSAGES

After the audiences and needed messages were agreed upon, the PPI committee developed projects to convey each message. These projects and their implementation details are shown in Table 14-3. Projects have been identified for the next performance period for the PPI.

**Table 14-2.** Priority Topics and Messages

| Topic | Message[a] |
|---|---|
| **Know your flood hazard** | Know your flood zone |
| | You are in a repetitive flood area |
| | Your property may be subject to flooding or flood-related hazards |
| | If it can rain, it can flood! |
| **Insure your property against your flood hazard** | Take advantage of a low-cost, preferred-risk policy |
| | You need flood insurance |
| | Renters can buy flood insurance |
| **Protect people from the hazard** | Avoid swift water |
| | Move to high ground |
| | Turn around, don't drown |
| | Be aware of hazardous road conditions |
| | Know the signs of flash flooding |
| | Know what flood warning means |
| | Teach school children about flooding |
| | Do not reside in water courses during storm season |
| **Protect your property from the hazard** | Flooding affects more than homes |
| | Your actions impact others |
| | Illegal activities may lead to fines |
| | Need advice for protecting your property from flood? |
| **Build responsibly** | A little investment now could save you money later |
| | Understand your flood risk. |
| | Just because it is not mapped does not mean you are not at risk |
| | Get a permit before you build |
| **Protect natural floodplain functions** | Share the floodplains |
| | No dumping |
| | Protect these areas |
| | Floodplains help us |
| | These areas are habitat |
| **General preparedness** | Sign up for Alert LA |
| | Develop a family disaster plan |
| | Know your risk |
| | Be aware, #LARain is coming |

a. All messages identified by the PPI committee are included to inform the annual review and update of the PPI.

**Table 14-3.** Inventory of Public Information Efforts

| Program | Outreach Effort | Frequency | Notes |
|---|---|---|---|
| **Los Angeles County Department of Public Works** | | | |
| **Public Information** | Public Works Website: pw.lacounty.gov/ | Year Round | |
| | Public Works YouTube Channel: youtube.com/user/LAPublicWorks | Year Round | |
| | Los Angeles County "The Works" App for mobile phones | Year Round | |
| | "The Works" pw.lacounty.gov/theworks/ | Year Round | The Works offers a one-stop solution for County residents to report and track services. |
| | Social Media. Public Works maintains active accounts in Twitter, Facebook, Instagram and Nextdoor. The use of these platforms for public engagement is extensive. | Year Round | Twitter, Facebook and Nextdoor were used extensively in the development of the floodplain management plan update |
| | "Infrastructure LA" infrastructurela.org | Year Round | A regional forum for strategic collaboration |
| **Community Rating System (CRS)** | Letter to insurance agents and mortgage lenders regarding flood zone determinations, elevation certificates, and other information | Annually | Announcing availability of County flood information |
| | Letter with resources on flood protection and retrofitting of structures to property owners | Annually | To repetitive loss areas |
| | "Are You Prepared for A Flood?" Brochure to properties with structures in the flood zone | Annually | |
| | Flood protection information available through all County libraries | Year Round | Includes FIRMs and 10 FEMA publications |
| | Mud-flow advice to properties impacted by wildfires in nearby hillsides | As Needed | |
| | Press release regarding flood risk, preparedness, mud-flow advice, and flood insurance | Annually | Released to various media |
| | County NFIP Website: pw.lacounty.gov/wmd/nfip/ | Year Round | Public Works website that provides information and direct links to information that is credited under the web element of CRS Activity 350 (see Figure 14-2) |
| **Clean LA/ Project Pollution Prevention** | Smart Gardening Program Workshops | Year Round | |
| | CleanLA website: pw.lacounty.gov/epd/cleanla/ | Year Round | |
| | Stormwater Pollution Prevention Outreach and Illegal Dumping Prevention | As Needed | General outreach including brochures, mailings, and events |
| | Household Hazardous Waste Collection Program: pw.lacounty.gov/epd/cleanla/HHW.aspx | Events on Weekends | Outreach through various means |
| | Environmental youth education at elementary schools: Environmental Defenders Program. pw.lacounty.gov/epd/defenders/index.html | Year Round | |
| | Environmental youth education at secondary schools: Generation Earth. pw.lacounty.gov/epd/ge/ | Year Round | The Generation Earth program empowers students in grades 6 - 12 in Los Angeles County to take action and address environmental waste and water issues. |

| Program | Outreach Effort | Frequency | Notes |
|---|---|---|---|
| **Chief Executive Office** | | | |
| | Office of Emergency Management. Outreach for all hazards preparation through the Emergency Survival Program, expos, public venues, and presentations. lacounty.gov/emergency/ | Year Round | |
| | Ready LA Website: ready.lacounty.gov/ | Year Round | Have a plan, keep supplies, stay informed, get involved |
| | Twitter @LACountyCEO | Year Round | |
| | LA County Recovers website: lacounty.gov/recovery/ | Year Round | Site dedicated to recovery following events within the County. Good resource for flood after fire information. |
| **Los Angeles County Sheriff's Department** | | | |
| | AlertLA – Emergency mass notification system using recorded phone messages, text messages, and emails. lacounty.gov/emergency/alert-la/ | Year Round | |
| | Twitter @LASDHQ | Year Round | |
| **Los Angeles County Department of Parks and Recreation** | | | |
| **General Outreach** | Twitter @lacountyparks | Year Round | |
| | Instagram: lacountyparks | Year Round | |
| | Facebook: facebook.com/parks.lacounty.gov | Year Round | |
| | YouTube: youtube.com/user/LACountyParks | Year Round | |
| | Flickr: flickr.com/photos/lacountyparks/ | Year Round | |
| | Website: parks.lacounty.gov | Year Round | |
| | Special events, such as sports, fitness, hobbies, outdoor classes, holiday celebrations, summer camp, lunch programs, etc. | Year Round | |
| **Los Angeles County Waterworks District** | | | |
| **Water Quality and Conservation Awareness** | Newsletters in "Splash": pw.lacounty.gov/wwd/web/Publications/Splash.aspx | Quarterly | A variety of articles about water conservation, floodplains, river habitat, restoration, and flooding. Videos about drought tolerant landscaping for water conservation. |
| **National Park Service** | | | |
| **Santa Monica Mountains National Recreation Area** | Malibu Creek State Park events: nps.gov/samo/planyourvisit/ | Year Round | Special events include talks about native creek habitat, protecting the floodplain, and what wildlife uses creeks. |
| **Heal the Bay** | | | |
| **General Outreach** | Creek Week Education: healthebay.org | Year Round | |
| **Educational Programs** | Website: https://healthebay.org/education/ | Year Round | Educational resources: events, field trips, science camps, teacher workshops, school clubs, and activity guides. |
| **Tree People** | | | |
| | Environmental education resources for teachers: treepeople.org/action/for-schools/teachers | Year Round | Curriculum for elementary, middle and high school students and in-service training for teachers. |
| | Workshops, tours, classes: treepeople.org/calendar | Year Round | Events calendar with variety of topics on water conservation, native plants, drought, stormwater pollution prevention. |

| Program | Outreach Effort | Frequency | Notes |
|---|---|---|---|
| **Santa Monica Mountains Resource Conservation District** | | | |
| | Education and Outreach Program: https://www.rcdsmm.org/education/ | Year Round | |
| **Mountains Recreation and Conservation Authority** | | | |
| | Website, Los Angeles River: mrca.ca.gov/los-angeles-river/ | Year Round | |
| | Upper Los Angeles River & Tributaries Working Group website upperlariver.org/ | Year Round | Through direct action, alliances, partnerships, and joint powers authorities, the Conservancy's mission is to strategically buy back, preserve, protect, restore, and enhance treasured pieces of Southern California to form an interlinking system of urban, rural and river parks, open space, trails, and wildlife habitats that are easily accessible to the general public. |
| **Mountains Restoration Trust** | | | |
| | Mountains Restorations Trust Website: mountainstrust.org | Year Round | |
| | Discovery Nature Camp | Year Round | |
| | Youth Naturalist Program | Year Round | |
| **Los Angeles Homeless Services Authority** | | | |
| | Homeless Engagement Team: lahsa.org/what-we-do | Year Round | The Homeless Engagement Team reaches out to individuals experiencing homelessness throughout Los Angeles County. The Team helps educate the public about resources available to individuals experiencing homelessness, such as referrals to shelter and transportation. |

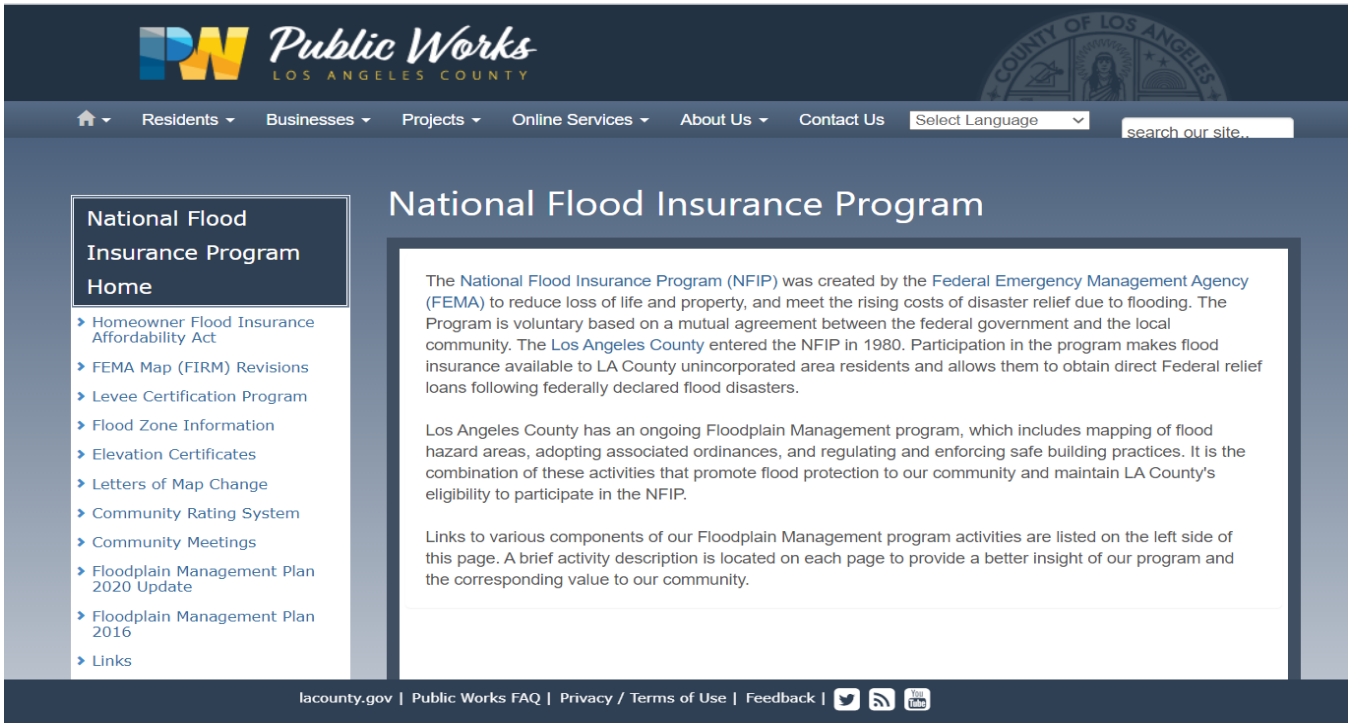



**Figure 14-2.** Los Angeles County Public Works Flood Information Website

## 14.4.1 Flood Response Preparation

Section 332.b of the 2017 CRS Coordinators Manual provides credit for having a pre-flood plan for public information activities ready for the next flood. Credits are available for developing a pre-flood plan for public information projects that will be implemented during and after a flood. A Flood Response Preparations (FRP) package is a collection of outreach projects prepared in advance, but not delivered until a flood occurs. These materials may include templates and masters of handouts, mailers, press releases, etc. that cover key messages that need to be disseminated before, during, and after a flood. The package must include both the materials that will be needed and the procedures for how they will be used.

During the development of this PPI, the PPI Committee identified projects that could be deployed as part of a flood response. Table 14-4 identifies which of the PPI projects would be deployed by the County as part of a flood response. The table also includes the messaging that would be promoted as part of the response package.

**Table 14-4.** PPI Implementation Plan

| Message | Target Audiences | Outcomes | Projects | Assignment | Schedule | FRP?[a] |
|---|---|---|---|---|---|---|
| **Topic 1: Know Your Flood Hazard** | | | | | | |
| **Know Your Flood Zone** pw.lacounty.gov/floodzone/ | • Residents, property owners and businesses in the regulated floodplains<br>• Renters in flood-prone areas<br>• Critical facility operators in the regulated floodplains<br>• Real estate agents, lenders and insurance agents | • Increase in hits to flood zone determination website | Mailing of outreach brochure "Are You Prepared for a Flood?" to target audiences | Public Works | Annually prior to rainy season; October | No |
| | | | Social media post for "*Are You Prepared for a Flood*?" brochure | Public Works | Annually prior to rainy season; October | No |
| | | | Annual notice of map information services pursuant to Activity 320 publicity requirements to local Realtors/ lenders/ insurance agents | Public Works | Annually; October | No |
| **You Are in a Repetitive Flood Area** | • Residents, property owners and businesses in mapped repetitive loss areas | • Increase in inquiries to Public Works regarding flood hazards from repetitive loss property owners<br>• Property owners implementing temporary or permanent flood mitigation projects<br>• Increased demand for sandbags during the storm season | Annual mailing to repetitive loss area properties | Public Works | Annually; October | No |

| Message | Target Audiences | Outcomes | Projects | Assignment | Schedule | FRP?[a] |
|---|---|---|---|---|---|---|
| **Topic 2: Insure Your Property for Your Flood Hazard** | | | | | | |
| **You Need Flood Insurance** | • Residents, property owners, and businesses in the 100-year floodplain<br>• Homeowners who do not have a mortgage | • Increase in flood insurance policy holders in the 100-year floodplain | Mailings to property owners in the flood zone and repetitive loss areas. | Public Works | Annually; October | No |
| **Renters Can Buy Flood Insurance** | • Renters in flood-prone areas | • Increase in flood insurance purchase by renters in the 100-year floodplain | Mailings to renters in the flood zone. | Public Works | Annually; October | No |
| **Topic 3: Protect People from The Hazard** | | | | | | |
| **Avoid Swift Water!** | • People/children who hike or bike through channels and streams<br>• People who are camping/residing in channels and streams | • Decrease in swift water rescues<br>• Decrease in observed camping/residing in the channels and streams | YouTube videos | Public Works | Year Round on YouTube | No |
| | | | Social media reminder | Public Works | Prior to and during rainy season, and during a flood response | Yes |
| **Turn around, don't drown** | • Motorists | • Decrease in swift water rescues | Social media reminder | Public Works | Prior to and during rainy season and during a flood response | Yes |
| **Be aware of hazardous road conditions** pw.lacounty.gov/roadclosures/ | • Motorists | • Increase in hits to Los Angeles County's road closure website<br>• Decrease in swift water rescues | Social media reminder | Public Works | Prior to and during rainy season and during a flood response | Yes |
| **Do not camp or reside in waterways** | • People who are camping/residing in channels and streams | • Decrease in swift water rescues<br>• Decrease in observed camping/residing in the channels and streams | Targeted outreach prior to flood season or major storms | LAHSA, Public Works | Year Round | No |
| **Topic 4: Protect Your Property from The Hazard** | | | | | | |
| **Need Advice for Protecting Your Property from Flood Hazards? Please Call Us or Visit Website.** pw.lacounty.gov/wrd/Fire/ **and** pw.lacounty.gov/landing/em/docs/HOMEOWNERSGUIDE.pdf | • Residents, property owners and businesses in regulated floodplains<br>• Residents, property owners and businesses in repetitive loss areas<br>• Environmental consultants/building contractors or others involved in the permitting process | • Increase in requests for assistance/ advice. | YouTube Video | Public Works | Available year round online | No |
| | | | Twitter reminder | Public Works | Prior to and during rainy season and during a flood response | Yes |
| | | | Distribute mailer to affected properties. | Public Works | Prior to and during rainy season and as needed. | No |

| Message | Target Audiences | Outcomes | Projects | Assignment | Schedule | FRP?[a] |
|---|---|---|---|---|---|---|
| | • Gaps in the Maps identified properties<br>• Lake Los Angeles property owners with creeks on property<br>• Property owners near recently burned areas | | Facebook message | Public Works | Prior to and during rainy season and during a flood response | Yes |
| **Sandbags Available** pw.lacounty.gov/dsg/sandbags/ | • Residents, property owners and businesses near recently burned areas<br>• Residents, property owners and businesses in regulated floodplains<br>• Residents, property owners and businesses in repetitive loss areas | • Increase in demand for sandbags during the storm season | Social media message (Facebook, Twitter) | Public Works | Prior to and during rainy season and during a flood response | Yes |
| **Topic 5: Build Responsibly** | | | | | | |
| **A Little Investment Now Could Save You Money Later** | • Environmental consultants/building contractors or others involved in the permitting process<br>• Homeowners applying for permits | • Increase in protection of structures | Promote on social media (Twitter) and NFIP website | Public Works | Year Round; Revisions to website by October | No |
| **Topic 6: Protect Natural Floodplain Functions** | | | | | | |
| **No Dumping** | • Countywide<br>• Areas where there are significant instances of illegal dumping into storm drains, channels, and flood control basins | • Reduction of illegal dumping instances | Drains to Ocean signage/No Dumping signage | Public Works | Signs posted year-round at LACFCD facilities | No |
| | | | YouTube Video | Public Works | Available year round online | No |
| **Topic 7: General Preparedness** | | | | | | |
| **Sign Up for Alert LA County** lacounty.gov/emergency/alert-la/ | • Countywide<br>• Residents, property owners and businesses in the regulated floodplains<br>• School Districts | • Increase in number of residents that register their mobile number for Alert LA. | Promote Alert LA on County Website. | Public Works Sheriff's Department | Available online year-round | No |
| | | | Provide Alert LA County Brochure | CEO Office of Emergency Management | Available online year-round | No |
| | | | Promote on social media | Public Works | Annually | No |
| | | | Promote Alert LA on County Website. | Public Works Sheriff's Department | Available online year-round | No |
| **Develop a Family Disaster Plan** | • Countywide<br>• Residents, property owners and businesses in the regulated floodplains<br>• School Districts | • Increase preparedness by residents | Promote on social media (Twitter) and website | Public Works | Quarterly; During rainy season and during a flood response | Yes |

| Message | Target Audiences | Outcomes | Projects | Assignment | Schedule | FRP?[a] |
|---|---|---|---|---|---|---|
| **Know Your Risk** | • Countywide<br>• Residents, property owners and businesses in the regulated floodplains<br>• School Districts | • Increased visits to the Flood Zone Determination Website | Mailer to all properties with structures in the floodplain. | Public Works | Annual mailing; October | No |
| | | | Promote on social media (Twitter) | Public Works | Annually | No |
| **Be aware, #LARain is coming** | • Countywide<br>• Residents, property owners and businesses in the regulated floodplains<br>• School districts | • Increased awareness of incoming storms | Twitter reminder | Public Works, National Weather Service Los Angeles | During rainy season and during a flood response | Yes |

a. FRP column indicates whether item would be included in the Flood Response Preparation effort.

## 14.5 (STEP 5) EXAMINE OTHER PUBLIC INFORMATION INITIATIVES

In addition to outreach projects, the PPI committee reviewed and considered related CRS activities and some of the messages that these activities could convey under this step. This includes looking at other CRS activities for which Los Angeles County is currently receiving credit under its CRS program. In order to build on, rather than duplicate, what County departments and other stakeholders in the planning area are already doing for flood-related outreach, the planning team developed a list of other public information efforts in the County (see Table 14-2). The list was used throughout the remaining steps in the PPI development process.

### 14.5.1 Website

The cornerstone for Los Angeles County's PPI is a robust website (see Figure 14-2) that provides the public direct access to a suite of floodplain management information that is credited under the web element of CRS Activity 350 (Flood Protection Information). The creditable content accessible on this website includes:

- Information on the National Flood Insurance Program (NFIP) as well as the Homeowner Flood Insurance Affordability Act of 2014 (pw.lacounty.gov/wmd/NFIP/hfiaa2014.aspx ).
- Access to the Los Angeles County Flood Insurance Rate Map (FIRM) as well as a listing of recent FEMA Map Revisions ( pw.lacounty.gov/wmd/NFIP/FIRM.aspx).
- FAQ's on the Los Angeles County levee certification program administered by the Los Angeles County Flood Control District pw.lacounty.gov/wmd/NFIP/dsp_LeveeCertificationFAQs.aspx
- Direct link access to the County flood zone information website (pw.lacounty.gov/floodzone/ )
- Information on FEMA elevation certificates and access to available completed certificates in the unincorporated areas of Los Angeles County ( pw.lacounty.gov/wmd/NFIP/EC/ )
- Information on "Letters of Map Change" and access to the FEMA Map Service Center (pw.lacounty.gov/wmd/NFIP/Page_04.aspx )
- Information on the Community Rating System (pw.lacounty.gov/wmd/NFIP/Page_06.aspx)
- Information on the community meetings that the County conducts as part of the PPI (pw.lacounty.gov/wmd/NFIP/meetings.aspx )
- Information on the Los Angeles County Comprehensive Floodplain Management Plan (pw.lacounty.gov/wmd/NFIP/FMP/ )
- Links to other relevant sites with important flood hazard information (pw.lacounty.gov/wmd/NFIP/Page_07.aspx )
- A resources tab that links to other outreach projects conducted annually by Los Angeles County.

The CRS provides credit for providing public access to important information via a jurisdiction-sponsored and maintained website under CRS activity 350, the WEB element. Los Angeles County is currently receiving credit for the web element under its CRS program. This website is a key point of distribution and access for the outreach activities identified in this PPI. This website was reviewed by the planning team during the plan update process and all content has been confirmed and all links are active. The PPI committee was able to review the content of the website via its review of this PPI document.

## 14.6 (STEP 6) PREPARE THE PPI DOCUMENT

The Floodplain Management Plan planning team prepared the PPI document for inclusion as a chapter in the Floodplain Management Plan. The plan document was reviewed by the PPI committee as well as the steering committee overseeing the development of the Floodplain Management Plan.

## 14.7 (STEP 7) IMPLEMENT, MONITOR AND EVALUATE THE PPI

The PPI outlines public outreach over a one-year time span. It was critical that a plan be developed for implementing, monitoring and evaluating the PPI. Implementation details are included in Table 14-4. County staff will collect data on project implementation over the course of the public information year in order to evaluate progress and to suggest changes to the PPI framework to the PPI committee.

The PPI implementation and evaluation schedule will correspond with the rainy season in Los Angeles County. The public information year will begin on October 1 of each year and the annual review will be conducted prior to October 1 of each year, likely during the dry summer months. The PPI evaluation will be coordinated by County Public Works' Stormwater Engineering Division staff. The staff will inform the PPI committee about implementation progress and will suggest changes to the PPI framework. Table 14-4 will form the basis of this review and discussion, with additional columns to be added allowing for staff to report on the following items:

- The target audiences, the messages, and the desired outcomes.
- The projects in the PPI used to convey the messages.
- Which projects were implemented.
- Why some projects were not implemented.
- What progress was made toward the desired outcomes.
- What should be changed.

The PPI committee will review progress and discuss and approve suggested changes. The results of this discussion will be compiled into an annual evaluation report to the Los Angeles County Executive and included in the County's annual CRS recertification. This report will be reviewed and approved by the PPI committee to ensure consistency with discussion and changes agreed to at the annual PPI evaluation. In addition to the annual evaluation report, the meeting summary, sign-in sheets and any other materials documenting PPI participation in the evaluation will be submitted to ISO, the review agency.

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# Appendix A. CRS Guidelines for Flood Planning



*OMB No. 1660-0022*
*Expires: March 31, 2020*

National Flood Insurance Program
Community Rating System

# Coordinator's Manual (Excerpts)

*FIA-15/2017*

FEMA

# 510 FLOODPLAIN MANAGEMENT PLANNING—Summary

Maximum credit: 622 points

## 512 Elements

a. **Floodplain management planning (FMP)**: 382 points for a community-wide floodplain management plan that follows a 10-step planning process:

   Step 1. Organize
   Step 2. Involve the public
   Step 3. Coordinate
   Step 4. Assess the hazard
   Step 5. Assess the problem
   Step 6. Set goals
   Step 7. Review possible activities
   Step 8. Draft an action plan
   Step 9. Adopt the plan
   Step 10. Implement, evaluate, revise.

b. **Repetitive loss area analysis (RLAA)**: 140 points for a detailed mitigation plan for a repetitive loss area.

c. **Natural floodplain functions plan (NFP)**: 100 points for adopting plans that protect one or more natural functions within the community's Special Flood Hazard Area.

## Credit Criteria

Each element has a separate section discussing credit criteria.

## Impact Adjustment

The impact adjustments for FMP and RLAA are described in separate sections. There is no impact adjustment for NFP.

## Documentation Provided by the Community

Each element has a separate section describing needed documentation.

# 510 FLOODPLAIN MANAGEMENT PLANNING

The OBJECTIVE of this activity is to credit the production of an overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs.

## 511 Background

Too often flood protection decisions are made quickly, with inadequate or outdated information or without considering all possible mitigation alternatives or the consequences of those alternatives. As a result, the community's resources are not allocated most appropriately, flood problems may not be fully addressed, and natural floodplain functions may suffer.

To remedy this situation, a careful, systematic process of planning is recommended, and may be credited by this activity. The Community Rating System (CRS) does not specify what activities a plan must recommend; rather, it recognizes plans that have been prepared according to the standard planning process explained in this activity.

**Benefits:** A well-prepared plan will

- Identify existing and future flood-related hazards and their causes;
- Ensure that a comprehensive review of all possible activities and mitigation measures is conducted so that the most appropriate solutions will be implemented to address the hazard;
- Ensure that the recommended activities meet the goals and objectives of the community, are in coordination with land use and comprehensive planning, do not create conflicts with other activities, and are coordinated so that the costs of implementing individual activities are reduced;
- Ensure that the criteria used in community land use and development programs account for the hazards faced by existing and new development;
- Educate residents and property owners about the hazards, loss reduction measures, and the natural and beneficial functions of floodplains;
- Build public and political support for activities and projects that prevent new problems, reduce losses, and protect the natural and beneficial functions of floodplains; and
- Build a constituency that wants to see the plan's recommendations implemented.

**Types of plans:** This activity credits three kinds of plans:

- Floodplain management planning (FMP): The most credit is for the first element, a community-wide floodplain management plan, but the element can also credit multi-hazard mitigation plans, multi-jurisdictional floodplain management and hazard mitigation plans, and floodplain management plans prepared for the U.S. Army Corps of Engineers. Only one plan may receive credit under this element, and plans may not

be combined as appendices or credited by virtue of internal reference to another plan, because this element credits the process as well as the content of the planning document.

- Repetitive loss area analyses (RLAA): The second element credits more detailed, site-specific plans to reduce flood losses in repetitively flooded areas. It has a narrower scope than a floodplain management plan, and receives fewer credit points.
- Natural floodplain functions plan (NFP): The third element provides credit for plans that address natural floodplain functions in the community.

A Category C repetitive loss community (defined in Section 502) must prepare either a FMP or RLAA area analysis that covers at least all of its repetitive loss areas.

**Implementation:** Credit is not provided for simply preparing a plan. Continued credit is dependent upon plan implementation. To maintain the credit for Activity 510, every year the community must evaluate its progress toward implementing the projects and programs in the plan, area analysis, or natural floodplain functions plan, and submit a report of that evaluation with its annual CRS recertification. It must update the background information and the recommendations in its floodplain management plans and repetitive loss area analyses at least every five years and in its natural floodplain functions plan(s) every 10 years.

By their very nature as overall guidance for a community's program, plans should be coordinated with other plans and programs as well as the activities of other agencies or offices that have authority over the same area. It is recommended that communities also contact state and regional offices and agencies to review their plans and planning criteria. For example, state planning agencies have requirements for some kinds of plans and state emergency management agencies may have additional elements they would like to see included in a mitigation plan.

**NOTE:** An ordinance is NOT a plan. *An ordinance sets standards for land development and other activities. Planning may include a review of land development standards and procedures, but it should also cover a much broader range of activities, as noted in Figure 510-4.*

**Class 9 Prerequisite:** A Category C repetitive loss community (see Section 502) must receive credit under EITHER Section 512.a, floodplain management planning (FMP), with full credit in planning Step 5(c) OR Section 512.b, repetitive loss area analysis (RLAA), with a plan that covers its repetitive loss areas.

# 512 Elements

## 512.a. Floodplain management planning (FMP)

The maximum credit for this element is 382 points.

FMP credit is provided for a community-wide floodplain management plan that was prepared by following a standard planning process. To receive any credit under this activity, the planning process must receive some credit under each of the 10 steps listed below. If the plan was approved by the Federal Emergency Management Agency (FEMA) as a multi-hazard mitigation plan and one step is missing, the mitigation plan may receive credit, but FMP credit will be limited to 50 points. If two steps are missing, there is no credit for a multi-hazard mitigation plan.

For some steps, such as Step 1, the community may show that it implemented at least one of the listed credit items. For other steps, specific items are required as a minimum. Required items are noted with "(REQUIRED)" after them.

FEMA's multi-hazard mitigation planning regulations pursuant to the Disaster Mitigation Act of 2000 are explained at www.fema.gov/plan/mitplanning. The 10-step CRS planning process is consistent with those regulations, which identify four phases of hazard mitigation planning. The 10 CRS steps are aligned with the four phases of mitigation planning requirements in Table 510-1.

The CRS-credited planning process must follow the 10 steps. Although the plan document must discuss and document all 10 steps, the written plan does not need to be organized by these 10 steps. To document CRS credit, the community must identify where these steps were covered in its plan, using the CRS planning credit activity checklist (see Figure 510-1).

Documentation or discussion of all but Steps 3 and 9 must be presented in the plan document. Steps 3 and 9 may be in the plan document or they may be explained in a separate memo from the community or the plan's author as explained in the documentation section at the end of each step. The community must update the plan at least every five years and document the update by October 1, five years after the plan was adopted.

**Note:** It is recommended that the planner review all state and FEMA planning program guidelines, including the CRS planning credit checklist for Activity 510. Doing so will ensure that the planning effort will meet all state, FEMA, and CRS criteria. It is the community's option, but with proper planning, one plan document can fulfill the planning criteria of several FEMA and state programs.

| Table 510-1. Planning steps for mitigation and for the CRS. | | |
|---|---|---|
| Multi-hazard Mitigation Planning | CRS | Maximum |
| Phase I − Planning process | | |
| §201.6(c)(1) | 1. Organize | 15 |
| §201.6(b)(1) | 2. Involve the public | 120 |
| §201.6(b)(2) & (3) | 3. Coordinate | 35 |
| Phase II − Risk assessment | | |
| §201.6(c)(2)(i) | 4. Assess the hazard | 35 |
| §201.6(c)(2)(ii) & (iii) | 5. Assess the problem | 52 |
| Phase III − Mitigation strategy | | |
| §201.6(c)(3)(i) | 6. Set goals | 2 |
| §201.6(c)(3)(ii) | 7. Review possible activities | 35 |
| §201.6(c)(3)(iii) | 8. Draft an action plan | 60 |
| Phase IV − Plan maintenance | | |
| §201.6(c)(5) | 9. Adopt the plan | 2 |
| §201.6(c)(4) | 10. Implement, evaluate, revise | 26 |
| Total | | 382 |

| | **512.a Floodplain management planning (FMP):** | |
|---|---|---|
| ✓ | (1) Attached is the floodplain management or hazard mitigation plan to be credited. | |
| ✓ | Check here if the plan was also approved by FEMA as a hazard mitigation plan | |
| ✓ | (2) This CRS planning credit worksheet, completed. | |
| | **CRS Planning Step** | **Page/Section** |
| | **Step 1. Organize to prepare the plan** | |
| | (a) Involvement of the office responsible for community planning | Ch. 6, p. 6-2 |
| | (b) Planning committee of department staff | Ch. 1, p. 1-3 |
| | (c) Process or committee formally created by the community's governing board | |
| ✓ | (1) Mark the plan document to show how it was prepared and who was involved in the planning process. Show which people or offices implement which of the six mitigation categories. | |
| | (2) [For item 1.(c)] Attach a copy of the governing body's action or resolution. | |

**Figure 510-1. An excerpt from a floodplain management planning credit checklist.**

**Credit Points for FMP**

FMP = the total of points credited for Step 1 through Step 10, up to the maximum of 382 points

There are no credit formulae for this activity. The credits for each step are simply added together.

Note that the points listed (Step 1 to Step 10) are maximum possible points. The ISO/CRS Technical Reviewer may determine that one or more items do not warrant full credit.

## Step 1. Organize to prepare the plan

The credit for this step is based on how the community organizes to prepare its floodplain management plan.

**Credit Points for FMP Step 1**
Credit for Step 1 is the total of the following points. (Maximum credit: 15 points)

(a) 4 points, if the office responsible for the community's land use and comprehensive planning is actively involved in the floodplain management planning process. The "office" may be the community's planning or community development department, a consulting firm, or a regional planning agency, provided that it performs regular land use or comprehensive planning duties for the community. This office is usually not the floodplain management or mitigation planner or consultant, because the intention of this credit is to incorporate the floodplain management or mitigation plan into the rest of the community's planning activities. "Actively involved" means that staff regularly attend meetings, assist in the coordination (Step 3), and either write or review draft sections of the plan.

(b) 9 points, if the planning process is conducted through a committee composed of staff from those community departments that implement or have expertise in the activities that will be reviewed in Step 7. One point is provided for each office represented. Divisions of departments can be counted as separate offices. For smaller communities with fewer departments, full credit is provided if the committee has representation from all offices with expertise in all six categories of activities credited in Step 7.

A planning committee is strongly recommended. By involving those who can contribute and will be most affected when the recommendations are carried out, the community will get a more realistic product that will have a much better chance of being

**Step 7 Categories**

- Preventive measures (e.g., codes)
- Property protection (e.g., elevation)
- Natural resource protection
- Emergency services
- Structural flood control projects
- Public Information

Also see Figure 510-4.

adopted and implemented. Community departments that could be represented on the committee include, but are not limited to

- Building department/code enforcement,
- Engineering,
- Land use planning/zoning,
- Public works,
- Emergency management/public safety,
- Public information,
- Environmental protection/public health,
- Parks/recreation,
- A city manager or council member, and
- Housing/community development.

If the planning committee includes representatives from the public and other stakeholders (with no attachment to local government), additional credit is provided in Step 2. Note that there is extra credit in Step 10 if the committee continues to meet after the plan is adopted in order to evaluate progress and recommend changes.

No credit is provided for the creation of a planning committee if the committee only meets once or twice. It must meet a sufficient number of times to involve the members in the following key steps of the planning process (e.g., at least one meeting on each step):

Step 4. Assess the hazard,
Step 5. Assess the problem,
Step 6. Set goals,
Step 7. Review possible activities, and
Step 8. Draft an action plan.

If the community wants credit for participating in a multi-jurisdictional floodplain management or hazard mitigation planning committee,

- The community must send at least two representatives to the planning committee;
- At least half of the community's representatives must attend all the meetings of the planning committee. In effect, there must be a quorum from each community. Remote attendance, e.g., via a webinar that allows for everyone to talk, is permissible; and
- CRS credit for the multi-jurisdictional planning committee will be based on the representation from offices that implement the activities in Step 7.

### Examples

a. A community has a planning committee with representatives from its planning, zoning, building, emergency management, code enforcement, and public works departments, as well as the city manager's public information person. There is no one at the community level that deals with natural floodplain functions. The community's committee would receive six points, one for each representative.

b. A county is preparing a multi-jurisdictional plan for the county and 10 participating cities. This planning committee has 30 members, including two from each city. Among the members are representatives of all six Step 7 categories, e.g., a city engineer, a city public works person, the county planner, and the county soil and water conservation district. The county's committee would receive the full nine points, provided there was a quorum from each community seeking credit.

(c) 2 points, if the planning process and/or the committee are formally created or recognized by action of the community's governing body.

Two points are provided if the community's governing body (e.g., the city council) formally recognizes the planning process. The preferred method is a formal resolution that designates who is responsible for preparing the plan and specifies a completion deadline. If a committee credited under Step 1(b) or 2(a) is used, the resolution should identify the members and the chair (or how the chair is selected) and how staff support is provided.

If a community participates in a multi-jurisdictional committee, its governing body must act in order for the community to receive this credit. A city will not receive this credit for a county council resolution. Conversely, a city can receive this credit even if there is no county credit.

## Step 2. Involve the public

The planning process must include an opportunity for the public to comment on the plan during its development and before its approval. Members of the public may be part of the planning committee created under Step 1 or they may be organized as a separate committee.

For this credit, the term "public" includes residents, businesses, property owners, and tenants in the floodplain and other known hazard areas as well as other stakeholders in the

community, such as developers and contractors, civic groups, environmental organizations, academia, non-profit organizations, major employers, and staff from other governmental agencies, such as a levee district, housing authority, Natural Resources Conservation Service, or the National Weather Service.

> The most important partners to assist in the plan development are already within your community: local government officials, community planning and design professionals, business leaders, civic and volunteer groups, emergency services personnel, and interested residents.
>
> . . . .Ensuring that your team has an equitable and diverse representation will enhance your planning efforts and help build support for mitigation.
>
> —*Planning for a Sustainable Future*, FEMA-364

Members of an advisory body to the community that does not have any regulatory authority, such as a stormwater advisory board, can be counted as representatives of the public. Community employees and members of a regulatory body, such as a zoning board of appeals that makes final decisions, are not considered "public" or stakeholders and are counted as representatives of the community departments credited under Step 1(b).

As with staff, involving the public and stakeholders brings them fully into the planning process, provides input on the viability of options being considered, and helps them to become concerned about the outcome. The largest number of points is provided for Step 2(a) because a planning committee with public membership has the following advantages:

- The committee can be a forum to both educate the public and also provide a means for public input into the plan.
- The participants recognize that they are involved and will be more willing to commit themselves to the process.
- The participants can do some of the work, especially data gathering, thereby reducing the overall cost of preparing the plan.
- A committee can be an effective forum for discussing alternatives, debating goals and objectives, and matching the technical requirements of a program to local situations.
- The committee members will provide information on the plan and process to their respective constituencies.
- The participants gain a feeling of "ownership" of the plan and its recommendations, which helps build public support for it.
- Committee members form a constituency that will have a stake in ensuring that the plan is implemented.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

**Credit Points for FMP Step 2**

The credit for this step is the total of the following points based on how the community involves the public during the planning process. (Maximum credit: 120 points)

(a) Up to 60 points, if the planning process is conducted through a planning committee that includes members of the public and meets the following criteria:

(1) If the committee includes community staff (e.g., the planning committee credited under Step 1(b)), then at least one-half of the members must be representatives of the public or stakeholders for full credit. The credit is prorated for lower levels of public or stakeholder representation. Note that receiving 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities and item (a) is one-half of the credit for Step 2.

(2) It must meet a sufficient number of times to involve the members in the key steps of the planning process, i.e., it must meet the same meeting criteria specified in Step 1(b).

(3) All meetings must be open to the public and the meeting schedule must be publicly posted (e.g., on a website).

(4) If the community wants credit for participating in a multi-jurisdictional floodplain management or hazard mitigation planning committee, it must meet the criteria specified in Step 1(b).

(5) The formalities of organizing and naming the committee are not as important as the membership and the ability of all members to participate. For example, a community may augment an existing committee with an advisory body of stakeholders. Such an arrangement would be credited, provided the stakeholders were treated as full committee members during the meetings, i.e., they can speak up, vote, and receive all the materials that regular members do.

Note that this planning committee can be (and it is recommended that it be) the same committee that prepares a Program for Public Information under Activity 330 (Outreach Projects). The floodplain management plan document can also be or include the Program for Public Information document and/or the flood insurance coverage improvement plan credited under Activity 370 (Flood Insurance Promotion).

There is extra credit in Step 10 if the committee continues to meet after the plan is adopted in order to evaluate progress and recommend changes, provided that the committee continues to meet the above criteria. Such annual evaluations by a committee are required for some of the credits under Activities 330 and 370.

(b) 15 points, if one or more public information meetings is held in the affected area(s) within the first two months of the planning process to obtain public input on the natural hazards, problems, and possible solutions. The meetings must be held separately from the planning committee meetings credited in item (1).

The intent of the public meeting(s) is to go out to the people to gather input. At a minimum, it must be separate from regular meetings of the planning committee or the

community's governing body. It is recommended that at least one of these public meetings be held in the affected neighborhoods.

(c) 15 points, for holding one or more public meetings to obtain input on the recommended plan. The meeting(s) must be at the end of the planning process, at least two weeks before submittal of the recommended plan to the community's governing body.

Simply discussing the plan at a regular public meeting of the governing body, just before it is voted on, is not sufficient public input for CRS credit. To receive credit for this item, there must be at least one public meeting at the end of the planning process, at which the plan and its findings and recommendations are explained and people can ask questions and submit their comments for review, consideration, and potential modification of the plan. The CRS does not require public hearings. State and local laws take precedence, however. The community's legal counsel should determine if a public hearing is required.

(d) 5 points, for each additional public information activity implemented to explain the planning process and encourage input to the planner or planning committee, up to a maximum of 30 points. Examples include, but are not limited to

- A website that explains the planning process and posts the time and place for its meetings, meeting agendas, status reports, and the draft plan, when it is ready for review.
- Conducting a public webcast that explains the planning process and solicits input.
- Questionnaires asking the public for information on their natural hazards, problems, and possible solutions. A questionnaire or survey that is sent to everyone in the floodplain or everyone in the community will receive double credit (10 points).
- Outreach projects, such as those credited in Activity 330 (Outreach Projects), which explain the planning effort and seek comments. These could include brochures, mailers, booths at shopping malls, presentations at civic or neighborhood organizations, etc.

## Step 3. Coordinate

Most communities' flood problems have been studied already. There are likely to be existing plans, studies, and reports on flooding that need to be reviewed. There also may be flood protection activities being considered or implemented by other agencies.

This planning step credits incorporating other plans and other agencies' efforts into the floodplain management plan. Other agencies and organizations must be contacted to determine if they have studies, plans, or information pertinent to the floodplain management plan; to determine if their programs or initiatives may affect the community's program; and to see if they could support the community's efforts.

Examples of "other agencies and organizations" include neighboring communities; local, regional, state, and federal agencies; and businesses, colleges, and other private and non-profit organizations affected by the hazards or involved in hazard mitigation or floodplain management.

This credit is for coordinating with other agencies and organizations, particularly those that are not represented on the planning committee credited under Step 1(b) or Step 2(a). No special additional coordination measures are needed for the agencies and organizations on the planning committee, but the planners may want to formally contact the directors and others for the record.

Note that community needs and goals typically are developed during comprehensive planning activities. These goals should be identified in this step, reviewed, and considered during the development of the floodplain management plan. They should be taken into account when the goals for the floodplain management plan are developed in Step 6.

**Credit Points for FMP Step 3**

The credit for this step is the total of the following points. To receive credit for this step, the coordination must include item (a). (Maximum credit: 35 points)

(a) 5 points, if the planning includes a review of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area. (REQUIRED) Where the information from the existing studies and reports is used in the plan, the source(s) should be referenced.

This review needs to include a review of community needs and goals, past flood studies, disaster damage reports, natural areas plans, and other documents that will provide information for the planning process.

(b) 30 points, for coordinating with agencies and organizations outside the community's governmental structure. There is no credit for talking to other departments within the city or county government. For this credit, "coordinate" means to

- Contact the agency or organization and keep a record of the contact (a generic announcement or notice on a website is not sufficient);
- Ask for data or information related to the hazard;
- Ask if the agency or organization is doing anything that might affect flooding or properties in flood-prone areas; and
- Offer the agency or organization an opportunity to be involved in the planning effort, such as by attending a committee meeting or commenting on the draft plan.

One point is provided for each agency or organization that is contacted.

Two points are provided for meeting or having a telephone conversation with the agency or organization. Such a coordination meeting or conversation must be separate from attendance at a planning committee meeting.

Coordination with an agency can only be counted once. For example, if a letter to an agency results in a follow-up meeting or telephone conversation, the community receives two points.

Examples of such agencies and organizations include, but are not limited to

- Neighboring communities;
- Local and regional agencies involved in hazard mitigation activities;
- Stakeholder-type organizations that are not represented on the planning committee;
- Local drainage, levee, sanitary, and soil and water conservation districts;
- Regional and metropolitan planning agencies;
- State National Flood Insurance Program (NFIP) Coordinator;
- State water resources agency;
- State coastal zone management agency;
- State emergency management agency;
- FEMA Regional Office;
- National Weather Service;
- U.S. Army Corps of Engineers;
- Natural Resources Conservation Service;
- U.S. Bureau of Reclamation;
- U.S. Fish and Wildlife Service;
- National Oceanic and Atmospheric Administration;
- Native American tribes;
- American Red Cross;
- Local homebuilders association; and
- Local environmental groups.

If the community wants the plan to qualify as a multi-hazard mitigation plan, the plan must identify all stakeholders that are involved or given an opportunity to be involved in the planning process. At a minimum, stakeholders must include

1) Local and regional agencies involved in hazard mitigation activities,
2) Agencies that have the authority to regulate development, and
3) Neighboring communities.

An "opportunity to be involved in the planning process" means that the stakeholders are engaged or invited as participants and given the chance to provide input to affect the plan's content.

—*Local Mitigation Plan Review Guide,* FEMA

## Step 4. Assess the hazard

At this step in the planning process, the planner or committee reviews, analyzes, and summarizes data collected about the natural hazard(s) that the community faces. This step focuses on the sources, frequency, extent, and causes of flooding while Step 5 will address the impact of flooding on people, property, infrastructure, the local economy, and natural floodplain functions.

Under Step 3(a), the community gathers data about the flood hazard. This step involves reviewing, analyzing, and summarizing the data from existing flood studies, including the Flood Insurance Study, drainage problem studies, historical records, and the knowledge and experiences of the planning committee members.

For CRS credit, the community does not need to conduct studies to develop new flood data. However, if this process determines that new maps or data are needed, they should be described for credit under item (d).

The hazard assessment needs to describe the local flood hazard and not be a broad or generic discussion of flooding in general. It needs to discuss how often it floods, the locations of areas that flood, the depth of flooding, and the source or cause of the flooding. Because the most important readers are elected officials and flood-prone residents, the descriptions of the hazards should be in lay terms.

The CRS Community Self Assessment described in Section 240 can help with this step.

**Credit Points for FMP Step 4**

The credit for this step is the total of the following points based on what the community includes in its assessment of the hazard. (Maximum credit: 35 points)

- To receive CRS credit for this step, the plan must include a flood hazard assessment credited under item (1).
- If the community is a Category B or C repetitive loss community (see Sections 502–503), this step must cover all of its repetitive loss areas.

(a) 15 points, for including an assessment of the flood hazard in the plan. (REQUIRED) Flood hazard areas that require assessment include

- The Special Flood Hazard Area (SFHA) shown on the Flood Insurance Rate Map (FIRM),
- Repetitive loss areas,
- Areas not mapped on the FIRM that have flooded in the past, and
- Other surface flooding identified in other studies.

(1) 5 points, for a map of the flood hazard areas. Area maps are acceptable for multi-jurisdictional plans.

(2) 5 points, for a description of the known flood hazards, including source of water, depth of flooding, velocities, and warning time.

(3) 5 points, for a discussion of past floods.

(b) 10 points, for including an assessment of less-frequent flood hazards in the plan. For this credit, the community must

(1) Identify the hazard, including

a. Preparing an inventory of levees that would result in a flood of developed areas if they failed or were overtopped during a flood, and/or

b. Preparing an inventory of dams that would result in a flood of developed areas if they failed, and/or

c. Identifying any of the flood-related special hazards listed in Section 401 of the *CRS Coordinator's Manual* that may affect the community, and/or

d. Identifying the coastal A Zone, i.e., the area where wave heights during the 100-year flood are between 1.5 and 3 feet;

(2) Map the area(s) affected. (For planning purposes, an approximate affected area is sufficient. No new engineering studies are needed. Area maps are acceptable for multi-jurisdictional plans.) If an engineering study is conducted, it may receive credit under Activity 410; and

(3) Summarize the hazard(s) in lay terms.

Note that, under Activities 620 (Levees) and 630 (Dams), items (b)(1)a and (b)(1)b are prerequisites for reaching Class 4 or better. Additional guidance on inventorying and mapping the areas affected by levee and dam failures can be found in Section 621.b and Section 631.b, respectively. It is recommended that communities incorporate these inventories into their floodplain management plans.

Item (a) is prorated if part of the "flood hazard" is missing, where applicable. For example, if the community is downstream of a dam, has a levee, and has a coastal A Zone, and the assessment includes only the dam failure hazard, the credit will be less than the full 10 points. If the community does not have a levee, it is reflected in the proration.

Two points are provided if the inventory is conducted and concludes that there are no levees, dams, or special flood-related hazards that threaten the community.

(c) 5 points, if the assessment identifies areas likely to be flooded and flood problems that are likely to get worse in the future as a result of (1) changes in floodplain development and demographics, (2) development in the watershed, and (3) climate change or sea level rise. The credit is prorated if the assessment does not include all three types of changes.

(d) 5 points, if the plan includes a description of the magnitude or severity, history, and probability of future events for other natural hazards, such as earthquakes, wildfires, or tornados. The plan should include all natural hazards that affect the community. At a minimum, it should include hazards identified by the state's hazard mitigation plan.

***NOTE:*** *To qualify as a multi-hazard mitigation plan, the plan must address ALL of the community's flood and other natural hazards identified in the hazard assessment. Not only does an all-hazards plan help qualify for mitigation funds, but also it will better prepare the community for hazards other than flooding. It is common for communities to focus only on mitigation of flood problems because they occur more often. However, assessing the other hazards when preparing a flood plan can help address what can be done for all hazards, some of which may occur less frequently, but have a greater impact on the community.*

## Step 5. Assess the problem

Flooding can be a natural and beneficial occurrence. A floodplain is only a problem area if human development (the built environment) gets in the way of, or exacerbates, the natural flooding process.

The previous step assessed the hazards facing the community. In this step, the community planners or planning committee members collect and summarize data on what is at risk. This step looks at the impact of those hazards on the community.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

### Credit Points for FMP Step 5

The credit for this step is the total of the following points, based on what is included in the assessment of the vulnerability of the community to the hazards identified in the previous, hazard assessment, step. (Maximum credit: 52 points)

- To receive credit for this step, the assessment must include items (a) and (c). A plan for a Category B or a Category C repetitive loss community that does not include item (c) may still receive up to 50 points for the plan, provided that no other step is missed.
- Each credited item must cover all relevant flood-related hazards identified in Step 4.
- Each credited item must include a description and summary of the problem(s). Simply listing data, such as the names of the critical facilities or the number of flood insurance claims, does not suffice for credit—there must be description of the impact of flooding and what kinds of problems arise, not just raw data.
- For a multi-jurisdictional plan, each item needs to be described for each community. Tables are acceptable to show the data by community, but there still needs to be a narrative description and summary of the problem(s).

(a) 2 points, if the plan includes an overall summary of the jurisdiction's vulnerability to each hazard identified in the hazard assessment (Step 4) and the impact on the community. (REQUIRED)

(b) 25 points, if the plan includes a description of the impact that the hazards identified in the hazard assessment (Step 4) have on the features listed below:

(1) 5 points, for life safety and the need for warning and evacuating residents and visitors.

(2) 5 points, for public health, including health hazards to individuals from flood waters and mold.

(3) 5 points, for critical facilities and infrastructure.

(4) 5 points, for the community's economy and major employers.

(5) 5 points, for the number and types of affected buildings (e.g., residential, commercial, industrial, with or without basements, etc.). For this credit, the

assessment must include an inventory of all buildings owned by the community that are located in flood-prone areas and that identifies which buildings are insured for flood damage.

(c) 5 points, if the assessment includes a review of historical damage to buildings, including all repetitive loss properties and all properties that have received flood insurance claims payments, and/or an estimate of the potential damage and dollar losses to vulnerable structures, including damage from mold and other flood-related hazards. Vulnerable structures must include all buildings within the community's defined repetitive loss area(s).

Communities must include repetitive loss areas in their problem assessment. (REQUIRED of Category B and C repetitive loss communities (see Sections 502–503))

In order to receive the full credit under item (c), the community reviews ALL the addresses of properties that have received flood insurance claims, not just the repetitive loss properties. Such a list is sent annually to all Category B and C repetitive loss CRS communities. Communities can request more recent lists through their FEMA Regional Office.

**The Privacy Act**

Flood insurance data about private property, including repetitive loss properties, are protected under the Privacy Act. Personally identifiable Information such as the names or addresses of specific properties, whether they are covered by flood insurance or not, whether they have received flood insurance claims, or the amounts of such claims may not be released outside of local government agencies or to the public or used for solicitation or other purposes. Such information should be marked "For internal use only. Protected by the Privacy Act of 1974."

General or aggregated information, such as total claims paid for a community or an area or data not connected to a particular property may be made public.

Data on building damage usually can be obtained from post-disaster damage assessment reports, flood insurance claims or disaster assistance data, and flood control studies. Particularly in areas that have experienced little or no serious flooding in recent history, a Hazus-MH flood analysis can yield valuable information about the potential for flood damage and loss (Figure 510-2). For best results, the building/structure inventory data bases in Hazus-MH should be augmented with local input.

HAZUS MH
EARTHQUAKE • WIND • FLOOD

Hazus-MH is a software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. It can be a great help in the Step 5 vulnerability assessment.

Hazus-MH uses geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods, and earthquakes on populations.

Copies of Hazus-MH are available at no charge from the FEMA Distribution Center. Users can request that a 60-day trial/evaluation copy of ESRI's ArcGIS software be sent with Hazus-MH. Users should be familiar with GIS software. Hazus training is available at FEMA's Emergency Management Institute and elsewhere. Information is at http://www.fema.gov/hazus/.

**Figure 510-2. About Hazus-MH.**

(d) 5 points, if the assessment describes areas within the floodplain that provide natural functions, such as wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species.

Along with flood protection, comprehensive floodplain management planning should review the unique natural features, natural areas, and other environmental and aesthetic attributes that may be present in the floodplain. Protecting and preserving these natural and beneficial floodplain functions yield flood protection benefits and also help integrate floodplain management efforts with other community goals and objectives. This section should also review existing natural floodplain functions plans, such as those credited under Section 511.c.

(e) 7 points, if the assessment includes a description of development, redevelopment, and population trends and a discussion of what the future brings for development and redevelopment in the community, the watershed, and natural resource areas.

(f) 8 points, if the assessment includes a description of the impact of the future flooding conditions described in Step 4(c) on people, property, and natural floodplain functions.

## Step 6. Set goals

The goals should set the context for the subsequent review of floodplain management activities and drafting of the action plan (Figure 510-3). They should incorporate or be consistent with other community goals for the affected areas. A multi-hazard mitigation plan should have goals that address all the major hazards that face the community.

### Credit Points for FMP Step 6

The points for this step are provided if the plan includes a statement of the goals of the community's floodplain management or hazard mitigation program. The goals must address all flood-related problems identified in Step 5. (Maximum credit: 2 points)

## Step 7. Review possible activities

At this step, the plan reviews different activities that could prevent or reduce the severity of the problems described in Step 5. This is a systematic review of a wide range of activities to ensure that all possible measures are explored, not just the traditional approaches of flood control, acquisition, and regulation of land use. The review, including the pros and cons of each activity, must be included in the plan document. Figure 510-4 lists some of the types of activities that could be reviewed under each of the six credited categories.

***NOTE:*** *This review is separate from Step 8, the selection of projects and activities to pursue. It includes activities that may not be selected and explains why some activities may be appropriate for the community and its flooding conditions and why some may not be appropriate.*

The range of activities should be evaluated for each area affected. While some of them may be quickly eliminated as inappropriate, most deserve careful consideration, especially to ensure full understanding of their costs and benefits.

## St. Tammany Parish, Louisiana, Multi-Hazard Mitigation Plan

1. Protect the lives and health of the Parish's residents from the dangers of natural hazards.
2. Ensure that public services and critical facilities operate during and after a disaster.
3. Ensure that adequate evacuation routes, streets, utilities and public and emergency communications are maintained and available during and after a disaster.
4. Protect homes and businesses from damage.
5. Use new infrastructure and development planning to reduce the impact of natural hazards.
6. Give special attention to repetitively flooded areas.

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## Gurnee, Illinois, Flood Mitigation Plan

1. Protect existing properties
   a. Use the most effective approaches to protect buildings from flooding, including acquisition or relocation where warranted.
   b. Enact and enforce regulatory measures that ensure that new development will not increase flood threats to existing properties.
   c. Use appropriate measures to mitigate against the danger and damage posed by other natural hazards.
2. Protect health and safety
   a. Advise everyone of the safety and health precautions to take against flooding and other natural hazards.
   b. Improve traffic circulation, during floods and at other times.
   c. Improve water quality and habitat.
   d. Do something about the mosquitoes.
3. Improve the quality of life in Gurnee.
   a. Preserve and improve the downtown core of businesses and services.
   b. Ensure that current owners can maintain and improve their properties.
   c. Use acquisition programs to expand open space and recreational opportunities.
   d. Maintain an attractive riverfront and other public open spaces.
4. Ensure that public funds are used in the most efficient manner.
   a. Prioritize mitigation projects, starting with those sites facing the greatest threat to life, health, and property.
   b. Utilize public funding to protect public services and critical facilities.
   c. Utilize public funding for those projects on private property where the benefits exceed the costs.
   d. Maximize the use of outside sources of funding.
   e. Maximize owner participation in mitigation efforts to protect their own properties.
   f. Encourage property-owner self-protection measures.

**Figure 510-3. Two examples of communities' statements of their goals.**

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

   - Floodplain mapping and data
   - Open space preservation
   - Floodplain regulations
   - Erosion setbacks
   - Planning and zoning
   - Stormwater management
   - Drainage system maintenance
   - Building codes

2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.

   - Relocation
   - Acquisition
   - Building elevation
   - Retrofitting
   - Sewer backup protection
   - Insurance

3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.

   - Wetlands protection
   - Erosion and sediment control
   - Natural area preservation
   - Natural area restoration
   - Water quality improvement
   - Coastal barrier protection
   - Environmental corridors
   - Natural functions protection

4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

   - Hazard threat recognition
   - Hazard warning
   - Hazard response operations
   - Critical facilities protection
   - Health and safety maintenance
   - Post-disaster mitigation actions

5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.

   - Reservoirs
   - Levees/floodwalls
   - Diversions
   - Channel modifications
   - Storm drain improvements

6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

   - Map information
   - Outreach projects
   - Real estate disclosure
   - Library
   - Technical assistance
   - Environmental education

**Figure 510-4. Categories of floodplain management activities.**

**Credit Points for FMP Step 7**

The credit for this step is the total of the following points based on which floodplain management or hazard mitigation activities are reviewed in the plan. (Maximum credit: 35 points)

This step must describe those activities that were considered. There is no credit for simply listing the various types of projects under each credited category. For each activity, there must be a discussion of why the activity is or is not appropriate for the community and its flood problems.

For an activity that is determined to be appropriate,

- The discussion must also include community's capability to fund and implement the activity.
- If an activity is currently being implemented, the plan must note if it is achieving expectations and, if not, whether it should be modified.
- If the plan is an update of a previously credited plan, each activity recommended by the previous plan must be discussed, along with the status of implementation.

The discussion of each activity needs to be detailed enough to be useful to the lay reader.

Section (a) is required for any credit under this step.

(a) 5 points, if the plan reviews preventive activities, such as zoning, stormwater management regulations, building codes, subdivision ordinances, and preservation of open space, and the effectiveness of current regulatory and preventive standards and programs. (REQUIRED) For this credit, the review must include a discussion of the community's

  - Comprehensive or land use plan,
  - Building code,
  - Zoning ordinance,
  - Floodplain management regulations,
  - Subdivision ordinance, and
  - Stormwater management regulations.

  The discussion must review

  - How these tools can reduce future flood losses,
  - The current standards in the community's plans and regulations, and
  - Whether the community should adopt or revise such plans and regulations in light of the Step 5 problem assessment and the goals set in Step 6.

(b) 5 points, if the plan reviews whether the community's floodplain management regulatory standards are sufficient for current and future conditions, as discussed under Steps 4(c) and 5(f).

(c) 5 points, if the plan reviews property protection activities, such as acquisition, retrofitting, and flood insurance;

(d) 5 points, if the plan reviews activities to protect the natural and beneficial functions of the floodplain, such as wetlands protection;

(e) 5 points, if the plan reviews emergency services activities, such as warning and sandbagging;

(f) 5 points, if the plan reviews structural projects, such as levees, reservoirs, and channel modifications; and

(g) 5 points, if the plan reviews public information activities, such as outreach projects and environmental education programs.

## Step 8. Draft an action plan

After the review of alternatives during Step 7, an action plan is drafted (Step 8) that selects and specifies those activities appropriate to the community's resources, hazards, and vulnerable properties. The community should strive for a balanced program, selecting measures from more than one category of floodplain management activity. In every case, the community should implement preventive activities both to keep its flood problems from getting worse and also to protect new construction from the effects of natural hazards.

There is no requirement that a floodplain management plan identify expensive or massive structural flood control projects. The plan must include activities that the community can be assured will be implemented through its own resources. If outside funding support is needed for some projects, the funding sources should be identified and researched to ensure that the projects are eligible and the community has a chance of receiving the funds. Many of the activities could receive CRS credit once they are implemented.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

### Credit Points for FMP Step 8

The credit points are based on the range of actions that are recommended in the plan, subject to the criteria listed below. (Maximum credit: 60 points)

- For each recommendation, the action plan must identify
    - Who is responsible for implementing the action,
    - When it will be done, and
    - How it will be funded.

"When it will be done" can be specified in terms of a date, a set period of time after another action is complete, after the next flood, etc. "How it will be funded" could state that funding will be dependent on a grant, provided the project is eligible for the grant program.

- The actions must be prioritized. When prioritizing mitigation actions, the planners need to consider the benefits that would result from the mitigation actions and projects versus the cost of those actions. Note that this is not a requirement for a cost-benefit analysis for every action item. However, an economic evaluation is essential for selecting one or more actions from among many competing ones.
- There must be an action item for each goal in Step 6. An example of this is in Figure 510-5.
- Credit is provided for a recommendation on floodplain regulations, provided it recommends adopting or continuing a regulatory standard that exceeds the minimum requirements of the National Flood Insurance Program (NFIP). Simply continuing to meet the minimum criteria of the NFIP is not credited as an action item to improve the community's floodplain management program.
- If the plan calls for acquiring properties, there must be a discussion of how the project(s) will be managed and how the land will be used after it is acquired.
- When a multi-jurisdictional plan is prepared, it must have action items from at least two of the six categories that directly benefit each community seeking CRS credit.
- To qualify as a multi-hazard mitigation plan, the plan must include a "process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate" (44 *CFR* §201.6(c)(4)(ii)). The action items that relate to preventive activities should clarify how this is done. For example, an action item could recommend that the next time the zoning ordinance is revised, flood and landslide hazard areas be considered when determining allowable uses.

(a) 45 points, depending on how many categories are covered by the action items:

(1) 10 points, if the action plan includes flood-related recommendations for activities from two of the six categories credited in Step 7; OR

(2) 20 points, if the action plan includes flood-related recommendations for activities from three of the six categories credited in Step 7; OR

(3) 30 points, if the action plan includes flood-related recommendations for activities from four of the six categories credited in Step 7; OR

(4) 45 points, if the action plan includes flood-related recommendations for activities from five of the six categories credited in Step 7.

**Table 9-1. Action Items, Goals, and Recommendations**

| Action Item | Goal 1. Protect critical facilities and utilities | Goal 2. Protect lives and health | Goal 3. Protect homes, businesses, and schools | Goal 4. Minimize the costs to the City and property owners | Goal 5. Ensure that new construction supports these goals | Chapter – Recommendation | Deadline |
|---|---|---|---|---|---|---|---|
| **9.2. Administrative Action Items** | | | | | | | |
| 1. *Plan* adoption | X | X | X | X | X | | 5/31/07 |
| 2. Monitoring and reporting | X | X | X | X | X | | 9/30 each year |
| 3. Community Rating System | X | X | X | X | X | 4-3, 6-5, 7-3, 8-1 - 8-8 | CRS visit |
| | | | | | | | |
| **9.3. Program Action Items** | | | | | | | |
| 4. Levee improvements | X | X | X | X | | 4-1 | Ongoing |
| 5. Drainage improvements | X | X | X | X | | 4-2 | 8/31/08 |
| 6. Drainage system maintenance | X | X | X | | | 4-3 | CRS visit |
| 7. Property protection funding | X | X | X | X | | 5-2, 5-3 | 8/31/07 |
| 8. Regulatory review | X | | X | | X | 6-5 | CRS visit |
| 9. NFIP administration | X | X | X | | X | 6-2 | After CAC |
| 10. CFMs | X | X | X | | X | 6-2, 6-3 | 8/31/07 |
| 11. BCEGS | X | X | X | | X | 6-4 | 5/31/07 |
| 12. Flood response plan | X | X | X | | | 7-1 – 7-4 | Ongoing |
| | | | | | | | |
| **9.4. Public Information Action Items** | | | | | | | |
| 13. Annual mailing | | X | X | | X | 8-1, 8-2, 8-7, 8-8 | Each Spring |
| 14. Technical references | | X | X | | X | 8-4, 8-5 | CRS visit |
| 15. Public information projects | | X | X | | X | 4-4, 5-1, 6-1, 6-6, 7-4, 8-1 – 8-8 | Ongoing |
| 16. Public information messages | | X | X | | X | 4-4, 5-1, 6-1, 6-6, 7-4, 8-1 – 8-8 | Ongoing |
| | | | | | | | |

This table relates the 16 action items to the 5 goals of this Plan. The goals are stated in full on pages 3-6 and 9-1. The table also shows the relation between the action items and the recommendations at the end of chapters 4 – 8. For example action item 8, Regulatory Review, implements recommendation 6-5 at the end of chapter 6. The reviews need to be completed in time for the CRS verification visit, which will be in the second half of 2007.

**Figure 510-5. An excerpt from the City of Gretna, Louisiana's *Flood Hazard Mitigation Plan.***

(b) 10 additional points are provided if the action plan establishes or revises post-disaster redevelopment and mitigation policies and procedures. These policies and procedures should account for the expected damage from a base flood or other disaster. For example, the action plan should identify the areas likely to be worst hit and the policies should determine whether they will be rebuilt if substantially damaged. Post-disaster mitigation procedures should assign responsibilities for public information, code enforcement, planning, and other efforts that encourage, mandate, and/or fund loss reduction activities.

Note that Activity 330 (Outreach Projects) provides credit for public information materials developed for use during and after a flood (Flood Response Preparations (FRP)). Preparation of those materials should be done when the other post-disaster policies and procedures are prepared.

(c) 5 additional points are provided if the plan includes action items (other than public information activities) to mitigate the effects of the other natural hazards identified in the hazard assessment (Step 4, item (d)).

## Step 9. Adopt the plan

The points for this step are provided if the plan and later amendments are officially adopted by the community's governing body. The plan must be an official plan of the community, not an internal staff proposal. "Adopted" means that there is a resolution or other formal document that is voted on by the community's governing body. A note in the minutes or passage via a consent agenda is not credited.

When a multi-jurisdictional plan is prepared, it must be adopted by the governing body of each community seeking CRS or multi-hazard mitigation plan credit.

## Step 10. Implement, evaluate, and revise

To be useful, planning must be ongoing and plans must be dynamic. The plan should not sit on a shelf gathering dust once it is completed. Therefore, the community must have an evaluation and update process.

For CRS credit, plans must be implemented. No plan is perfect. As implementation proceeds, flaws will be discovered and changes will be needed. Not only can hazard conditions change but also goals and objectives may change. If a community is hit by a tornado, for example, the short-term action items may be changed to focus attention on the newly damaged areas in the SFHA.

Changes should be made in the action plan when opportunities arise to add new activities or complete some items ahead of schedule. The plan should also be revised if it is found that some activities cannot be completed on the original timetable. At a minimum, these types of changes must be made at the required 5-year update.

The key to this step is the annual evaluation report on progress in implementing the plan. Not only are annual evaluations required with the community's annual recertification, but also the process of conducting an annual evaluation gives the community a framework for

monitoring the plan's effectiveness and the community's progress in implementing it. Failure to submit the evaluation report with the community's annual recertification will result in loss of the planning credit (i.e., FMP = 0). This can cause a Category C repetitive loss community to revert to a Class 10.

**Credit Points for FMP Step 10**

The credit for this step is the total of the following points, based on how the community monitors and evaluates its plan. (Maximum credit: 26 points)

- The plan document must describe how, when, and by whom the plan will be monitored, evaluated, and revised**.** It is recommended that these items be included in the adoption resolution as well.
- An annual evaluation report on progress towards plan implementation must be prepared at least once each year and submitted with the community's annual CRS recertification. The report must be submitted to the governing body, released to the media, and made available to the public.
- If a community receives credit as a result of participation in a multi-jurisdictional plan that includes action items for each community, the annual evaluation report must cover those action items. This can be done either by a multi-jurisdictional planning committee or through separate submittals by each community. However, a community will not receive credit if it did not participate in the meeting at which the annual report was prepared. Therefore, the submittal needs to show who participated in the preparation of the report.
- The community must update the plan at least every five years. The update is due by October 1, five years after the plan was adopted (see next section).
- Step 10(b) provides credit if the planning committee does the evaluation and revision. If the committee does not continue to meet and report or if the committee membership no longer meets the credit criteria in Step 2(a), the community will not keep the committee credits under Steps 1(b) or 2(a).

(a) 2 points, if the community has procedures for monitoring implementation, reviewing progress, and recommending revisions to the plan in an annual evaluation report. The report must be submitted to the governing body, released to the media, and made available to the public. (REQUIRED)

(b) 24 points, if the annual evaluation report is prepared by the same planning committee that prepared the plan that is credited in Step 2(a) or by a successor committee with a similar membership that was created to replace the planning committee and charged with monitoring and evaluating implementation of the plan. The points are based on how frequently the committee meets, since more frequent meetings yield more progress toward implementing the plan. The committee must continue to meet the representation, quorum, and other criteria that determined the credit points under Step 2(a).

(1) 6 points, if the committee meets only once a year.

(2) 12 points, if the committee meets twice a year.

(3) 24 points, if the committee meets at least quarterly.

### Five-year Update

The community must submit a copy of its plan update at least every five years. The plan update will be reviewed for CRS credit according to the *Coordinator's Manual* currently in effect, not the version used when the community originally requested this credit. The update must include the following steps:

(a) Steps 1 and 2: If the original planning process included a committee, then in order to keep the credit provided under Step 1(b) or Step 2(a), the update must be conducted by a committee that meets the criteria identified in those steps.

(b) Step 2: If the original planning process received credit for a public meeting credited under Step 2, item (c), then to keep this credit the community must also conduct a public meeting that reviews and receives comments on the draft update.

(c) Step 3, item (a): The update must include a review of new studies, reports, and technical information and of the community's needs, goals, and plans for the area that have been published since the plan was prepared.

(d) Steps 4 and 5: The hazard and problem assessments must be reviewed and brought up to date. The assessments must account for

- New floodplain or hazard mapping,
- Annexation of flood-prone areas,
- Additional repetitive loss properties,
- Completed mitigation projects,
- Increased development in the floodplain or watershed,
- New flood control projects,
- Lack of maintenance of flood control projects,
- Major floods or other disasters that occurred since the plan was adopted, and
- Any other change in flooding conditions and/or development exposed to flooding or the other hazards covered in the plan.

(e) Step 6: The original plan's goals must be reviewed to determine if they are still appropriate, given the revisions to Steps 4 and 5.

(f) Step 8: The action plan must be revised to account for projects that have been completed, dropped, or changed and for changes in the hazard and problem assessments, as appropriate.

(g) Step 9: The update must be adopted by the community's governing body.

An annual evaluation report that includes these steps may qualify as the five-year update (but may not qualify as an update for a multi-hazard mitigation plan).

**Impact Adjustment for FMP**

rFMP is a ratio that reflects how much of the community's flood hazard areas are covered by the floodplain management plan. Note that for a hazard mitigation plan to qualify, all of the community's flood hazards must be covered.

rFMP = EITHER

1.0, if the plan covers all of the community's known flood hazard areas. "Known flood hazard areas" means the SFHA shown on the FIRM, repetitive loss areas, areas not mapped on the FIRM that have been flooded in the past, and surface flooding identified in existing studies (see Step 4)

OR

0.25, if the planning covers either all of the community's repetitive loss areas or at least 25% of the community's known flood hazard areas.

**Documentation for FMP Provided by the Community**

(1) With the submittal of the plan or the five-year update to the plan,

(a) A copy of the plan or updated plan to be credited. This can be digital, a hard copy, or a link to a website with the full document. Either the plan is marked, or a separate document is provided, to show where each credited step and sub-step appears. There is a checklist that can be used to do this, available at www.CRSresources.org/500.

(b) [For Step 1(b) credit for a committee of staff from different departments] The plan or a separate document must show which department representatives implement, or have expertise in, which of the six categories of mitigation measures.

(c) [For Step 1(c) credit] A copy of the resolution or other official action taken by the governing body to create or recognize the planning process as specified in Step 1. For Step 2(a) credit for a planning committee, the resolution or action must identify the committee's membership.

(d) [For Step 2(a) credit for a planning committee] The names of the committee members, their titles, and their represented organizations must be listed in the plan. The community may submit separate materials, such as meeting minutes and sign-in sheets, to document meeting attendance.

(e) For Step 2(b), (c), or (d) credit for public meetings] Copies of the publicity for the public meetings. The notices of the meetings should be in the form of letters to floodplain residents, a notice sent to all residents, or a newspaper article or advertisement. An inconspicuous legal notice appearing in the classified section of the newspaper is not sufficient for CRS credit. If very few residents are affected, as may be the case for a plan that addresses only a repetitive loss area, a written record that the residents were called would be sufficient documentation.

(f) [For Step 3(a) credit for reviewing existing studies, reports, and technical information] The plan must note where the information from the studies and reports was used, e.g., with quotations or footnotes. The plan also needs to include a list of all the documents reviewed. This is usually done in a reference section or at the end of each chapter.

(g) [For Step 3(b) credit for coordination with other agencies and organizations] A record of the contacts and meetings. Acceptable records include letters that cover the items needed for coordination, copies of any responses that were received, follow-up memos from the meetings, notes from telephone conversations, and e-mails. These items are usually not included as a part of the plan document.

(h) A copy of the resolution or other formal adoption action by the governing body as specified in Step 9. The resolution should identify the implementation responsibilities, describe the evaluation and revision procedures, and call for the five-year update (or adopt by reference such language that may be in the plan document).

(2) With each annual recertification,

(a) A copy of the annual evaluation report as specified in Step 10. The report must review each action item, describe what was implemented (or not implemented), and recommend changes to the action plan as appropriate. If not in the evaluation report document, the recertification submittal must also include the minutes of the committee meeting(s) (if getting credit for Step 10(b)) and a description of how the report was submitted to the governing body, released to the media, and made available to the public.

***NOTE:*** *Failure to submit the floodplain management plan's evaluation report with the annual recertification or the five-year update will result in loss of the planning credit (i.e., FMP = 0). Loss of credit for this activity may cause a repetitive loss Category C community to revert to a Class 10.*

## 512.b. Repetitive loss area analysis (RLAA)

The maximum credit for this element is 140 points.

A repetitive loss area analysis is a detailed mitigation plan for a repetitive loss area. It provides more specific guidance on how to reduce damage from repetitive flooding than a community-wide floodplain management or hazard mitigation plan. Before beginning the RLAA process, the community must review its repetitive loss list to determine if any properties have been mitigated or incorrectly assigned to the community. Once the list is reviewed and the necessary updates approved as per Section 502, the remaining unmitigated repetitive loss properties will form the basis for the RLAA. Mapping repetitive loss areas is discussed in Section 503.

As with a floodplain management plan, CRS credit is dependent upon the community's following an appropriate process. The five steps for an area analysis are less involved than

the 10-step floodplain management planning process, but the analysis must evaluate each building in the repetitive loss area(s).

A community may receive credit for both a floodplain management plan and repetitive loss area analyses. Area analyses may be conducted during floodplain management planning or a floodplain management plan may identify areas needing analyses, which are conducted after the plan is adopted. For CRS credit, a separate analysis must be prepared for each repetitive loss area and made available to residents of those areas.

Additional guidance and suggestions for conducting an area analysis can be found in Chapter 7 of *Reducing Damage from Localized Flooding*, FEMA-511.

**Credit Criteria for RLAA**

(1) Communities with one or more repetitive loss properties on FEMA's list must have at least one repetitive loss area delineated in accordance with the criteria in Section 503. The area(s) must include at least one of the properties on FEMA's repetitive loss list.

An exception to this criterion is made for communities that have no historic repetitive flood claims, but are nevertheless working to reduce repetitive flooding. These communities may prepare area analyses for areas that have been repetitively flooded. The analyses must describe and map the repetitive flooding problem (including all past flood insurance claims, if any) and meet all the following credit criteria. If there are multiple areas, they must not be contiguous. Communities using this approach may receive 20 credit points per area.

(2) An area analyses must have been prepared and adopted for each repetitive loss area in the community. The analyses must meet the following criteria:

(a) The repetitive loss areas must be mapped as described in Section 503.a.

(b) If the community does not conduct an analysis of all the areas, it will be reflected through the impact adjustment. A Category C community must prepare analyses for all of its repetitive loss areas if it wants to use RLAA to meet its repetitive loss planning prerequisite (see Section 502).

(c) A five-step process must be followed. Although all five steps must be completed, steps 2–4 do not have to be done in the order listed. For example, the planners may want to contact agencies and organizations to see if they have useful data (Step 2) after the site visit is conducted (Step 3).

**Step 1.** Advise all the properties in the repetitive loss areas that the analysis will be conducted and request their input on the hazard and recommended actions. The notice (or any public document) cannot identify which properties are on FEMA's repetitive loss list (see the box on flood insurance data and the Privacy Act). There are no restrictions on publicizing what properties are in repetitive loss AREAS that have more than one property and there are no restrictions on publishing aggregate data, such as how many properties received claims or the average value of those claims. Community planning staff may share insurance claims information with the owner of the property, but may not make it available to anyone else.

**The Privacy Act**

Flood insurance data about private property, including repetitive loss properties, are protected under the Privacy Act. Personally identifiable Information such as the names or addresses of specific properties, whether they are covered by flood insurance or not, whether they have received flood insurance claims, or the amounts of such claims may not be released outside of local government agencies or to the public or used for solicitation or other purposes. Such information should be marked "For internal use only. Protected by the Privacy Act of 1974."

General or aggregated information, such as total claims paid for a community or an area or data not connected to a particular property may be made public.

- The notice can be sent to owners OR residents at the community's discretion, as long as a representative of each property is notified.
- The notice cannot be done via a newspaper or newsletter notice or article.
- The notice must advise the recipients when and how copies of the draft report can be obtained and ask for their comments on the draft.

**Step 2.** Contact agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding. The agencies or organizations must be identified in the analysis report.

**Step 3.** Visit each building in the repetitive loss area and collect basic data.

- The site visit must collect data sufficient to do a preliminary determination of the cause of the repetitive flooding and of the mitigation measures that would be appropriate. This usually includes a review of drainage patterns around the building, the condition of the structure, and the condition and type of foundation.
- The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street.
- Floor elevations or historical flood levels are not required, but can be very helpful where available.
- The date for each building's insurance claim can help identify the cause of flooding (e.g., rainfall or overbank flooding) and the amount of the claim can help determine the amount of damage. Note that, every year, each repetitive loss community is provided with a list of its historic insurance claims. This includes single-claim properties. Non-repetitive-loss communities that elect to do an RLAA may request these data from their ISO/CRS Specialist.
- More information on appropriate data can be found in *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA-551.

**Step 4.** Review alternative approaches and determine whether any property protection measures or drainage improvements are feasible. The review must look at all of the property protection measures listed in Figures 360-1 and 510-4 that are appropriate for the types of buildings affected. A review that looks only at drainage or structural flood control project alternatives is not sufficient.

**Step 5.** Document the findings. A separate analysis must be conducted for each area. In general, separate reports are preferred for each area, but in cases in which several areas have similar building and flooding characteristics and similar mitigation measures are appropriate, the analyses can be assembled into a single report. Each report must include

- A summary of the process that was followed, including how the property owners were involved;
- The problem statement with a map of the area affected. The statement and map may show individual properties or parcels, but cannot show which ones are on FEMA's repetitive loss list;
- A list or table showing basic information for each building, such as address, foundation type, condition, and appropriate mitigation measures. This list cannot include insurance data, such as how many claims have been paid for that property. If the property owners responded to a survey, the survey responses may be included (unless the community promised confidentiality);
- The alternative approaches that were reviewed; and
- Action items that include
    - Who is responsible for implementing the action,
    - When it will be done, and
    - How it will be funded.

  "When it will be done" can be expressed in terms of a date, a set period of time after another action is complete, after the next flood, etc. "How it will be funded" could state that funding will be dependent upon receiving a grant, provided that one or more suitable grant programs are specified to which application(s) for funding will be made.

(3) The repetitive loss area analysis report(s) must be submitted to the community's governing body and made available to the media and the public. If private or sensitive information (such as names or street addresses) is included in the report, then a summary report(s) must be prepared for the governing body, committees, media, and the public. The complete repetitive loss area analysis report(s) must be adopted by the community's governing body or by an office that has been delegated approval authority by the community's governing body.

(4) The community must prepare an annual evaluation report for its area analyses.

- The report must review each action item, describe what was implemented (or not implemented), and recommend changes to the action items as appropriate.
- One annual report can cover some or all of the area analyses that were prepared.
- The report must be made available to the media and the public (including the property owners and residents of the repetitive loss areas).
- The report is submitted with the community's annual recertification.

(5) The community must update its repetitive loss area analyses in time for each CRS cycle verification visit.

- The update must review the flooding and building conditions as well as any changes to FEMA's repetitive loss list, to determine whether the number of buildings on the list or other circumstances have changed, and revise the mapping and action items accordingly.
- The update can be a new report or an addendum to the existing report.
- An annual evaluation report that reviews and updates the 5-step process may qualify as the area analysis update.
- The update can qualify as the annual evaluation report for the year it was prepared.
- The update must be made available to the media and the public (including the property owners and residents of the repetitive loss areas).
- If the repetitive flooding problem has been mitigated, the appropriate documentation must be submitted in order to remove the properties from FEMA's repetitive loss list (see Section 501).
- Any changes to an adopted area analysis must be approved following the same process as approval of the original analysis.

If, during the area analysis or annual reviews, the community finds that the flood risk to one or more repetitive loss properties has been mitigated, FEMA must be notified by submitting an AW-501, as described in Section 501.

### Credit Points for RLAA

RLAA = 140

The maximum credit for this element is 140 points. A community can obtain the maximum only if it prepares and adopts repetitive loss area analyses for all its repetitive loss areas. This is factored in through the impact adjustment.

### Impact Adjustment for RLAA

rRLAA is the ratio of the number of buildings covered by credited area analyses to the total number of buildings in the community's repetitive loss areas. See Sections 301–303 on calculating an impact adjustment.

$$rRLAA = \frac{bAA}{bRLA}$$, where

bAA = the number of buildings addressed in credited area analyses, and

bRLA = the number of buildings in the community's repetitive loss areas

### Documentation for RLAA Provided by the Community

(1) At each verification visit,

(a) A copy of each repetitive loss area analysis report or update of an earlier report that the community wants credited (see Step 5).

(b) Documentation showing how the owners or residents of the areas were notified (see Step 1).

(c) Documentation showing how the analysis was made available to the media and the public.

(d) A copy of the resolution or other formal action by the governing body that adopts the area analysis or accepts changes in subsequent updates.

(2) With the annual recertification,

(a) A copy of the annual evaluation report (Section 512.b, credit criterion (4)). If not in the evaluation report, the recertification submittal must also document how the evaluation report and update were made available to the media and the public.

***NOTE:*** *Failure to submit the area analysis' evaluation report with the annual recertification or the update at the next cycle verification visit will result in loss of the credit (i.e., RLAA = 0). Loss of credit for this activity may cause a repetitive loss Category C community to revert to a Class 10.*

## 512.c. Natural floodplain functions plan (NFP)

The maximum credit for this element is 100 points.

NFP credit is provided for adopting plans that protect one or more natural functions within the community's floodplain. Examples include

- A habitat conservation plan that explains and recommends actions to protect rare, threatened, or endangered aquatic or riparian species.
- A habitat protection or restoration plan that identifies critical habitat within the floodplain, actions to protect remaining habitat, and/or actions to restore fully functioning habitat. Frequently this will result in the preservation and/or restoration of riparian habitat that is necessary for water-dependent species.
- A "green infrastructure plan" that identifies open space corridors or connected networks of wetlands, woodlands, wildlife habitats, wilderness, and other areas that support native species, maintain natural ecological processes, and/or sustain air and water resources (for credit, the corridors or networks must include some floodplains).
- A plan or section of a comprehensive or other community plan that includes an inventory of the ecological attributes of the watershed and/or the floodplain and recommends appropriate actions for protecting them, provided that the recommendations are implemented through a mechanism such as a development regulation, development order, grant program, or capital improvement plan.

***NOTE:*** *Element NFOS2, (section 2 of the natural floodplain functions open space credit under Activity 420 (Open Space Preservation)), provides bonus credit for open space parcels that are designated in a plan to protect natural functions. A plan that receives NFP credit qualifies parcels for this extra open space credit.*

### Credit Criteria for NFP

(1) For all plans:

(a) The plan may cover more than one community, but it must identify the natural floodplain functions present within the community and have an impact on those functions within the community seeking credit.

(b) The plan must be adopted. If the plan is not a community plan adopted by the community's governing body, it must be adopted by the appropriate regional agency.

(c) The plan must be updated at least once every 10 years. The update must include a review of any changes to conditions as well as progress made since the original plan was prepared. Any changes to the adopted plan must be approved by the original adopting agency.

(d) The plan must include an inventory of the species and/or habitat present within the floodplain and action items for protecting one or more identified species of interest and natural floodplain functions. The action items must describe who is responsible for implementing the action, how it will be funded, and when it will be done.

General policy statements with no means of implementation are not considered action items.

(e) There is no credit for a plan that addresses water quality issues prepared pursuant to a requirement for an NPDES (National Pollution Discharge Elimination System) permit. Plans to improve drainage, stormwater storage, or channel bank erosion may be credited under Activity 450 (Stormwater Management) or Activity 540 (Drainage System Maintenance). Plans that are produced as a requirement for a development permit are not credited.

(2) For NFP1: A plan for NFP1 credit must include a comprehensive inventory of the natural floodplain habitat within the community. It must identify areas that warrant protection or preservation in order to maintain fully functioning habitat for the species of interest. Where threatened or endangered species are present, each species must be addressed and a restoration plan must be included.

(3) For NFP2: This sub-element credits other plans that meet the credit criteria listed in (1), but that do not address the entire SFHA or all of the species present. These could be single-issue or single-species plans or plans that cover only one area of the community's floodplain.

**Credit Points for NFP**

NFP = EITHER

NFP1 = 100 points, for a plan, or combination of plans, that meets credit criteria (1) and (2) and covers the entire SFHA within a community

OR

NFP2 = 15 x the number of plans that meet credit criterion (1), up to four plans (60 points maximum)

**Impact Adjustment for NFP**

There is no impact adjustment for this element. The NFP1 plan must cover the entire community or all of the community's SFHA. Each NFP2 plan receives 15 points regardless of the extent of the area covered.

**Documentation for NFP Provided by the Community**

(1) At each verification visit,

(a) A copy of each natural floodplain functions plan or update to a plan that the community wants credited.

(b) A copy of the resolution or other formal adoption action.

## 513 Credit Calculation

c510 = (FMP x rFMP) + (RLAA x rRLAA) + NFP, where

FMP = the total of the credit points for the 10 steps in Section 512.a

## 514 For More Information

a. Additional information, reference materials, checklists, and examples can be found at www.CRSresources.org/500.

b. Hazus-MH is a risk assessment software program that is described in Figure 510-2. Copies are available free from FEMA. Users need to be familiar with operating GIS software. Training is also available. More information is available at www.fema.gov/hazus/.

c. Contact state or regional planning, water resources, natural resources, environmental protection, state hazard mitigation, or NFIP coordinating agencies for information on state and federal agencies that can help prepare a floodplain management plan.

d. The following publications discuss the floodplain management planning process and the variety of measures that should be examined. They can be found on the websites noted.

FEMA has a series of "how-to guides" on planning, to help communities meet the multi-hazard mitigation planning criteria. They can be found at www.fema.gov/vi/media-library/collections/6.

*Getting Started: Building Support for Mitigation Planning* (FEMA-386-1) covers planning Phase I and CRS planning Steps 1–3.

*Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA-386-2) covers planning Phase II and CRS planning Steps 4–5.

*Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies* (FEMA-386-3) covers planning Phase III and CRS planning Steps 6–8.

*Bringing the Plan to Life: Implementing the Hazard Mitigation Plan* (FEMA-386-4) covers planning Phase IV and CRS planning Steps 9–10.

*Integrating Manmade Hazards into Mitigation Planning*, FEMA-386-7.

*Reducing Damage from Localized Flooding: A Guide for Communities*, FEMA-511 (2005). Also available at www.fema.gov/library/viewRecord.do?id=1448.

*Planning for Post Disaster Recovery and Reconstruction*, American Planning Association (APA) Planning Advisory Service, 346 pages, APA Report # 483/484, FEMA-421 (1998). www.fema.gov/library/viewRecord.do?id=1558.

*Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability*, 43 pages, FEMA-364, 2000. Also available for downloading at http://www.fema.gov/media-library/assets/documents/2110?id=1541.

*Reducing Losses in High Risk Flood Hazard Areas—A Guidebook for Local Officials*, FEMA-116, 1987. Also available for downloading at www.fema.gov/library/viewRecord.do?id=1508.

"Mitigation Benefit Cost (BCA) Toolkit." This is FEMA's BCA software, used to perform benefit-cost analyses for applications to FEMA's mitigation grant programs. It and its supporting documentation are available for download from www.fema.gov/media-library/assets/documents/92923. More information can be obtained by calling FEMA's toll-free BC Hotline at 1-855-540-6744 or emailing bchelpline@dhs.gov.

e. *Hazard Mitigation: Integrating Best Practices into Planning*, James C. Schwab (ed.) (2010) is published by the American Planning Association as Planning Advisory Service No. 560. Available for $60 from https://www.planning.org/research/hazards/.

f. The Corps of Engineers can also provide technical information and advice to communities interested in preparing a comprehensive floodplain management plan. Requests for assistance should be submitted to the Flood Plain Management Services Coordinator at the appropriate District Office of the Corps. Corps offices can be found at http://www.usace.army.mil/Locations.aspx.

g. The following publications can help with a repetitive loss area analysis.

*Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA-551.

*Reducing Damage from Localized Flooding: A Guide for Communities*, FEMA-511 (2005).

*Flood Proofing: How to Evaluate Your Options*, U.S. Army Corps of Engineers (1994). Download at http://www.usace.army.mil/Missions/CivilWorks/ProjectPlanning/nfpc.aspx. Click on "NFPC Publications" and scroll down to find the title.

# 515 Related Activities under the Community Rating System

- A floodplain management plan should be a blueprint for ALL of a community's public information and floodplain management activities. Planning Step 7 should review all ongoing and possible activities and Step 8 should identify which should continue, which should change, and what new ones should be initiated.
- The CRS Community Self Assessment in Section 240 can help with the hazard and problem analyses in FMP Steps 4 and 5.
- Activities 330 (Outreach Projects) and 370 (Flood Insurance Promotion) provide credit for having a committee that meets criteria very similar to those of the committee in FMP Step 2. The same committee can fulfill all activities' credit criteria.
- The credit for natural floodplain functions open space (NFOS) under Activity 420 (Open Space Preservation) can be increased if the open space parcels are identified in a natural floodplain functions plan (NFP).
- A repetitive loss area analysis (RLAA) can identify projects and priorities for mitigation activities that can receive bonus credit under Activities 520 (Acquisition and Relocation) and 530 (Flood Protection).
- A multi-hazard mitigation plan that meets FEMA planning criteria is a prerequisite for FEMA funding for projects that can be credited under Activities 520 (Acquisition and Relocation) and 530 (Flood Protection).

# Appendix B. Steering Committee Ground Rules

# B. Steering Committee Ground Rules

The name of this organization shall be the Los Angeles County 2020 Floodplain Management Plan Steering Committee, hereafter referred to as the Steering Committee (SC). The purpose of the SC shall be to:

- Serve as an advisory body to oversee the planning process.
- Provide guidance and leadership, and act as the point of contact for local governments and the various organizations that may be interested in this planning effort.
- Solicit a wide range of input into the planning process and advocate for public involvement.
- Educate all participants in floodplain management planning.

Members of the SC were selected to represent a cross-section of views and interests within the planning area. Through this inclusion of diverse interests, the SC will strive to strengthen the planning effort and build support for floodplain management activities across numerous stakeholder groups. A successful planning effort will result in the adoption and approval of the floodplain management plan to reduce adverse impacts of flooding in the planning area, through activities and strategies embraced by both elected officials and their constituents.

## CHAIRPERSON AND VICE CHAIRPERSON

***Patricia Wood*** of Los Angeles County Public Works will serve as the chairperson. ***Gina Natoli*** of Los Angeles County Regional Planning will serve as the alternate chairperson. The role of the chairperson is to:

- Ensure agendas are followed and meetings adjourn on-time
- Allow all members to be heard during discussions
- Moderate discussions between members with differing points of view
- Be a sounding board for staff in the preparation of agendas and how to best involve the full committee in work plan tasks.

The role of the alternate chairperson is to assume the duties of the chair when the chair is not able to attend a meeting or forum. The alternate chair will act as the designated alternate for the chairperson. The alternate chair will designate an alternate as described below, in the event she is serving as the chair. If neither the chair nor alternate chair can attend a scheduled meeting, the meeting will be re-scheduled to a date where one or both seats are able to attend.

## QUORUM

A quorum for the SC will be 50 percent of the committee membership plus one, and the chair or alternate chair must be present during the vote. There are 18 members on the SC, therefore 10 members denote a quorum.

## ALTERNATES

Alternates may be designated for SC members, if desired. Designated alternates shall be considered official members of this committee. Alternates are welcome to attend any and all scheduled meetings. They will receive

copies of all meeting materials as well as meeting agendas and summaries to keep informed. SC members and alternates are interchangeable, and alternates will have full voting rights, but only when the primary SC member is not in attendance. Coordination of who attends scheduled SC meetings is the sole responsibility of the primary member and the designated alternate. SC members who choose to designate alternates shall notify the planning team no later than one week prior to the next scheduled SC meeting.

## DECISION-MAKING

As the SC provides advice and guidance on the plan, it will reach its recommendations primarily through consensus. Consensus is defined as a recommendation that may not be ideal for each committee member, but every member can accept. If consensus cannot be reached, the SC members will vote to reach a ruling, with the majority of the votes deciding the vote.

Absent members may delegate their voting power to another member of the SC. Members may abstain from voting if they choose. Designated alternates for SC members are interchangeable and have full voting rights on behalf of the SC member. However, members and alternates get only one vote (when primary members are assigned as an alternate) and there is only one vote given per organization (where multiple agency representatives attend the meeting). To vote by proxy, SC members must inform the planning team at least one week in advance.

The County may accept the direction of the SC or not, as it chooses. Meeting summaries will record minority dissent and that the SC chose to note such opinions in their final recommendations.

## RECOMMENDATIONS

The committee's recommendations will be recorded in the meeting summaries and reflected in the plan as appropriate. The SC may also be asked to assist in public presentations of the plan and its recommendations.

## STAFFING

The planning team for this project includes appropriate representatives from the Los Angeles County Public Works Stormwater Engineering Division, along with contract consultant assistance provided by Tetra Tech, Inc. The planning team will schedule meetings, distribute agendas, prepare information/presentations for steering committee meetings, write meeting summaries, and generally seek to facilitate the steering committee's activities.

## SPOKESPERSONS

Ideally the SC will present a united recommendation after considering the different viewpoints of its members, recognizing that each member might have made a somewhat different recommendation as an individual. To consistently represent the committee's united recommendations to participating organizations, the public, and the media, the committee spokesperson will be the Los Angeles County Public Works Public Information Officer. In the Public Information Officer's absence, the SC Chair will serve as the spokesperson.

In addition, each committee member has the responsibility to represent the SC's recommendation when speaking on plan-related issues. Any differing personal or organizational viewpoints should be clearly distinguished from the committee's work. Finally, committee members may need to assist with presentations given to governing bodies within the planning area as well as during public meetings or presentations.

## MEETING DATES

Meetings generally will be on the second Wednesday of every month from 10:00 a.m. to 12:00 p.m. at Los Angeles County Public Works, 900 S. Fremont Avenue, Alhambra, CA 91803. The exact room may change due to availability and will be listed on the agenda for each meeting. Maps will be distributed as needed. Members of the SC may also participate via conference call. Conference call information will be sent with the calendar invitation and agenda at least two weeks prior to the meeting. Meetings will be open to the public and advertised as such with the location of the SC meeting publicly advertised on the project website.

## ATTENDANCE

Participation of all SC members in meetings is important and members should make every effort to attend each meeting. If committee members cannot attend, they should inform the planning team before the meeting is conducted. Attendance will be addressed if a member or alternate misses two consecutive meetings. If a member of the SC needs to resign from the committee, and there is a designated alternate, the alternate will be asked to take his or her place on the SC as the primary member. As a new primary member, an alternate may be designated. If there is no designated alternate, the SC will seek to find a replacement SC member.

## PUBLIC INVOLVEMENT

All SC meetings will be open to the public. Members of the public wishing to address the SC at a meeting may do so based on the protocol used by the County Board of Supervisors.

Members of the public will have an opportunity to address the SC on items of interest which are within the subject matter jurisdiction of the SC. It is up to the SC to determine limits of time per person and overall length of time for public comment, based on the complexity of the agenda, items on the agenda and number of people wishing to speak. The time limit will typically be two to three minutes per person. Public members addressing the SC shall speak on topics relevant to floodplain planning or activities related to flooding. Any individual found to exhibit disruptive conduct may be removed from the meeting and prohibited from addressing the SC during public comment at future meetings.

## ACCOMMODATIONS

Individuals requiring reasonable accommodations, interpretation services, and materials in other languages or in an alternate format may contact the Public Works coordinator at (626) 458-7901. Requests must be made one week in advance of the scheduled meeting date. Individuals with hearing or speech impairment may use California Relay Service 711.

The SC will strive to post meeting agendas on the floodplain management website two weeks prior to all scheduled meetings.

## COURTESY

Committee members should treat each other with respect, listen to each other, work cooperatively, and allow all members to voice their opinions.

## STEERING COMMITTEE MEMBERSHIP

At the time these ground rules were adopted, alternates have been named for eight governmental SC members and four non-government SC members. The remaining SC members were given until July 9, 2019 to designate an alternate. The table below identifies all current primary and alternate members.

| Steering Committee Member | Department / Agency | Alternate |
|---|---|---|
| **Patricia Wood (SC Chair)** | Public Works Stormwater Engineering - CRS Coordinator | Eduardo Escobar |
| **Loni Eazell** | Public Works Disaster Services Group | Jack Husted |
| **Lisa Naslund** | Public Works Building & Safety | Glenn Tong |
| **Ron Lacayo** | Public Works Stormwater Maintenance | Araik Zargaryan |
| **Gina Natoli (SC Vice-Chair)** | Los Angeles County Regional Planning | Patricia Hachiya, Caroline Chen, Iris Chi |
| **Scott Gardner** | Los Angeles County Fire Department | David Godoy |
| **Jolene Guerrero** | Public Works Community Government Relations Group | Neonika Walker, Jalaine Q. Madrid |
| **Cung Nguyen** | Public Works Stormwater Planning | Marcela Benavides |
| **Martin Araiza** | Public Works Stormwater Engineering – Hydrology & Hydraulics | |
| **Susan Shu** | City of Los Angeles Bureau of Engineering | Chang-Shein Lin |
| **Jessica Duboff** | Los Angeles Chamber of Commerce | Kendal Asuncion |
| **Okorie Ezieme** | Altadena Town Council | Patricia Sutherlen, Dorothy Wong |
| **Shannon Ggem** | Malibou Lake Mountain Club | |
| **John Blalock** | Antelope Valley Resident | |
| **Joselito Garcia-Ruiz** | Red Cross of Greater Los Angeles | Scott Underwood |
| **Salomon Miranda** | California Department of Water Resources | Garret Tam Sing |
| **Dr. Andre Ellis** | Cal State Los Angeles Geosciences & Environment | |
| **Debbie Sharpton** | Environmental Restoration Group | |

Los Angeles County Comprehensive Floodplain Management Plan

# Appendix C. Public Outreach Materials

# STEERING COMMITTEE MEETING AGENDAS, ATTENDANCE, AND SUMMARIES

**County of Los Angeles**
**2020 Flood Management Plan Revision**
1st Steering Committee (SC) Meeting
Tuesday, June 25, 2019, 10:30 a.m. to 12:30 p.m.
Traffic Management Center Conference Room
Annex Building, 1st Floor
900 S. Fremont Avenue, Alhambra, CA 91803

**Welcome and Introductions**

- Group Introductions
- Review Agenda

**Project Overview**

- Work plan
- Timeline
- Important milestones

**The Steering Committee's Role**

- SC Purpose
- SC Expectations
- SC Organization
- SC Charter

**Plan Review**

- Reviews of Existing Flood Management Plan and other plans
- Discuss Current Mission Statement:
    - Protect life, property, the economy and the environment of Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards.
- Discuss Current Plan Goals/Objectives (Page 2)

**Public Outreach**

- Public Engagement Meetings
- Additional Outreach Capabilities (suggestions welcomed)
    - Websites
    - Questionnaires/surveys
    - Press/media
    - Social Media

**Action Items and Next Steps**

- Confirm Goals and Public Involvement Strategy
- Confirm SC Charter

**Next Meeting Date**

- Confirm Next Meeting Date

**Adjourn**

These planning components all directly support one another. Goals were selected that support the mission statement, and objectives were identified that fulfill multiple goals.

**Goals**

- Protect life, safety, property, and economy.
- Work with local citizens and watershed management groups so that residents understand the flood hazard of the region based on best available data and science.
- Increase resilience of infrastructure and critical facilities.
- Account for flood risk in land use and planning.
- Preserve, enhance, or restore the natural environment's floodplain functions.
- Encourage the development and implementation of long-term, cost-effective, and environmentally-sound mitigation projects.

**Objectives**

1. Work cooperatively with public agencies with responsibility for flood protection and with stakeholders in planning for flood and inundation hazards.
2. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
3. Provide state, county, and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
4. Create a public outreach strategy.
5. Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.
6. Consider open space land uses within known flood hazard areas.
7. Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.
8. Retrofit, purchase, and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
9. Provide flood protection by maintaining flood control systems.
10. Sustain reliable local emergency operations and facilities during and after a flood event.
11. Consider climate change implications in planning for flood and inundation hazards.

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Revision**
1st Steering Committee (SC) Meeting
Tuesday, June 25, 2019, 10:30 a.m. to 12:30 p.m.

## Meeting Participants

| | |
|---|---|
| Benavides, Marcela | PW Stormwater Planning |
| Blalock, John | Antelope Valley Resident |
| Chi, Iris | LA County Regional Planning |
| Duboff, Jessica | Los Angeles Chamber of Commerce |
| Eazell, Loni | PW Disaster Services Group |
| Ellis, Dr. Andre | California State University, Los Angeles |
| Ezieme, Okorie | Altadena Town Council |
| Garcia-Ruiz, Joselito | American Red Cross Los Angeles |
| Godoy, David | Los Angeles County Fire Department |
| Guerrero, Jolene | PW Community Government Relations Group |
| Hachiya, Patricia | LA County Regional Planning |
| Husted, Jack | PW Disaster Services Group |
| Moriasaku, Yoshiya | PW Building &Safety |
| Natoli, Gina | LA County Regional Planning |
| Scharf, Robert | PW Disaster Services Group |
| Sharpton, Debbie | Environmental Restoration Group |
| Shu, Susan | City of Los Angeles Bureau of Engineering |
| Walker, Neonika | PW Community Government Relations Group |
| Zargaryan, Araik | PW Stormwater Maintenance |
| Chen, Michael | Los Angeles County Public Works |
| Escobar, Eduardo | Los Angeles County Public Works |
| Tran, Larry | Los Angeles County Public Works |
| Win, Thu | Los Angeles County Public Works |
| Wood, Patricia | Los Angeles County Public Works |
| Artz, Ira | Tetra Tech, Inc. |
| Flaner, Rob | Tetra Tech, Inc. |
| Parker, Steve | Tetra Tech, Inc. |

## Welcome and Introductions

Patricia Wood, Senior Civil Engineer, Los Angeles County Department of Public Works, Stormwater Engineering Division, welcomed everyone to the meeting. Larry Tran is the Project Manager for this plan revision along with Tetra Tech, which is the consulting company performing the update. Patricia thanked everyone for taking the time to participate in this endeavor. She stated she is sure the citizens of Los Angeles County appreciate their participation very much. Larry Tran stated he is the Project Manager for the Floodplain Management Plan (FMP) update and will assist Patricia to oversee the County's participation in the National Flood Insurance Program. Larry facilitated introductions of the Steering

Committee (SC). Patricia ensured SC members that are on the conference call could hear the conversation. Larry Tran introduced Rob Flaner, Lead Project Planner, who will review the agenda.

**Agenda**

Rob stated the SC will be going through the agenda today to give an explanation of what the SC will be doing.

**Project Overview**

Rob Flaner stated this will be an update to the 2015 FMP. The plan was developed due to flooding issues in Los Angeles County. It is important to look at those issues to develop recommendations for addressing the issues, but the real driver for the plan is a federal program called the Community Rating System (CRS). The CRS is within the National Flood Insurance Program (NFIP), sponsored by the Federal Emergency Management System (FEMA). It is a voluntary program put out by FEMA and is a "carrot and stick" incentive-based program. Communities that participate agree to do minimum floodplain management standards in exchange for the federal government making floodplain management insurance available in the FEMA identified floodplains. Anyone who has a federally backed mortgage and lives in a floodplain or requires disaster assistance after an emergency, is required to have flood insurance as a condition of the mortgage or disaster assistance. This is all part of the NFIP. The CRS states if you go above and beyond the minimum standards, they will reward the property owner with a reduction in the cost of flood insurance in the participating communities.

Los Angeles County has been participating in the NFIP since 1990. It is a Class 7 Community, which means the County has accrued enough points on a positive point schedule. The more points the County accrues in the different levels of classification, there is a corresponding insurance premium reduction. Citizens in the unincorporated area of the county that are buying flood insurance are receiving a 15 percent discount on their insurance because of the CRS programs. The epicenter of the County's CRS program is this plan. A lot of credit comes from this plan. This is driven by numerous other elements the County is getting credits for, and it's a good thing!

The purpose of the plan is to coordinate the programmatic components of the CRS program and take a deep look at the flood problem in Los Angeles County. The CRS requires these plans to be updated every five years. The last plan was written in 2015, so although the plan is still current, it will be updated for 2020. This effort is attempting to get ahead of the curve and have the plan ready for adoption prior to the expiration date (sometime in the middle of 2020). We have a very prescript work plan that follows the CRS program. The CRS program is very definitive – it basically states "you shall do this" to be eligible for credits. The existing plan is very comprehensive. It has a component that is called the Repetitive Loss Area Analysis (RLAA) which examines the repetitive flood loss problem in Los Angeles County. The RLAA is being updated at the same time as the FMP. A framework, established during the last planning process, is called a Program for Public Information (PPI), for public involvement. The County has been deploying the PPI, and we will be updating the framework. We will be working with community relations and public relations, which are a key element of what we are doing. The FMP is a very comprehensive plan.

**Workplan**

The workplan is tied to the CRS requirements and has a seven-phase scope of work which determines the process for this project.

- Phase one is to *organize resources*. CRS wants an oversight committee and the SC will be providing oversight to the process. There is diversity in the makeup of the SC, and you have all been hand

selected and chosen for a reason. CRS wants these plans to be overseen by not just the government, but non-government representation. We have pre-determined a committee that has a 50/50 ratio of governmental to non-governmental members. A governmental member has an association with permit authority of Los Angeles County, and has the ability to regulate codes and ordinances that are in effect in the county. A non-governmental member will not have any association with permit authority, even if working for a government agency, i.e., Army Corp of Engineers. This plan will be looking at permit authority as a capability. The mix of 18 people – nine government and nine non-government was pre-determined. Today, we will go through the ground rules, which is merely organizational. We have to set the charter and the order of what we will be doing over the next six to nine months, as we are developing the plan update. This all falls under organizing resources. We need to identify who we want to coordinate with and keep those agencies apprised of the SC's involvement.

- Phase two is the *risk assessment*. The risk assessment the most important part of the plan. Risk cannot be reduced if we don't know what risk is. As far as this plan, there is risk from a single hazard. This shouldn't be confused with a hazard mitigation plan or the safety element. Many of you are very aware of the hazard mitigation planning in response to AB 2140 and SB 379, but this is different because it doesn't address all hazards. This plan is focused purely on the flood hazard, although what we develop will likely be a key component in forming future updates to the Los Angeles County Hazard Mitigation Plan. This plan is separate from that. The risk assessment will focus on flood risk and an enhanced look at the repetitive flood loss properties. Repetitive loss has a very distinct definition. FEMA has identified certain properties within the unincorporated area of Los Angeles county based upon their loss history. If a property owner has had two or more claims of more than $1,000 paid by the NFIP within a rolling ten-year period, they have a repetitive loss property. This plan's risk assessment will look deeper at where those properties are and why they are getting repetitive claims. We did this last time and will be updating that element.
- Phase three is *public information*. CRS wants all phases of this plan to be open to the public. Todays meeting was not advertised as a public meeting because we are still organizing, but all subsequent SC meetings from here on out will be advertised and open to the public. It is pretty rare that we get public members attending the meetings, but it is possible, and we encourage it. We will have a public outreach strategy that you will help inform. The SC will determine how to engage the public as we are updating this plan. We are targeting two phases; the first early in the process to engage the public perceptions of the flood risk, and the second is later toward the end of the process when we present the draft plan.
- Phase four is *goal setting*. The plan has goals and objectives, a mission statement. We want to make sure they are still relevant. We will look at those and adjust them accordingly.
- Phase five is *plan maintenance*. CRS is very prescript in that it wants progress reporting. The County needs to review every year on how it's going to review the plan and make recommendations.
- Phase six is *writing the document*. The plan will be assembled and go through a series of reviews. The first review will be the SC. The SC will do an internal review as the oversight committee. You will be advising the County on changes, additions or deletions that you would like to see. The County will consider those. Once the County approves the internal review draft, that draft is made

available to the public for review. We have to have an extensive public engagement process with the draft plan. We have to have a minimum two-week public comment period.

- Phase seven is *submit the plan*. Finally, we submit the plan. It doesn't go to FEMA, it goes to the program coordination contractor, called the ISO, the Insurance Services Office that administers the program for FEMA, and they conduct a technical review by a technical reviewer who reviews every plan in the country as it pertains to CRS. We have to fill out a crosswalk and provide the ten steps and the elements – it is a very arduous process. Hopefully we get a good score. CRS classification breaks are 500 points per class. The maximum points you can get for this plan is 500 points. The plan by itself could generate enough credit to improve the County by one class. The County's current points were over 400 last time. We hope to keep that and possibly increase that credit.

  This is what we want to do to have a draft plan ready for the political process and adoption by late spring, 2020. The next nine to twelve months you will be actively involved in this process. When we set up the charter today and set up a standard meeting date and time, probably once a month where the SC will convene, and the Core Planning Team (CPT) will present you with factors that we need to address and milestones that we need to complete. You will be making decisions. This is why we have to have a charter.

**Important Milestones**

Important milestones that we have are we have to get the risk assessment ready. We have already started with a data mine, looking at new data. We want to see if the flood risk has changed. I can tell you that it did, because flood risk always changes. When you look at risk, defined as probability times impact, the impacts are on people, property, the economy and the environment. We measure impacts in monetary value, i.e., if your monetary value increases your risk increases. Just by the nature of property values increasing in the last five years, our risk has increased. But, did our risk increase because we have new hazard data that showed new hazard data that shows new buildings at risk? Do we have new data that says the flood risk is deeper, more intense? What about the impact from climate change? We have new data sets now that look at the impacts from sea level rise. We have a lot of new data sets that we can say with this newer data, the flood risk has changed. And that is one of the required components. We have to quantify that change and explain why. Is it purely because valuation changed and that is it? Or did the extent and location of the hazard change? Did the depths or velocity change?

Did we have a fire, or not, or what else happened? We will be looking at other sources of flooding, i.e., coastal flooding, potential impacts of a tsunami, which is a flood. Flood is clearly defined as overland water from any source. When you look at floodplains we want to look at all the potential sources. That is where repetitive loss analysis is interesting. There are 54 or 55 repetitive loss properties in Los Angeles County. When you look at the majority of these properties the majority of them are not in a mapped floodplain. Why do we have properties outside the mapped area that have had multiple repetitive loss properties claims? We will try to identify this. Most of these are in fire impact areas. And, flooding happens outside of mapped floodplains because FEMA doesn't map everything. So, when we look at our milestones, the big important ones are: (1) the risk assessment, because that is going to trigger when we can do the first phase of the outreach; (2) the data we want to share with the public first. Once we do the public outreach we will get input from the public that the SC will take into account. There will be a survey where there will be survey results where the SC can see what the public thinks about these problems; (3) then we can look at our goals and objectives and see if they are appropriate based on that risk. This is an important milestone – the outreach is very important; (4) assembling the draft plan and getting the draft to point

where the SC feels it has all the proper components. This is where the make up and diversity of the SC is important. We want perspective from multiple angles; once approved and deemed ready by the County we will do a final public outreach on the plan. This is the final milestone where we are ready to get the plan scored and reviewed; and then once that happens, the plan will go for adoption by the County. Based on this, are there any questions on what we are trying to accomplish here? A question asked was is there an adaptive capacity requirement or will you look for any adaptation as a result of flood risk? Great question! I guess that is to be determined. If this was a hazard mitigation plan, we would have no choice because SB 379 requires a look at adaptive capacity. I think we will have to seek direction from this committee. Adaptive capacity means, what is the County's capacity to adapt to future conditions? Sea level rise data is a future projection and we know flood risk is going to increase because the hydrograph is changing. This plan will address possible impacts to the flood hazard from climate change because you get extra CRS credit for addressing climate change, and we want to get as much CRS credit as we can. It is the obvious next step if we are going to be looking at the potential increase in risk from future conditions to look at what the County's adaptive capacity is to deal with those impacts. That is an enhancement over the last plan. The last plan did not include this. Tetra Tech has a lot of experience doing hazard mitigation plans in the state of California in compliance with SB 379, which requires this. We have data tables and approaches for doing that capability assessment for adaptive capacity. At this point in time that is to be determined. The plan will be set up where this could easily be done, but we would seek input from the SC on expanding the core capability assessment to take a look at that. The question was asked to get the County to start thinking about this and how to leverage the information gathering that everyone is doing to the safety element. What is the deadline for that? The State wants something Board approved by January 1, 2022. We are just starting to talk about this now. A core capabilities assessment could be done by adding a series of questions and rank whether the County is high, medium or low on the capability. The crosswalk Tetra Tech created is about 27 questions. For a mitigation plan, the deadline was January 1, 2018. The State of California, who is implementing this has still not come up with the review requirements. This planning effort needs to coordinate with the general plan and safety element and these types of plans. The timing is appropriate. I will provide the adaptive capacity table to the County to take a look at.

**SC Charter**

The next item on our agenda is development of a SC charter. CRS wants all phases of the process to be open to the public. The SC is not a political body. The project needs to be organized and we need a protocol to run the meetings. Public meetings and opportunities to attend meetings and workshops will be advertised to the entire community. A handout was provided to the attendees of the previous charter from the 2015 planning process.

SC Role: First thing on the charter is the SC's role. The SC is an advisory body. The County is able to

accept the direction of the SC or not. It is the County's choice.

SC Chair and Vice Chair: The SC needs to have a chair to assist in organizing the meetings, address the public, keeping the meetings moving forward, and the continuation of discussion topics. The chair has no other responsibilities for the project but to keep the meetings moving forward and provide direction. Tetra Tech will provide agendas and meeting summaries. The County would like the SC chair to be a member of the County Department of Public Works. We have not appointed one as of yet. The chair must be one of the 18 SC members. The County would like Patricia Wood to serve as the chair of the SC. Rob asked if there were any issues with Patricia being the chair and there were none. There is a need for a vice-chair, in case the chair is not available. Patricia will attend and serve as chair at the public meetings. The vice-chair can be any person from the SC (not under the County member requirement).

Rob asked if there was anyone in the room that would like to be designated as the vice-chair. Gina Natoli, from Los Angeles County Regional Planning, agreed to serve as the vice-chair. The charter will be finalized and posted on the FMP website, once developed.

Quorum: We need to establish a quorum for the decision-making process. There are 18 members on the SC, fifty percent non-governmental and fifty percent governmental. Typically, a quorum would be fifty percent plus one of the voting members. We have to be able to make sure we can get ten voting members at each meeting (no fewer than five and no more than eight meetings). We can choose a lower number if the SC agrees to. Does the SC think we can meet the requirement, or do we need to lower the quorum number? We can also use alternates as voting members. Alternates can either be completely interchangeable or acting as a proxy. If we designate alternates we need to know who they are, so we can send them the meeting summary and other meeting documents to keep abreast of what is going on throughout the process. The proxy approach requires regular communication between the primary and alternate. Interchangeable alternates vote how they feel, and it is accepted as valid. The question of whether the quorum can be met arose and the SC agreed that during the last process there was never an issue of meeting the quorum. The SC agreed to stick with fifty percent plus one as the quorum. There are eight government alternates and three non-government alternates already designated. Anything that needs to be voted requires minimum 10 votes (50%+1). There will be one vote per representation during voting. The SC was given a two-week period to assign an alternate and provide the name, agency and contact information to Larry. It was decided alternates have full voting rights when they are present, not voting by proxy.

Decision Making: Decision making will be made through consensus first, and if that cannot be reached, through a majority vote. Anytime a SC member wants a dissenting opinion during a meeting, we will record that in the summary. Rob asked if there were any issues with the voting procedures and there were none. All recommendations will be recorded in the meeting summaries and the summaries will be posted on the FMP website. We will try to create meeting summaries at least two weeks following the meeting. The summaries will go through an internal review by the CPT and once approved will be posted.

Public Involvement: The SC will need a spokesperson. In 2015 the County Public Information Officer (PIO) was the spokesperson. Rob asked if a PIO was present. The County PIO and a back up were present and will serve as such during the planning process.

Standard Meeting Date and Time: We need to determine a standard meeting date and time, so the meeting can be advertised to the public on the website. We may need to change the venue, depending on the dates and times. Rob asked which is best, morning or afternoon meetings. The SC stated no Mondays or Fridays for the meetings. Gina, Vice Chair, stated Wednesday morning were the best for her. Rob stated generally the meetings are two hours. The second Wednesday of every month from 10:00 a.m. to 12:00 p.m. was suggested. A question asked was if this applies to the next meeting and Rob stated the next meeting will be in August since we are so close to the second week in July. It was agreed the meetings will be on the second Wednesday of every month from 10:00 a.m. to 12:00 p.m. with the next meeting on August 14, 2019. A question was asked if the alternate members can be changed. Rob stated yes, if the change is made at lease two weeks before the next meeting.

Meeting Attendance: Attendance will be addressed if a member or alternate misses two consecutive meetings. If an issue arises (sick, etc.) please let someone know. A question asked was how long will the meetings be taking place? Rob stated the meetings will last no longer than February 2020. The holiday season is always tough to get members at meetings, we may skip the December meeting.

Public Involvement: Rob stated the last item to cover is public involvement. We need to have the public comment protocol written in the charter, i.e., how much speaking time do they get, any compliance with the Brown Act, etc. Is there a standard public comment protocol the County uses with the Board of Commissioners meetings? Gina replied yes and recommended the protocol used at the Board of Supervisor meetings. The public comment period is at the beginning of the meetings after the general introduction and approval of minutes before the business portion of the meeting begins to avoid the public talking about the agenda items. During agenda items, you are not supposed to talk about agenda items afterword's during public comment. The public comment period is strictly for items not on the agenda for which the committee would have some oversight. It would be a limit of either two or three minutes each. It is up to the body to determine limits of time per person and overall length of time for public comment. You would not have five people show up and one person speak for 15 minutes. The time period may be adjusted by the chair and the reviewing body based on the complexity of the agenda and the number of speakers. Rob asked if there is latitude for the chair to determine there will be no public comments due to the agenda? Gina stated yes, but as a hearing officer, if public members take the time to come to the meeting to provide comment, it is better to give them time to speak. During public comment period, the public may speak about anything, whether on or not on the agenda. Public comments can also be made during the time an item is being discussed. That may be the better way to address this. The SC would discuss an item and then ask if there is any public comment on the item. Rob asked Gina if she would review the proposed language regarding public involvement at SC meetings in the charter and make edits so that is parallels what is done at County board meetings. She stated yes and said she would also run it by the County Counsel. Rob stated there will be a sign in sheet for public members and we will make sure this information is in the charter by putting whatever Gina recommends. SC members will see the final charter at the next meeting – it will be a handout. The last thing is courtesy.

Courtesy: Obviously, we should all give courtesy to each other.

Personal Contact Information: We will have a roster of the steering committee in the charter. Is there anyone, including non-governmental members, who has a problem with having their contact information on the roster on the charter? No one replied they have a problem with that. Changes can be made during the planning process if things change.

The charter doesn't take an action at this time. We will finalize the charter and it must be posted on the FMP website prior to the next meeting. You will hear the mention of the core planning team. The core planning team is Tetra Tech staff and Larry, Patricia, Eduardo – the back row of people from the County. A statement was made that the use of County of Los Angeles Public Works is not correct. Direction from the department prescribes: Los Angeles County Public Works.

**Plan Review**

Rob stated the SC has homework. Each SC member will be sent a link to the 2015 FMP on the Los Angeles County Public Works website to review prior to the next meeting. Familiarize yourself with the plan, the layout, the core capabilities, etc. The layout of the plan follows the CRS script, but this is an update and we have the ability to change the format as needed. Review the handout with the mission statement and goals and objectives from the last plan. Do these support the general plan goals and objects? Rob asked Gina to please review this with that in mind. We will send other links for the Hazard Mitigation Plan with a flood section to review, as well as the Safety Element of the General Plan. Your homework is to look at the goals and objective for the hazard mitigation plan and are they consistent with the ones in the 2015 FMP. We have the opportunity to change these and create synergy across the County's plans. At the next meeting, the SC will be cross referencing the goals for the HMP and the FMP to determine any changes

that need to be made to the goals and objectives in the 2020 FMP. Please review the 2015 FMP and HMP prior to the next meeting. Ira asked SC members to please mute your phones during the meetings because the recording microphone will pick up that background noise.

**Public Outreach**

Beginning at the next meeting, everything we do will be part of the public outreach (separate from the PPI section). We have to conduct public outreach and develop a public strategy as it pertains to this planning effort. What are our current public outreach methods because we want people to come to these meetings. The outreach can be put on the website, and social media. A recommendation was made to check if we can put the information out on the Board of Supervisors (BOS) newsletters. A comment was that the BOS doesn't send out newsletters regularly, but when a specific item of interest is present, i.e. wildland fires. First thing we need to do is a press release that the FMP update has begun. Include that there is an oversight committee, the dates and times of the meetings, etc. Then when the meeting date is closer, a social media press blast about the meeting itself. A suggestion was to put an announcement on the NFIP website about the project for people that opt into receiving information from the website. Information could be sent via email lists for people affected by certain hazards in the county, i.e., the Woolsey Fire. We have a lot of representation here that have their own media access points that can post information about the update and meetings. We have to do our initial outreach for the Repetitive Loss Area Analysis (RLAA). We can add the FMP update information to the letter that must be sent out. An actual separate page for the 2020 FMP update on the website can be set up. The County will find out the best way to utilize the website for the FMP update. We have to be compliant with all of our outreach for the update. Google has an automatic translation page that we can use. For the surveys we need real translations – it is a general policy we do this for the demographic of the different neighborhoods. We use Survey Monkey for surveys and they do not have any translation services. It was mentioned that the County is in the process of translating the Homeowner's Guide for Flood and Debris Control into Spanish, Armenian, and Korean, aside from English. These are the primary languages in the County. Multi-languages are still in progress. In the previous process, did we know what the demographics were? No, we didn't, and we also didn't get much response from the surveys. We could use Census Block data to find the primary languages. Outreach strategy will be a bullet item on the agendas for the meetings about what is our outreach strategy. Short term a press release announcing the 2020 FMP update process needs to be released. Another suggestion is to reach out to the Town Councils to spread information on their website. Once we come up with a press release we will share it with everyone. We need to make sure the website is up and running because it will be the one-stop- shop for the update process. A suggestion was to set up a project page within Facebook and create an event for the update of the plan, that will also announce the FMP update webpage. We need to get more coverage on the this. The Waterworks Districts have a Nextdoor account that goes to Malibu, Palos Verde, etc., and we could possibly use it to advertise. Next Door is really good because it goes to homeowners' associations, which is incredible access. Sounds like a game-plan for the outreach process. We have a gap between now and August to get information out. Action items are your homework. Review three plans – the Safety Element, the 2015 FMP and the HMP, goals and objectives, of each of those. Find consistencies in them and be prepared to compare them. On the outreach side we will coordinate with the SC for public outreach and get the website set up. Any questions? There were no questions.

**Action Items**

- SC Meeting Agendas will be sent out two weeks prior to each meeting.

- SC Meetings will take place on the second Wednesday of each month from 10:00 a.m. to 12:00 p.m. The meeting location is to be determined. The next SC meeting will be August 14, 2019.
- SC Members to review the following plans prior to the next meeting. SC members should focus on the mission statement, goals and objectives of each plan to see if they align, and if not, how are they different. Links are as follows:
    - 2015 Floodplain Management Plan https://dpw.lacounty.gov/wmd/nfip/FMP/draftFMP.aspx
    - 2014 All-Hazards Mitigation Plan https://ceo.lacounty.gov/wp-content/uploads/OEM/hazmitgplan.pdf
    - 2014 Los Angeles County General Plan Chapter 12: Safety Element http://planning.lacounty.gov/assets/upl/project/gp_2035_Chapter12_2014.pdf
- SC members have two weeks to designate alternates.
- The SC Charter will be finalized and provided as a hand-out at the next SC meeting.

**Next Meeting Date**

- The next SC meeting date will be August 14, 2019 10:00 a.m. to 12:00 p.m. The meeting location is to be determined.

**Adjourn**

The meeting adjourned at 12:29 p.m.

**County of Los Angeles**
**Floodplain Management Plan Revision**
Steering Committee (SC) #2
Wednesday, August 14, 2019
10:00 a.m. – 12:00 p.m.
900 Fremont Ave, Alhambra, CA 91803
Conference Room C

Call-in Number: 1-800-523-8437 Conference ID: 7432998389

**Steering Committee Chair:** Pat Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #1 summary
- Review/Approve final Charter
- Receive Public Comment

## New Business

- ***SC Homework-Prior Plan Review***
    - Plan review Comments. What did you like? What did you not like?
    - Review Table of contents for proposed plan
    - Review Prior Action Plan
    - Review progress report
    - Changes?

- ***Goal Setting*** *– How do these align with General Plan and Hazard Mitigation Plan?*
    - Review Mission Statement
        - Changes?
    - Review Goals
        - Changes?
    - Review Objectives
        - Changes?

- ***Public Outreach Strategy***
    - The 2 phases of outreach, the CRS requirements
    - Additions, deletions, changes?
    - Additional Outreach Capabilities

- ***Action Items and Next Steps***

- ***Adjourn***
    - Next Meeting: September 11, 2019 10:00 a.m. – 12:00 p.m.

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
2nd Steering Committee (SC) Meeting
Wednesday, August 14, 2019, 10:00 a.m. to 12:00 p.m. PT.
Los Angeles County Public Works HQ – Conference Room C
900 South Fremont Ave, Alhambra, CA 91803

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**Meeting Participants**

| | | |
|---|---|---|
| 1. Government | Araiza, Martin | PW Stormwater Eng.-Hydrology/Hydraulics |
| 2. Government | Benavides, Marcella | *Alternate*- PW Stormwater Planning |
| 3. Government | Escobar, Eduardo | *Alternate*-PW Stormwater Engineering |
| 4. Government | Godoy, David | *Alternate*- Los Angeles County Fire Department |
| 5. Government | Guerrero, Jolene | PW Community Government Relations Grp. |
| 6. Government | Hachiya, Patricia | *Alternate*-LA County Regional Planning |
| 7. Government | Husted, Jack | *Alternate*-PW Disaster Services Group |
| 8. Government | Naslund, Lisa | PW Building & Safety |
| 9. Government | Tong, Glen | *Alternate*- PW Building & Safety |
| 10. Government | Walker, Neonika | *Alternate*- PW Community Government Relations Group |
| 11. Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. Non-Government | Blalock, John | Antelope Valley Resident |
| 2. Non-Government | Chang, Lin | *Alternate*- City of Los Angeles |
| 3. Non-Government | Ellis, Dr. Andre | California State University, Los Angeles |
| 4. Non-Government | Sharpton, Debbie | Environmental Restoration Group |
| 5. Non-Government | Shu, Susan | City of LA Bureau of Engineering |
| 6. Non-Government | Garcia-Ruiz, Joselito | American Red Cross Los Angeles |
| 1. Core Planning Team | Chen, Michael | Los Angeles County Public Works |
| 2. Core Planning Team | Tran, Larry | Los Angeles County Public Works |
| 3. Core Planning Team | Win, Thu | Los Angeles County Public Works |
| 4. Core Planning Team | Artz, Ira | Tetra Tech, Inc. |
| 5. Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| 6. Core Planning Team | Parker, Steve | Tetra Tech, Inc. |
| 7. Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |

## Planning Process

### Welcome and Introductions

Pat Wood, Los Angeles County Public Works welcomed attendees and went around the room so attendees could introduce themselves.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and noted this is the first meeting to start the Floodplain Management Plan (FMP) planning process and the previous meeting was for organizational purposes. All SC meetings starting at this meeting will be open to the public and upcoming agendas will be organized this way; New and Old Business.

### Meeting #1 Summary

Rob Flaner asked the SC if they had any edits to the June 25, 2019 meeting minutes. Nothing heard.

> **MOTION made by Jolene Guerrero to approve the June 25, 2019 meeting minutes and seconded by Pat Wood. Motion passed unanimously.**

### Review / Approve Final Charter

Rob Flaner asked the SC if they had any edits to the Charter. Debbie Sharpton noted that the name of her organization is Environmental Restoration Group rather than Environmental Restoration Trust.

> **MOTION made by Pat Wood to approve the Charter with the correction of Environmental Restoration Group name and seconded by Joselito Garcia-Ruiz. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No public comments were expressed.

## New Business

### Review Table of Contents for Proposed Plan

Rob Flaner reviewed the proposed Table of Contents (TOC) for both FMP and Repetitive Loss Area Analysis (RLAA) plans. He noted the FMP TOC is written to provide commonality between the FMP and Hazard Mitigation Plan (HMP) so that the FMP can be used as a functional annex to the HMP. Rob explained that much of the RLAA will be a private county document due to the Privacy Act but may create a forward-facing executive summary (public document) to post on the newly created website.

There was discussion about how the County compares nationally within the CRS system.

There was discussion regarding what changes in the TOC were coming due to CRS revisions. Changes noted were in program review. There was also a desire expressed to create a stronger public facing executive summary to summarize the FMP.

General agreement was made to include bookmarks and hyperlinks to allow readers to jump from a section, to a map or appendix, and then hyperlink back, if possible.

**Review Prior Action Plan**

Rob Flaner stated the Action Plan must be completed annually and we will use last year's Action Plan as a baseline for the next one.

**Review Progress Report**

Rob Flaner stated that the progress report is a functional component of the plan as part of the public outreach strategy. For this update, Tetra Tech will merge the Program for Public Information (PPI), RLAA, and FMP components into one progress report.

Rob Flaner highlighted the future of FEMA funding through the new Building Resilient Infrastructure and Communities (BRIC) grant program. The FMP identified actions/objectives can be used to go after this expanded pot of money.

**Goal Setting: Review Mission Statement**

Rob Flaner reviewed the previous FMP's mission statement and the SC had a discussion on how to update it. The SC agreed on the following mission statement: "P*rotect life, property, the economy and the environment of Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards and thus enhance community resilience."*

> **MOTION by Jolene Guerrero to approve the above mission statement and second by Joselito Garcia-Ruiz. Motion carried unanimously.**

**Goal Setting: Review Goals**

Rob Flaner reviewed the previous FMP's goals and the SC had a discussion on how to update them. After debate, the new goals were finalized as follows:

1. Enhance community resilience from the impacts of flood hazards
2. Protect life, safety, property and economy.
3. Communicate to residents and stakeholders flood risk based on best available data and science.
4. Increase resilience of infrastructure and critical facilities from flood hazards.
5. Account for flood risk in land use and planning.
6. Preserve, enhance or restore the natural environment's floodplain functions.

7. Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.

**MOTION by Lisa Naslund to approve the above goals and second by Jolene Guerrero. Motion carried unanimously.**

**Goal Setting: Review Objectives**

Rob Flaner reviewed the previous FMP's objectives and the SC had a long discussion on how to update them. It was noted the new HMP draft should be out at the end of August from the Office of Emergency Management (OEM). The FMP should link up with and be coordinated with the new HMP.

Of note was whether to include "resiliency" as a goal, which would necessitate a cascading update throughout all the objectives and subsequent action items, or to include it as an objective, to which certain action items would be impacted. After debate, the new objectives were partially finalized as follows:

1. Work cooperatively with public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
2. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
3. Provide state, county and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
4. Create a public outreach strategy.
5. Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.
6. Consider open space land uses within known flood hazard areas.
7. Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.
8. Promote the retrofit, purchase and relocation of structures in known flood hazard areas, especially those known to be repetitively damaged.
9. Provide flood protection by maintaining flood control systems.
10. Sustain reliable local emergency operations and facilities during and after a flood event.
11. Consider climate change implications in managing flood risk.

Further discussion on the objectives was tabled. Homework for Tetra Tech to send the SC the County sustainability report's definition of resilience. Each SC member will create a recommended objective regarding resilience to flood risk based on that definition. Tetra Tech will consolidate all recommendations into one document and send back to the SC for review and finalization at the next meeting.

**Public Outreach Strategy**

Rob Flaner explained that each subsequent SC meeting will discuss public outreach strategy and the next meeting will discuss content for the public survey as well as decide how many public meetings the SC

wants to hold. The first public meeting/workshop needs to be held within two months of this SC meeting. Timing and location to be discussed by the SC. Captive audience opportunities are preferred, such as safety fairs, etc. Also noted was that the RLAA outreach needs to be begun as well, though it does not need to coincide with the first public meeting/workshop.

**Action Items and Next Steps**

- Larry Tran to post the approved mission statement and goals onto the new website.
- Tetra Tech to send the SC the County's definition of resilience so they may create a 12th objective.
- Tetra Tech to send out the Agenda for the following meeting.

**Next Meeting Date**

- The next SC meeting date will be September 11, 2019 10:00 a.m. to 12:00 p.m. PT. The meeting location is the Traffic Management Center Conference Room, Los Angeles County Public Works HQ Annex Building, 1st Floor. 900 S. Fremont Avenue, Alhambra, CA 91803.

**Adjourn**

The meeting adjourned at 12:00 p.m. PT.

**Los Angeles County**
**Floodplain Management Plan Revision**
Steering Committee (SC) #3
Wednesday, September 11, 2019
10:00 a.m. – 12:00 p.m. PT
900 Fremont Ave, Alhambra, CA 91803
Traffic Management Center Conference Room, Annex Building, 1st Floor

Call-in Number: 1-800-523-8437 Conference ID: 7432998389

**Steering Committee Chair:** Pat Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #2 summary
- Receive Public Comment

## New Business

- ***SC Homework-Objectives Setting***
    - Review Resiliency Objective
    - Objectives Finalization

- ***Critical Facilities / Infrastructure***
    - FEMA's new BRIC (Building Resilient Infrastructure in Communities) initiative
        - What is a "lifeline"?
    - The 2015 Plan Critical Facilities /Critical Infrastructure (CF/CI) definition
        - Confirm the definition for the 2020 plan

- ***Public Outreach Strategy***
    - Phase 1 outreach
        - Website-Done
        - Survey- Do we want to do one?
            - Review Survey content from what was used last time. How can we make it better?
        - Public Meetings-When, Where, How Many?

- ***Action Items and Next Steps***

- ***Adjourn***

Next Meeting: October 9, 2019 9:30 a.m. – 11:30 a.m. PT at Conference Room A, HQ Building, 1st Floor

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
3rd Steering Committee (SC) Meeting
Wednesday, September 11, 2019, 10:00 a.m. to 12:00 p.m. PT.
Los Angeles County Public Works HQ – TMC Conference Room
900 South Fremont Ave, Alhambra, CA 91803

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## Meeting Participants

| | | | |
|---|---|---|---|
| 1. | Government | Chen, Caroline | LA County Regional Planning |
| | Government | Chi, Iris | LA County Regional Planning |
| 2. | Government | Godoy, David | *Alternate* Los Angeles County Fire Department |
| 3. | Government | Husted, Jack | *Alternate*-PW Disaster Services Group |
| 4. | Government | Natoli, Gina-Vice Chair | LA County Regional Planning |
| 5. | Government | Nguyen, Cung | PW Stormwater Planning |
| | Government | Madrid, Jalaine | PW Community Government Relations Group |
| 6. | Government | Tong, Glen | *Alternate* PW Building & Safety |
| 7. | Government | Walker, Neonika | *Alternate* PW Community Government Relations Group |
| 8. | Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. | Non-Government | Blalock, John | Antelope Valley Resident |
| 2. | Non-Government | Duboff, Jessica | Los Angeles Chamber of Commerce |
| 3. | Non-Government | Ellis, Dr. Andre | California State University, Los Angeles |
| 4. | Non-Government | Ggem, Shannon | Malibou Lake Mountain Club |
| 5. | Non-Government | Miranda, Salomon | California Department of Water Resources (DWR) |
| 6. | Non-Government | Sharpton, Debbie | Environmental Restoration Group |
| 7. | Non-Government | Garcia-Ruiz, Joselito | American Red Cross Los Angeles |
| 8. | Non-Government | Wong, Dorothy | *Alternate* Altadena Town Council |
| | Core Planning Team | Chen, Michael | Los Angeles County Public Works |
| | Core Planning Team | Tran, Larry | Los Angeles County Public Works |
| | Core Planning Team | Win, Thu | Los Angeles County Public Works |
| | Core Planning Team | Artz, Ira | Tetra Tech, Inc. |
| | Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| | Core Planning Team | Parker, Steve | Tetra Tech, Inc. |
| | Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |

Numbered = Voting attendees

## Planning Process

### Welcome and Introductions

Pat Wood, Los Angeles County Public Works welcomed attendees and went around the room so attendees could introduce themselves.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and provided time for attendees to review the agenda and make any final edits. No edits were requested.

### Meeting #2 Summary

Rob Flaner asked the SC if they had any edits to the August 14, 2019 meeting minutes. No edits were requested.

> **MOTION made by Pat Wood to approve the August 14, 2019 meeting minutes and seconded by Joselito Garcia-Ruiz. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No public comments were expressed.

## New Business

### SC Homework- Objectives Setting

Rob Flaner reviewed the objectives that were finalized at the August 14, 2019 SC meeting as well as the two proposed twelfth objectives. Great discussion was had about how to define resilience as stated in Objective Recommendation A. The SC agreed that the definition of "resiliency" they choose to use for this FMP needs to be a microcosm of how it is defined in other county plans. The county agreed to have Tetra Tech review the BRIC definition, Rockefeller and the 37 federal definitions and present a few resilience definitions geared toward the FMP to the SC for review at the next meeting. This will also be an agenda item at the next CPT meeting.

The SC agreed to use the following twelfth objective:

Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.

> **MOTION by Gina Natoli to approve the twelfth objective with a future possible amendment to define "resilience" and second by Pat Wood. Motion carried unanimously.**

**Critical Facilities / Infrastructure**

Rob Flaner explained FEMA's new BRIC (Building Resilient Infrastructure and Communities) initiative and discussed how it is replacing the PDM (Pre-Disaster Mitigation) grant. He reviewed the handout containing the critical facilities / infrastructure definition that was used in the 2015 plan and asked the SC if they'd like to make any updates to it.

The SC discussed adding "Services" to each existing bullet point, to make it read, "facilities/services." Rob Flaner explained it would be in the county's best interest to include a definition of critical facilities / infrastructure as it pertains to each of the BRIC program's seven lifelines as it would expand applicability of BRIC funding in the future. FEMA is still in progress for defining the details to the new BRIC program.

The SC decided to table approval of the critical facilities/ infrastructure until the next meeting. Tetra Tech will make the abovementioned edits and present recommendations at the next meeting.

**Public Outreach Strategy**

Rob Flaner asked the SC if they'd like to use a survey as they had done in the past and presented the survey that was used for the 2015 plan. The SC requested the following edits:

- Remove question 1
- Reword question 3 to ask, "Do you live or own a business in a floodplain?"
- Strike the word "citizen" and replace it with "resident" throughout the survey.
- County staff will continue to review the survey and provide comments to Tetra Tech before the next meeting. Tetra Tech will then make edits and send out to the SC via email.

Rob Flaner stated Malibou Lake is agreeable to the 10/9/19 date for the first public meeting/workshop. (Note: Open House was changed to 10/7/19 after meeting to avoid the religious holiday, Yom Kippur). The SC discussed using a public invitation via post cards and social media to gauge attendance and plan for HAZUS-MH work stations.

**Action Items and Next Steps**

- Larry Tran to post the approved August 14, 2019 SC summary onto the new website.
- Tetra Tech to craft a sample definition of resilience to present at the next meeting.
- Tetra Tech to make edits to the critical facilities / infrastructure definition and present at the next meeting.
- County staff will continue to review the survey and provide comments ASAP to Tetra Tech.
- Tetra Tech to send out the Agenda for the following meeting.

**Next Meeting Date**

- The next SC meeting date will be October 9, 2019 9:30 a.m. to 11:30 a.m. PT. The meeting location is the Los Angeles County Public Works HQ, Conference Room A, 900 S. Fremont Avenue, Alhambra, CA 91803.

**Adjourn**

> **MOTION by Pat Wood to adjourn the September 11, 2019 SC meeting and second by Gina Natoli. Motion carried unanimously.**

The meeting adjourned at 12:00 p.m. PT.

**Los Angeles County**
**Floodplain Management Plan Update**
Steering Committee (SC) #4
Wednesday, October 9, 2019
9:30 a.m. – 11:30 a.m. PT
900 Fremont Ave, Alhambra, CA 91803
Conference Room A, HQ Building, 1st Floor

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

**Steering Committee Chair:** Pat Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #3 summary
- Receive Public Comment
- Repetitive Loss Update- Tony Subbio

## New Business

- ***Risk Assessment Update***
    - Hazard area maps
    - Hazus work station examples
    - GBS status report
- ***Defining Resilience in the Objectives***
    - Resilience definition finalization
        - "Our County, Los Angeles Countywide Sustainability Plan"
- ***Critical Facilities / Infrastructure***
    - The Critical Facilities / Critical Infrastructure (CF/CI) definition finalization
- ***Public Outreach Strategy***
    - Survey Updated and posted live:
        - https://www.surveymonkey.com/r/LACounty_Flood_2019
    - First Public Outreach Meeting 10/7/19
        - What went well?
        - What should we do differently next time?
    - Phase 2 outreach
        - Website
        - Survey
        - 2nd Public Meeting-When, Where?
- ***Action Items and Next Steps***
- ***Adjourn***

Next Meeting: November 11, 2019 10:00 a.m. – 12:00 p.m. PT at TMC Conference Room, Annex Building, 1st Floor

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
4th Steering Committee (SC) Meeting
Wednesday, October 9, 2019, 9:30 a.m. to 11:20 a.m. PT.
Los Angeles County Public Works HQ – TMC Conference Room
900 South Fremont Ave, Alhambra, CA 91803

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## Meeting Participants

| | ROLE | NAME | AGENCY |
|---|---|---|---|
| 1. | Government | Eazell, Loni | PW Disaster Services Group |
| | Government | Escobar, Eduardo | *Alternate* - PW Stormwater Engineering |
| 2. | Government | Guerrero, Jolene | PW Community Government Relations Grp. |
| 3. | Government | Lacayo, Ron | PW Stormwater Maintenance |
| 4. | Government | Naslund, Lisa | PW Building & Safety |
| 5. | Government | Natoli, Gina-Vice Chair | LA County Regional Planning |
| 6. | Government | Nguyen, Cung | PW Stormwater Planning |
| | Government | Tong, Glen | *Alternate* - PW Building & Safety |
| 7. | Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. | Non-Government | Asuncion, Kendal | Los Angeles Chamber of Commerce |
| 2. | Non-Government | Blalock, John | Antelope Valley Resident |
| 3. | Non-Government | Ellis, Dr. Andre | California State University, Los Angeles |
| 4. | Non-Government | Garcia-Ruiz, Joselito | American Red Cross of Greater Los Angeles |
| 5. | Non-Government | Ggem, Shannon | Malibou Lake Mountain Club |
| 6. | Non-Government | Sharpton, Debbie | Environmental Restoration Group |
| 7. | Non-Government | Shu, Susan | City of LA Bureau of Engineering |
| 8. | Non-Government | Tam Sing, Garret | *Alternate*-California Department of Water Resources |
| | Core Planning Team | Chen, Michael | Los Angeles County Public Works |
| | Core Planning Team | Tran, Larry | Los Angeles County Public Works |
| | Core Planning Team | Win, Thu | Los Angeles County Public Works |
| | Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| | Core Planning Team | Parker, Steve | Tetra Tech, Inc. |
| | Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |
| | Core Planning Team | Subbio, Tony | Tetra Tech, Inc. |
| | Other | Chen, Caroline | LA County Regional Planning |
| | Other | Sinha, Subodh | PW Stormwater Engineering |

Numbered = Voting attendees

## Planning Process

### Welcome and Introductions

Pat Wood welcomed attendees and Larry Tran introduced attendees.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and provided time for attendees to review the agenda and make any final edits. No edits were requested.

### Meeting #3 Summary

Rob Flaner asked the SC if they had any edits to the September 11, 2019 meeting minutes. No edits were requested.

> **MOTION made by Gina Natoli to approve the September 11, 2019 meeting minutes and seconded by Pat Wood. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No public comments were expressed.

### Repetitive Loss Update

Rob Flaner introduced Tony Subbio, Tetra Tech as the Repetitive Loss Area Analysis (RLAA) lead.

## New Business

### Risk Assessment Update

Rob Flaner noted that the maps are ready and were used during the first public outreach meeting. Steve Parker has made the depth grids and has imported them into the HAZUS model. Rob noted that the risk assessment output will be compared to the 2015 FMP Risk Assessment data.

Rob Flaner explained to the SC how the 10, 50, 100 and 500 year floods are calculated. He also noted that the general building stock (GBS) status report is also ready, but is a lot of information so it will be summarized before it is sent to the SC for the next meeting.

Rob discussed how damage report is generated from the HAZUS results, exemplified by the printouts available to property owners at the public workshops. There was a discussion on the definition of 'debris' from the HAZUS output. Pat Wood asked to make sure debris is defined clearly in the FMP as material after damages, not mudflow. Insurance standards estimate property contents at 80% of structure value.

**Defining Resilience in the Objectives**

Rob Flaner explained that the CPT recommends using the definition of resilience as used in the "Our County, Los Angeles Countywide Sustainability Plan" to be consistent with an existing adopted County document and it also agrees with 100 Resilient Cities' (100RC) definition. Discussion was held regarding the definition's included "inequity and disparities in employment" language and how it relates resiliency. The SC agreed to use the "Our County, Los Angeles Countywide Sustainability Plan" verbatim definition of resilience. The definition will be in the glossary with the term utilized throughout the FMP document as needed.

**Critical Facilities / Infrastructure**

Rob Flaner reminded the SC that the last meeting they decided to table approval of the critical facilities/ infrastructure until the next meeting so that Tetra Tech can draft a definition of critical facilities / infrastructure as it pertains to each of the BRIC program's seven lifelines as it would expand applicability of BRIC funding in the future. Rob reiterated that the facilities/infrastructure will be categorized into the seven lifeline definitions. It was noted by a County representative that the County has a Recovery Plan, and that it should be cited and referenced for the Capabilities Assessment.

> **MOTION made by Gina Natoli to approve the definition of Critical Facilities and Infrastructure and seconded by Jolene Guerrero. Motion passed unanimously.**

**Public Outreach Strategy**

Rob discussed that Tetra Tech and the County reviewed and updated the public survey and utilized the results of that effort at the Malibou Lake public workshop on Monday (Oct 7th).

Rob Flaner stated that the survey is posted on the website and is live and ready to go. Rob and Larry Tran stated they are working with the Public Information Officer (PIO) and there will be a flyer created with a QR code for easy dissemination and survey completion on social media platforms, and for future public workshops.

The SC reviewed the survey and there was further discussion and consensus on some changes to implement in the current survey. Rob will get those agreed upon changes made.

Debbie Sharpton stated that Seminole Springs was not notified of the public meeting date change and local residents were unable to attend the public meeting. Larry Tran noted he emailed the contact provided for Seminole Springs and several others about the date change from the 9th to the 7th due to Yom Kippur, but some may have been left out. In the future, all correspondence will be sent to all SC members.

Related to Seminole Springs, there was discussion regarding permitting authorities between the State and County for mobile homes.

Discussion was held about where to hold the next public meeting, such as Antelope Valley or Malibou Lake again, but has not yet been decided.

**Action Items and Next Steps**

- Larry Tran to post the approved September 11, 2019 SC summary onto the website.
- Rob will make Survey updates based on SC discussion.

- Larry will send out flyer for public release of survey after changes made.
- Spreadsheet of building stock report will be created and sent to SC prior to next meeting.
- Tetra Tech to send out the Agenda for the following meeting.
- Next meeting will have Core Capabilities Exercise with posters. SC members highly encouraged to attend in person.

**Next Meeting Date**

November 13, 2019 10:00 a.m. – 12:00 p.m. PT at TMC Conference Room, Annex Building, 1st Floor

**Adjourn**

**MOTION by Pat Wood to adjourn the October 9, 2019 SC meeting and second by Jolene Guerrero. Motion carried unanimously.**

The meeting adjourned at 11:20 a.m. PT.

**Los Angeles County**
**Floodplain Management Plan Update**
Steering Committee (SC) #5
Wednesday, November 13, 2019
10:00 a.m. – 12:00 p.m. PT
900 Fremont Ave, Alhambra, CA 91803
Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

**Steering Committee Chair:** Pat Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #4 summary
- Receive Public Comment

## New Business

- ***Risk Assessment Update***
    - General Building Stock (GBS) status report
- ***Core Capabilities Exercise***
- ***Public Outreach Strategy***
    - Phase 1 outreach
        - Website
        - Survey
        - 2nd Public Meeting-When, Where?
- ***Action Items and Next Steps***
- ***Adjourn***

Next Meeting: December 11, 2019 10:00 a.m. – 12:00 p.m. at Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
5th Steering Committee (SC) Meeting
Wednesday, November 13, 2019, 9:30 a.m. to 11:20 a.m. PT.
Los Angeles County Public Works HQ – TMC Conference Room
900 South Fremont Ave, Alhambra, CA 91803

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**Meeting Participants**

| | | | |
|---|---|---|---|
| 1. | Government | Araiza, Martin | PW Stormwater Eng.-Hydrology/Hydraulics |
| | Government | Chi, Iris | *Alternate*-LA County Regional Planning |
| | Government | Escobar, Eduardo | *Alternate*-PW Stormwater Engineering |
| 2. | Government | Godoy, David | *Alternate*-Los Angeles County Fire Department |
| 3. | Government | Guerrero, Jolene | PW Community Government Relations Grp. |
| 4. | Government | Husted, Jack | *Alternate*-PW Disaster Services Group |
| 5. | Government | Natoli, Gina-Vice Chair | LA County Regional Planning |
| 6. | Government | Nguyen, Cung | PW Stormwater Planning |
| 7. | Government | Tong, Glen | *Alternate*-PW Building & Safety |
| 8. | Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. | Non-Government | Ellis, Andre | California State University, Los Angeles |
| 2. | Non-Government | Garcia-Ruiz, Joselito | American Red Cross of Greater Los Angeles |
| 3. | Non-Government | Ggem, Shannon | Malibou Lake Mountain Club |
| 4. | Non-Government | Lin, Chang-Shien | *Alternate*-City of LA Bureau of Engineering |
| 5. | Non-Government | Miranda, Salomon | CA Department of Water Resources |
| 6. | Non-Government | Sharpton, Debbie | Environmental Restoration Group |
| 7. | Non-Government | Wong, Dorothy | *Alternate*-Altadena Town Council |
| | Core Planning Team | Tran, Larry | County of Los Angeles Public Works |
| | Core Planning Team | Win, Thu | County of Los Angeles Public Works |
| | Core Planning Team | Artz, Ira | Tetra Tech, Inc. |
| | Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| | Core Planning Team | Parker, Steve | Tetra Tech, Inc. |
| | Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |

Numbered = Voting attendees

## Planning Process

### Welcome and Introductions

Pat Wood welcomed attendees, and everyone introduced themselves.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and provided time for attendees to review the agenda and make any final edits. No edits were requested.

### Meeting #4 Summary

Rob Flaner asked the SC if they had any edits to the October 9, 2019 meeting minutes. Gina Natoli requested the spelling of Malibu Lakes be corrected to Malibou Lake.

> **MOTION made by Pat Wood to approve the October 9, 2019 meeting minutes and seconded by Gina Natoli with the abovementioned correction. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No members of the public were present, and no public comments were expressed.

## New Business

### Risk Assessment Update

Rob Flaner provided the draft general building stock (GBS) loss status report and explained it entails nearly everything that is not designated as a critical facility, as that is a different Hazus analysis that is still being worked on. The GBS is in progress and fields with 0 indicates it is still being analyzed.

Pat Wood inquired about the planning boundaries lining up with the General Plan. There was a consensus by the Steering Committee to define the watershed HUC 1809020616. Tetra Tech to create a roadmap of the hydrologic unit codes (HUC)to the planning units as well as the metric and acreage numbers. Tetra Tech will also check the value of contents exposed ratio as the content value appears to be high compared to the value of structures exposed. Typical practice is to assume value of content exposed at 50% of the structure value. The risk assessment methodology will be explained in chapter 5 of the FMP.

### Core Capability Exercise

Rob Flaner explained the exercise; the core capability statements were listed on poster boards posted on the wall and each participant was given several green stickers (to indicate strengths) and red stickers (to indicate weakness). Each participant placed either a green or red sticker by each of the core capability statements, indicating whether they thought each statement was a strength or weakness of

Los Angeles County. The stickers will be tallied and inform core capabilities and mitigation actions for the Flood Mitigation Plan. Steering Committee members who were not able to attend the meeting in person will be provided a Survey Monkey link and asked to participate that way. Results will be tallied and provided to Steering Committee members once each member has had opportunity to participate.

**Public Outreach Strategy**

Larry Tran indicated that the survey was live on the County website, has been Tweeted and a Facebook post was also made providing citizens opportunity to take the survey. He also indicated that 3,000+ mailers were also being created and the County will begin to reach out to town councils so they can aid in distributing to residents. The Steering Committee requested to be sent the flyer for the survey to help with outreach efforts.

The Steering Committee discussed when to hold the next public outreach meeting and was decided to hold off until after the new year due to wildfires in the area and holidays. The Steering Committee discussed holding the next public outreach meeting in Antelope Valley.

**Action Items and Next Steps**

- Larry Tran to post the approved October 9, 2019 SC summary onto the website.
- Tetra Tech to create a roadmap of the hydrologic units to the planning units as well as the metric and acreage numbers.
- Tetra Tech to provide survey link for Core Capability Exercise to SC members
- Larry Tran to provide flood preparedness survey flyer to SC members.
- Tetra Tech to send out the Agenda for the following meeting.

**Next Meeting Date**

January 8, 2020 10:00 a.m. – 12:00 p.m. PT at Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

**Adjourn**

> **MOTION by Pat Wood to adjourn the November 13, 2019 SC meeting and second by Gina Natoli. Motion carried unanimously.**

The meeting adjourned at 11:20 a.m. PT.

**Los Angeles County**
**Floodplain Management Plan Update**
Steering Committee (SC) #6
Wednesday, January 8, 2020
10:00 a.m. – 12:00 p.m. PT
900 Fremont Ave, Alhambra, CA 91803
Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

**Steering Committee Chair:** Pat Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #5 summary
- Receive Public Comment

## New Business

- ***Risk Assessment Update***
  - Repetitive Loss Area Analysis (RLAA)
  - General Building Stock (GBS) HAZUS summary

- ***Core Capabilities Exercise Update***
  - Core Capability Exercise Results

- ***Public Outreach Strategy***
  - Phase 1 outreach
    - Website
    - Survey
    - 2nd Public Meeting-When, Where?
  - Agency Contact List

- ***Plan Update***
  - Draft FMP Report
  - Draft Chapter 4: Relevant Programs + Capability Assessment

- ***Action Items and Next Steps***
- ***Adjourn***

Next Meeting: February 12, 2020 10:00 a.m. – 12:00 p.m. at Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
6th Steering Committee (SC) Meeting
Wednesday, January 8, 2020 10 a.m. to 11:50 a.m. PST
Los Angeles County Public Works HQ – TMC Conference Room
900 South Fremont Ave, Alhambra, CA 91803

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## Meeting Participants

| All attendees are listed but only the attendees counted as voting representatives for this meeting are numbered. | | |
|---|---|---|
| 1. Government | Araiza, Martin | PW Stormwater Eng.-Hydrology/Hydraulics |
| 2. Government | Benavides, Marcella | *Alternate*- PW Stormwater Planning |
| Government | Chen, Caroline | *Alternate*- LA County Regional Planning |
| 3. Government | Eazell, Loni | PW Disaster Services Group |
| Government | Escobar, Eduardo | *Alternate*-PW Stormwater Engineering |
| 4. Government | Godoy, David | *Alternate*-Los Angeles County Fire Department |
| 5. Government | Lacayo, Ron | PW Stormwater Maintenance |
| 6. Government | Madrid, Jalaine | *Alternate*-PW Community Government Relations Group |
| 7. Government | Naslund, Lisa | PW Building & Safety |
| 8. Government | Natoli, Gina-Vice Chair | LA County Regional Planning |
| Government | Tong, Glenn | *Alternate*-PW Building & Safety |
| Government | Walker, Neonika | *Alternate* PW Community Government Relations Group |
| 9. Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. Non-Government | Blalock, John | Antelope Valley Resident |
| 2. Non-Government | Ellis, Andre | California State University, Los Angeles |
| 3. Non-Government | Garcia-Ruiz, Joselito | American Red Cross of Greater Los Angeles |
| Non-Government | Lin, Chang-Shien | *Alternate*-City of LA Bureau of Engineering |
| 4. Non-Government | Miranda, Salomon | CA Department of Water Resources |
| 5. Non-Government | Shu, Susan | City of LA Bureau of Engineering |
| Non-Government | Underwood, Scott | *Alternate*-Red Cross of Greater Los Angeles |
| 6. Non-Government | Wong, Dorothy | *Alternate*-Altadena Town Council |
| Core Planning Team | Chen, Michael | Los Angeles County Public Works |
| Core Planning Team | Tran, Larry | Los Angeles County Public Works |
| Core Planning Team | Win, Thu | Los Angeles County Public Works |
| Core Planning Team | Artz, Ira | Tetra Tech, Inc. |
| Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |
| Other | Montanez, Emily | LA County Office of Emergency Management |
| Other | Osorio, Miguel | Los Angeles County Public Works |
| Other | Sinha, Subodh | Los Angeles County Public Works |

Numbered = Voting attendees

## Planning Process

### Welcome and Introductions

Pat Wood welcomed attendees, and everyone introduced themselves.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and provided time for attendees to review the agenda and make any final edits. No edits were requested.

### Meeting #5 Summary

Rob Flaner asked the SC if they had any edits to the November 13, 2019 meeting minutes. No edits were requested.

> **MOTION made by Gina Natoli to approve the November 13, 2019 meeting minutes and seconded by Pat Wood. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No members of the public were present, and no public comments were expressed.

## New Business

### Risk Assessment Update

Rob Flaner reminded everyone that the General Building Stock (GBS) was reviewed at the last meeting. He discussed how the GBS was segregated into different occupancy categories and HAZUS assesses the value of contents based on occupancy category.

### Core Capability Exercise

Rob Flaner discussed the importance of the exercise in informing the County on their strengths and perceived gaps. The SC discussed difficulties of social media interest, the possibility that the County websites has too much information and may want to think of reorganizing it to be more user-friendly for those looking for hazard-related information. The SC discussed the Codes and zoning within the County.

### Public Outreach Strategy

Rob indicated that 66 surveys have been completed as of that morning and will serve as our last request for another social media blast. The next public meetings was discussed to possibly be held during the 3 week public comment period in Antelope Valley at either Quartz Hill Library or Lancaster Library and Malibou Lake.

**Plan Update**

Rob Flaner stated that Tetra Tech will have the 75% FMP draft to the County by 1/24/20. Larry mentioned that the Core Planning Team and SC will have 3 weeks to review the draft FMP simultaneously and the revisions will take about 2 weeks. The public comment period for the draft FMP is estimated to begin early March. The February SC meeting is anticipated to be our last SC meeting.

**Draft Chapter 4: Relevant Programs + Capability Assessment**

Rob Flaner asked the SC members to review the draft Chapter 4 section and provide their comments and feedback to Larry Tran, who will organize and provide to Rob Flaner. There was a discussion about the update to the County of Los Angeles All Hazard Mitigation Plan and it is anticipated to be approved in 2020. There was also a discussion about the update to the Safety Element of the Los Angeles County General Plan.

**Action Items and Next Steps**

- Melissa Schloss to send the SC the draft Agency Contact List.
- SC to review and provide comments of Chapter 4 to Larry Tran.
- Larry Tran to collect Chapter 4 comments and provide to Tetra Tech.

**Next Meeting Date**

February 12, 2020 10:00 a.m. – 12:00 p.m. PT at Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

**Adjourn**

**MOTION made by Gina Natoli to adjourn the January 8, 2020 meeting and seconded by Pat Wood. Motion passed unanimously.**

The meeting adjourned at 11:50 a.m. PST.

**Los Angeles County**
**Floodplain Management Plan Update**
Steering Committee (SC) #7
Wednesday, February 12, 2020
10:00 a.m. – 12:00 p.m. PT
900 Fremont Ave, Alhambra, CA 91803
Traffic Management Center (TMC) Conference Room, Annex Building, 1st Floor

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

**Steering Committee Chair:** Patricia Wood, Los Angeles County Public Works
**Steering Committee Vice-Chair:** Gina Natoli, Los Angeles County Department of Regional Planning
**County Project Manager:** Larry Tran, Los Angeles County Public Works
**Consultant Technical Lead:** Rob Flaner, Tetra Tech Inc.

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## Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #6 summary
- Receive Public Comment

## New Business

- ***Risk Assessment Update***
  - Repetitive Loss Area Analysis (RLAA)
  - General Building Stock (GBS) HAZUS
  - Critical Facilities Analysis
  - Identified Issues

- ***Plan Update***
  - 90% Draft FMP Report
    - Steering Committee will receive on 2/18 for preliminary review
      - Submit preliminary comments to Core Planning Team by 2/28
  - FMP Draft Public Comment Period from 3/9/2020 to 3/31/2020
    - Additional opportunity for Steering Committee review. Submit comments to Core Planning Team by 3/31/2020.
  - Draft FMP Action Plan - Mitigation Actions Discussion

- ***Public Outreach Strategy***
  - Phase 1 outreach
    - Survey Update
  - Phase 2 outreach
    - 1st and 2nd Public Meetings
      - Antelope Valley – Lancaster Library – Wednesday, March 11, 2020 from 6p.m. to 8 p.m.
      - Santa Monica Mountains – Malibou Lake – Thursday, March 12, 2020 from 6 p.m. to 8 p.m.
- ***Action Items and Next Steps***
- ***Adjourn***

No further Steering Committee meetings are currently anticipated.

**Los Angeles County Public Works**
**2020 Floodplain Management Plan Update**
7th Steering Committee (SC) Meeting
Wednesday, February 12, 2020 10:00 a.m. to 11:00 a.m. PST
Los Angeles County Public Works HQ – TMC Conference Room
900 South Fremont Ave, Alhambra, CA 91803

## Meeting Participants

| **All attendees are listed but only the attendees counted as voting representatives for this meeting are numbered.** | | |
|---|---|---|
| 1. Government | Araiza, Martin | PW Stormwater Eng.-Hydrology/Hydraulics |
| 2. Government | Benavides, Marcella | *Alternate*- PW Stormwater Planning |
| Government | Chen, Caroline | *Alternate*- LA County Regional Planning |
| Government | Escobar, Eduardo | *Alternate*-PW Stormwater Engineering |
| 3. Government | Gardner, Scott | Los Angeles County Fire Department |
| Government | Godoy, David | *Alternate*-Los Angeles County Fire Department |
| 4. Government | Husted, Jack | *Alternate*-PW Disaster Services Group |
| 5. Government | Lacayo, Ron | PW Stormwater Maintenance |
| 6. Government | Madrid, Jalaine | *Alternate*-PW Community Government Relations Group |
| Government | Martinez, Mark | *Alternate*-Los Angeles County Fire Department |
| 7. Government | Naslund, Lisa | PW Building & Safety |
| 8. Government | Natoli, Gina-Vice Chair | LA County Regional Planning |
| Government | Osorio, Miguel | *Alternate*-PW Stormwater Engineering |
| 9. Government | Wood, Patricia-Chair | PW Stormwater Engineering |
| 1. Non-Government | Galassi, Romano | *Alternate*-City of Los Angeles Bureau of Engineering |
| 2. Non-Government | Garcia-Ruiz, Joselito | American Red Cross of Greater Los Angeles |
| 3. Non-Government | Ggem, Shannon | Malibou Lake Mountain Club |
| 4. Non-Government | Lee, Olivia | LA Chamber of Commerce |
| 5. Non-Government | Miranda, Salomon | CA Department of Water Resources |
| 6. Non-Government | Sharpton, Debbie | Environmental Restoration Group |
| 7. Non-Government | Wong, Dorothy | *Alternate*-Altadena Town Council |
| Core Planning Team | Chen, Michael | Los Angeles County Public Works |
| Core Planning Team | Tran, Larry | Los Angeles County Public Works |
| Core Planning Team | Win, Thu | Los Angeles County Public Works |
| Core Planning Team | Artz, Ira | Tetra Tech, Inc. |
| Core Planning Team | Flaner, Rob | Tetra Tech, Inc. |
| Core Planning Team | Parker, Steve | Tetra Tech, Inc. |
| Core Planning Team | Schloss, Melissa | Tetra Tech, Inc. |

Numbered = Voting attendees

## Planning Process

### Welcome and Introductions

Pat Wood welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves.

### Review Agenda

Rob Flaner, Tetra Tech welcomed attendees and provided time for attendees to review the agenda and make any final edits. No edits were requested.

### Meeting #6 Summary

Rob Flaner asked the SC if they had any edits to the January 8, 2020 meeting minutes. No edits were requested.

> **MOTION made by Gina Natoli to approve the January 8, 2020 meeting minutes and seconded by Pat Wood. Motion passed unanimously.**

### Receive Public Comment

Rob Flaner asked members of the public if they wished to address the committee. No members of the public were present, and no public comments were expressed.

## New Business

### Repetitive Loss Area Analysis (RLAA)

Rob Flaner explained that the RLAA is a simultaneous project to the FMP and Steering Committee oversite is not required. All the mapping involved has been provided to the CPT for review. Larry Tran stated the CPT has received the 75% FMP draft and they are currently reviewing it. He also indicated the RLAA is being reviewed as well. Rob explained that we will create a mailing list to invite stakeholders to review the draft plan. Pat Wood reminded the SC that the mailing list for the repetitive loss (RL) properties is confidential information so the RLAA will contain a redacted version, while the County will retain the full RLAA.

### General Building Stock (GBS) HAZUS

Rob Flaner explained the 100- and 500- year flood tables handout and explained the County floodways are included in the 100-year results. Pat Wood noted she will take this to County administration, but they may want that separated out.

**Critical Facilities Analysis**

Rob indicated that approximately 75 identified facilities are within the 100-year flood and this section will also look at functional downtime. These models make estimates based upon use and time it will take to restore to 100% functionality.

**Identified Issues**

Rob explained the Identified Issues handout and how it will be included in section 6. Rob noted that some of these issues will continue in perpetuity. How the county manages them can inform best practices and strategies. Rob explained to the SC that this will be the time for them to review this document and advise the County on any additional issues. No comments were made.

**Plan Update**

**Draft FMP Report**

Rob stated that Tetra Tech will have the 75% FMP draft to the SC by 2/18/20 for preliminary review. Comments to be returned by 2/28/20. Larry mentioned that the Core Planning Team and SC will have just over 3 weeks to review the draft FMP simultaneously during the public comment period and that final revisions will take about 2 weeks.

**FMP Draft Public Comment Period from 3/9/20 to 3/31/20**

The public comment period for the draft FMP will be 3/9/20 through 3/31/20. Rob reminded the SC that the draft will look very similar to the last since it is an update, but they have made changes throughout the update process such as the critical facilities definition, action items, etc. Rob requested that the SC keep their edits to substance rather than editorial, as that will be done later by Tetra Tech's Quality Control. Rob explained that they will receive both a Microsoft Word (that will not include maps) and .pdf version (that will include maps) and requested their tracked changes and comment boxes be made in the Microsoft Word version saved with the SC member's initials and date reviewed.

**Draft FMP Action Plan – Mitigation Actions Discussion**

Rob explained that Chapter 11 will include the Drainage Needs Assessment Program (DNAP) along with BRIC. The Action Plan and suggested County changes was reviewed. Rob noted that all comments made by the SC will be taken under consideration.

**Public Outreach Strategy**

**Phase 1 Outreach**

Rob noted that as of yesterday, 84 surveys have been completed. The City has 163 completed surveys since they did a Spanish-speaking version as well. Rob explained how sharing survey data will count as agency coordination for the ISO. Since the City and County are agreeable, the Plan will show aggregated survey results.

**Phase 2 Outreach**

The next public meetings are as follows:

- 1st: Antelope Valley – Lancaster Library – Wednesday, March 11, 2020 from 6p.m. to 8 p.m.
- 2nd: Santa Monica Mountains – Malibou Lake – Thursday, March 12, 2020 from 6 p.m. to 8 p.m.

The SC requested workstations be included in these public meetings.

**Action Items and Next Steps**

- SC to review and provide comments of the FMP draft to Larry Tran.
- Larry Tran to collect FMP draft comments and provide to Tetra Tech.
- SC to be available for the annual progress report meeting.

**Next Meeting Date**

There are no future meetings. Rob Flaner and Gina Natoli thanked all those involved in this FMP update process.

**Adjourn**

> **MOTION made by Gina Natoli to adjourn the February 12, 2020 meeting and seconded by Pat Wood. Motion passed unanimously.**

The meeting adjourned at 11:00 a.m. PST.

# CORE CAPABILITY EXERCISE RESULTS

County of Los Angeles 2020 FMP Update
Core Capability Exercise Results
1/8/2020

| | | Average Green | Average Red |
|---|---|---|---|
| 1 | Flood Emergency management is provided by a unified authority or program within the County. | 87% | 13% |
| 2 | Current land uses within identified flood hazard areas are appropriate for the risk posed by each hazard. | 33% | 67% |
| 3 | There is a good understanding of the flood risk posed by all flood hazards in LA County. | 13% | 88% |
| 4 | Flood Emergency response functions for the County are clearly defined and are effective. | 57% | 43% |
| 5 | Members of the public know where to find information about flood hazards and risk. | 6% | 94% |
| 6 | Areas that provide natural resource protection are identified and protected within the County by a uniform policy. | 25% | 75% |
| 7 | Existing flood control systems are effective and well maintained. | 47% | 53% |
| 8 | Roles and responsibilities for emergency management within LA County are clearly defined. | 80% | 20% |
| 9 | LA County staff are knowledgeable about flood hazards and their impacts and are willing to share that knowledge with the public | 71% | 29% |
| 10 | The core capability to assess and mitigate flood risk within the planning area is high. | 69% | 31% |
| 11 | County personnel with emergency management functions are adequately trained and exercised. | 82% | 18% |
| 12 | LA County citizens have a good understanding of flood hazard exposure and risk. | 0% | 100% |
| 13 | The funding to support flood hazard risk reduction within LA County is adequate. | 65% | 35% |
| 14 | Strong collaboration and coordination exists between the County, neighboring jurisdictions including the City of LA, and state and federal agency partners. | 67% | 33% |
| 15 | Appropriate and timely flood warning systems are in place. | 75% | 25% |
| 16 | The County currently has an adequate variety of both, regulatory and non-regulatory strategies to reduce risk. | 80% | 20% |
| 17 | The County currently has adequate, adopted policies that encourage development to be located outside of high risk areas. | 40% | 60% |
| 18 | Risk from flood hazards within LA County is adequately managed and regulated. | 59% | 41% |
| 19 | There is strong public support for flood risk reduction within LA County. | 41% | 59% |
| 20 | The County is adequately prepared for the probable impacts on flood hazards due to the impacts from a changing climate. | 27% | 73% |
| 21 | Coordinated public outreach regarding risk from flood hazards convey clear, consistent messaging to the public. | 53% | 47% |
| 22 | The Planning Partnership's flood risk management programs are fair and equitable. | 36% | 64% |
| 23 | Information on flood insurance is readily available within the County. | 76% | 24% |

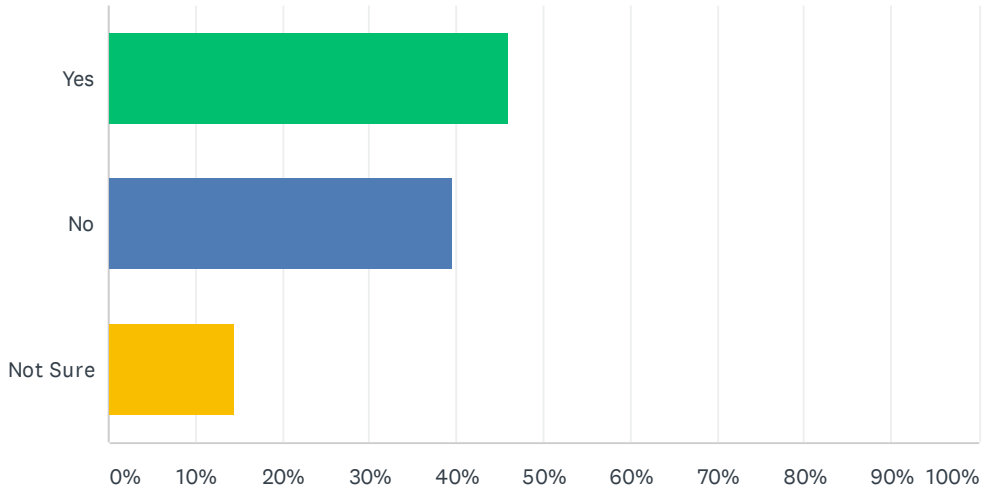
| | | | |
|---|---|---|---|
| 24 | There is political support for flood risk management within the County | 71% | 29% |
| 25 | All relevant stakeholders are engaged in the County's flood risk management efforts. | 59% | 41% |
| 26 | The County's development regulations for new development within identified flood hazard zones are clear and adequate to address flood risk. | 75% | 25% |
| 27 | There is a coordinated program to maintain drainage systems free of debris. | 24% | 76% |
| 28 | The enforcement of current codes and standards within the planning area is strong | 20% | 80% |
| 29 | The Citizens of LA County have the access to information necessary for them to be prepared to respond, recover and mitigation the impacts for flood hazards within the County. | 75% | 25% |
| 30 | Real Estate professionals adequately disclose risk exposure from natural hazards at the time of sale of real property | 71% | 29% |

# HAZARD MITIGATION SURVEY RESULTS

# Los Angeles County Survey Results

# Q1 Do you live or own a business in a known floodplain or an area that has been subject to flooding?

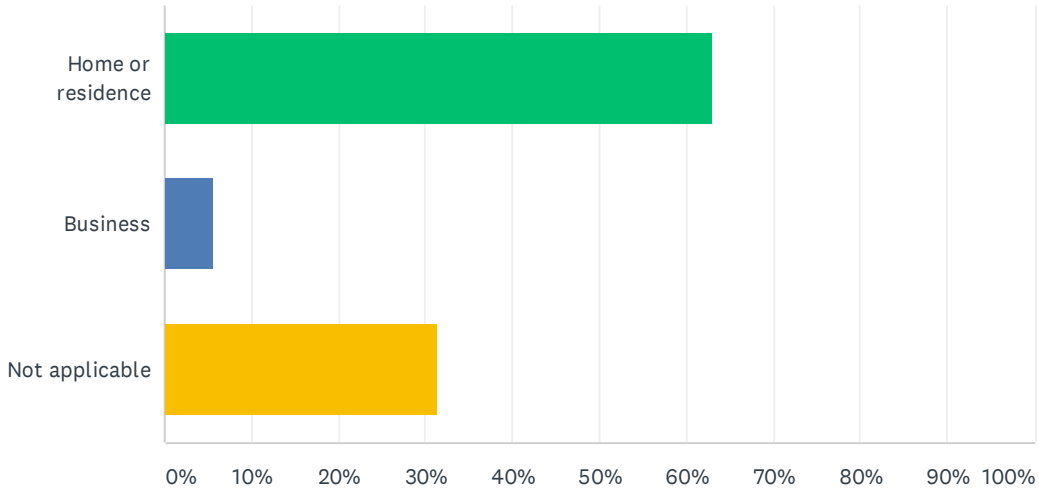
Answered: 76 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 46.05% | 35 |
| No | 39.47% | 30 |
| Not Sure | 14.47% | 11 |
| TOTAL | | 76 |

# Q2 If you answered yes to Questions #1, is this property your home, residences or business?

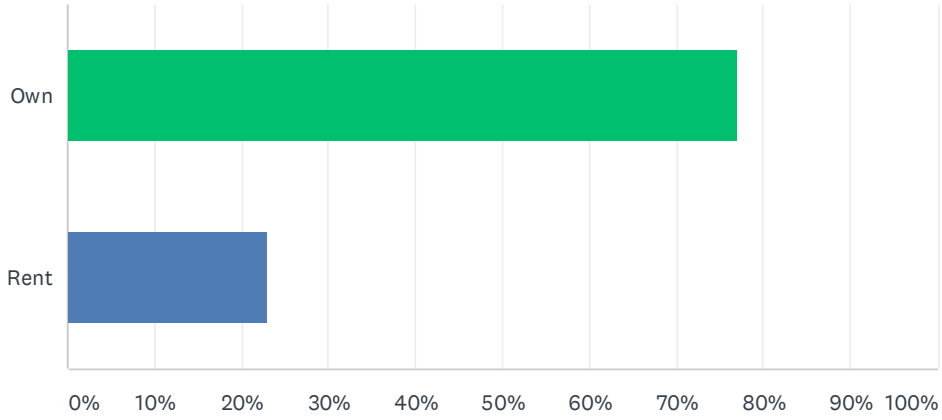
Answered: 54 Skipped: 22




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Home or residence | 62.96% | 34 |
| Business | 5.56% | 3 |
| Not applicable | 31.48% | 17 |
| TOTAL | | 54 |

# Q3 Do you own or rent this property?

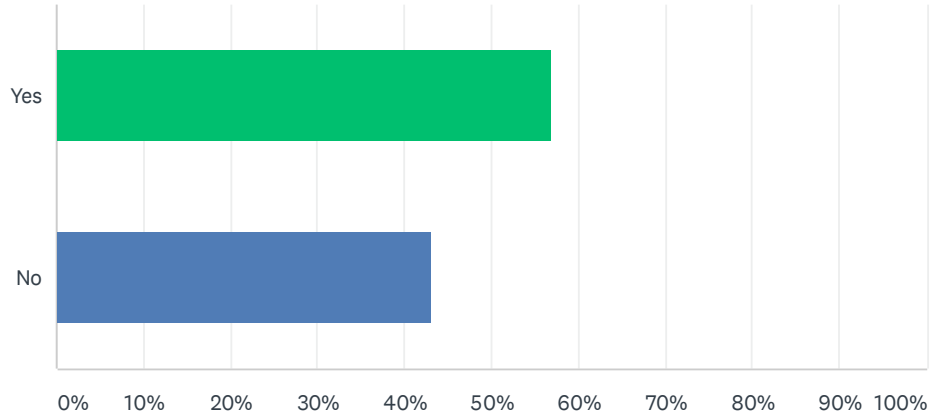
Answered: 65 Skipped: 11




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Own | 76.92% | 50 |
| Rent | 23.08% | 15 |
| TOTAL | | 65 |

# Q4 Do you have a mortgage on this property?

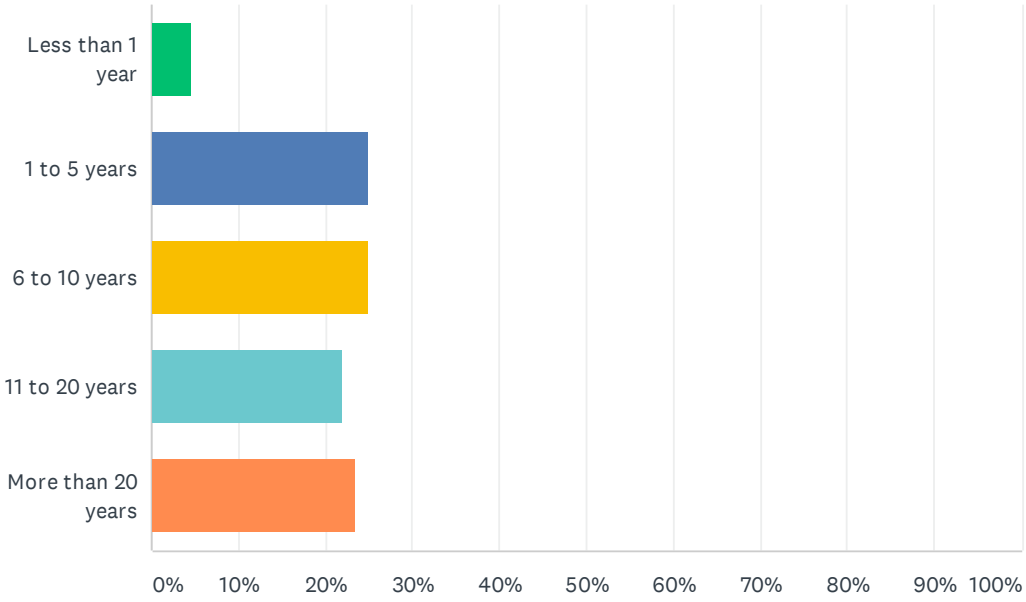
Answered: 65 Skipped: 11




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 56.92% | 37 |
| No | 43.08% | 28 |
| TOTAL | | 65 |

# Q5 How long have you lived or done business at that property?

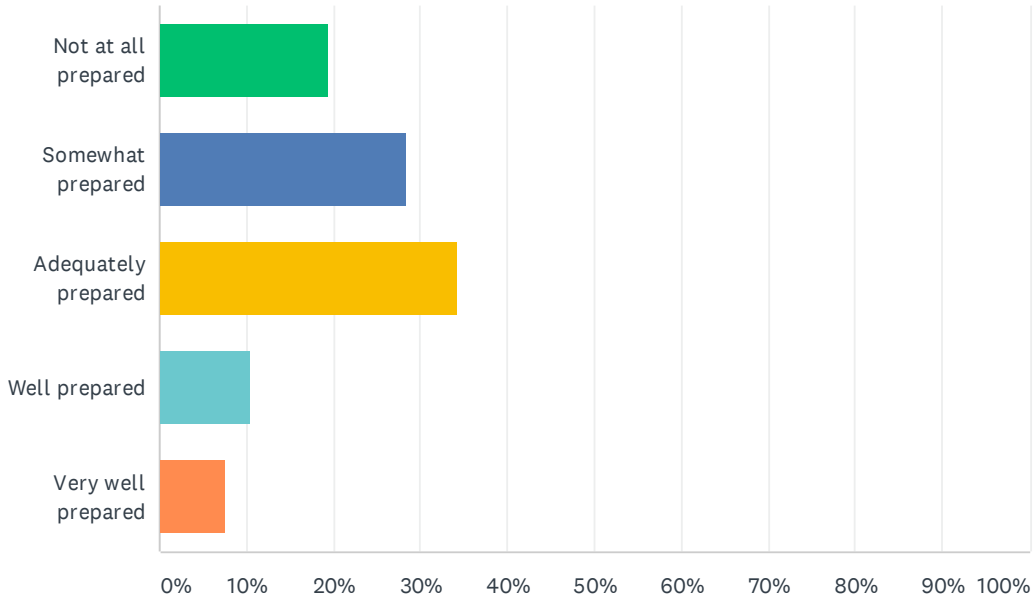
Answered: 64 Skipped: 12




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Less than 1 year | 4.69% | 3 |
| 1 to 5 years | 25.00% | 16 |
| 6 to 10 years | 25.00% | 16 |
| 11 to 20 years | 21.88% | 14 |
| More than 20 years | 23.44% | 15 |
| TOTAL | | 64 |

# Q6 How prepared is your household or business to deal with a flood event?

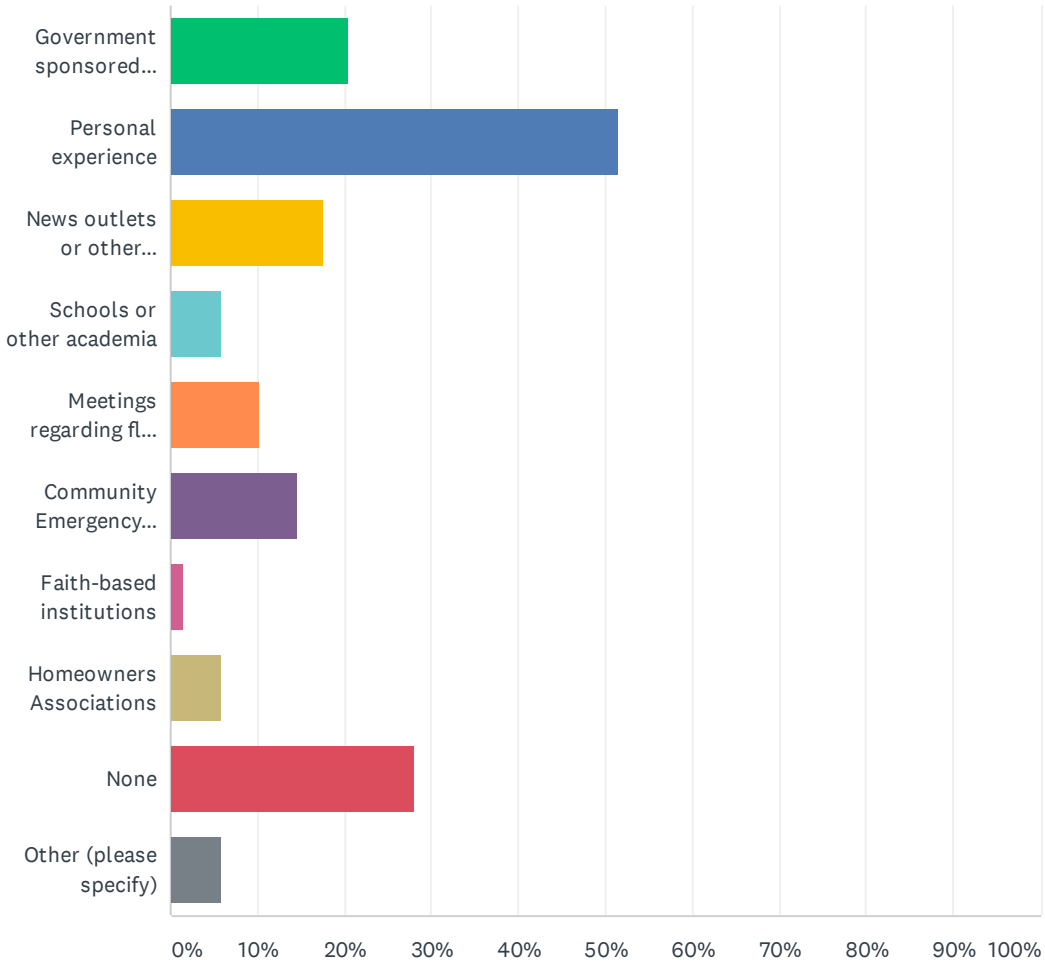
Answered: 67 Skipped: 9




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Not at all prepared | 19.40% | 13 |
| Somewhat prepared | 28.36% | 19 |
| Adequately prepared | 34.33% | 23 |
| Well prepared | 10.45% | 7 |
| Very well prepared | 7.46% | 5 |
| TOTAL | | 67 |

# Q7 Which of the following resources have helped you prepare for a flood event?

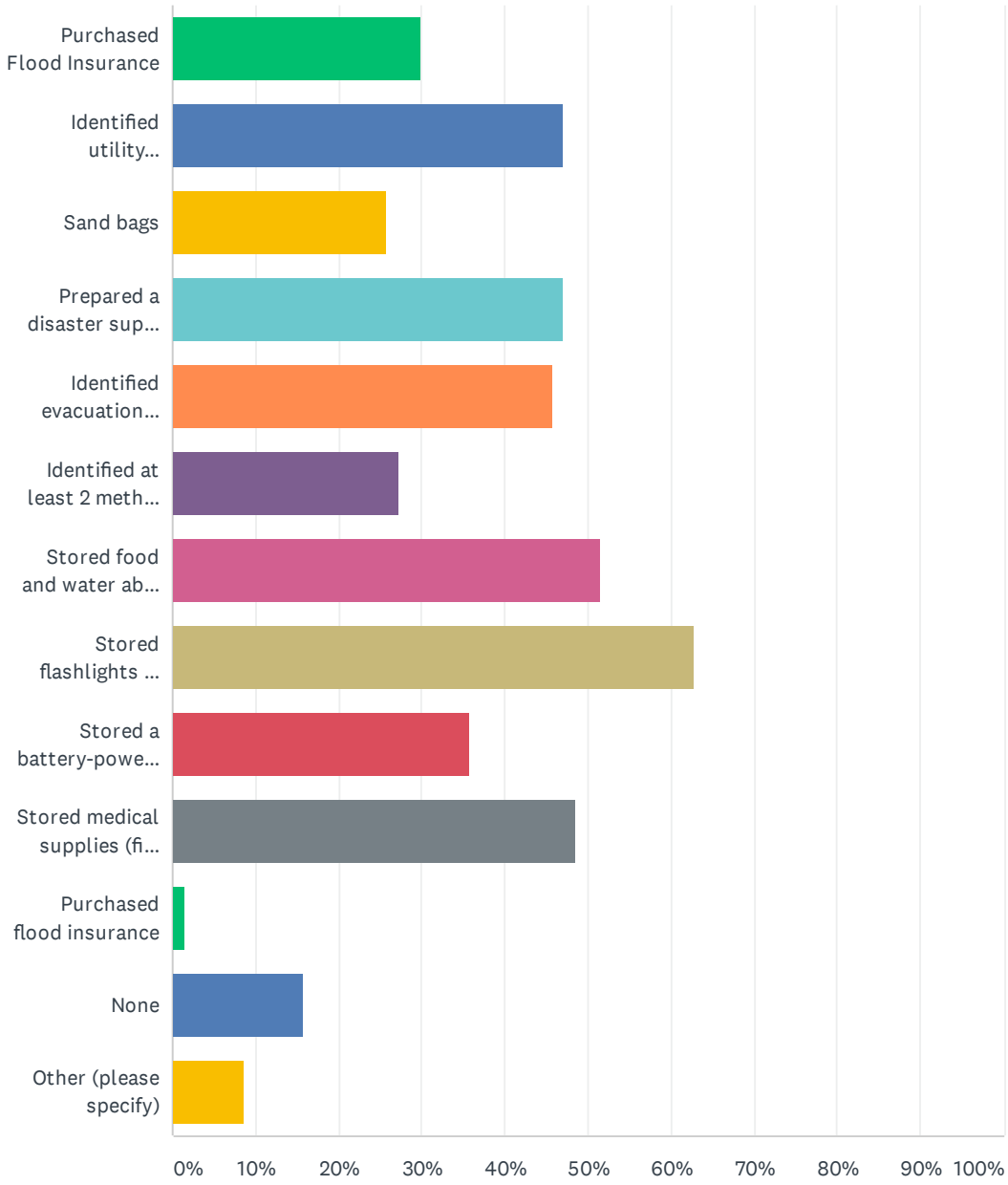
Answered: 68 Skipped: 8



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Government sponsored resources ( e.g., federal, state, or local emergency management programs or services) | 20.59% | 14 |
| Personal experience | 51.47% | 35 |
| News outlets or other multimedia platforms | 17.65% | 12 |
| Schools or other academia | 5.88% | 4 |
| Meetings regarding flood preparedness | 10.29% | 7 |
| Community Emergency Response Training (CERT) | 14.71% | 10 |
| Faith-based institutions | 1.47% | 1 |
| Homeowners Associations | 5.88% | 4 |
| None | 27.94% | 19 |
| Other (please specify) | 5.88% | 4 |
| Total Respondents: 68 | | |

# Q8 Which of the following steps has your household or business taken to prepare for a flood event? (Check all that apply)

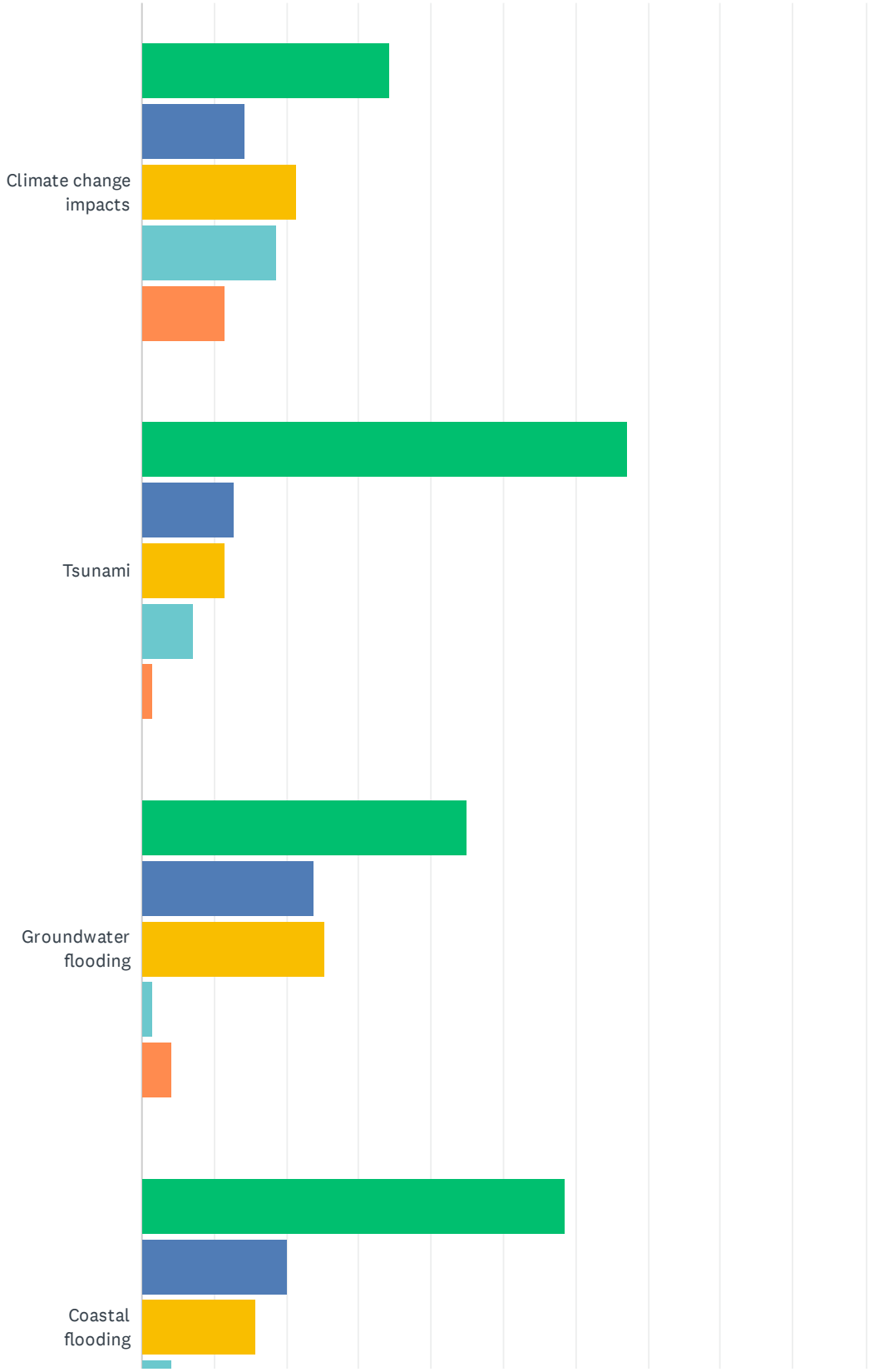
Answered: 70 Skipped: 6

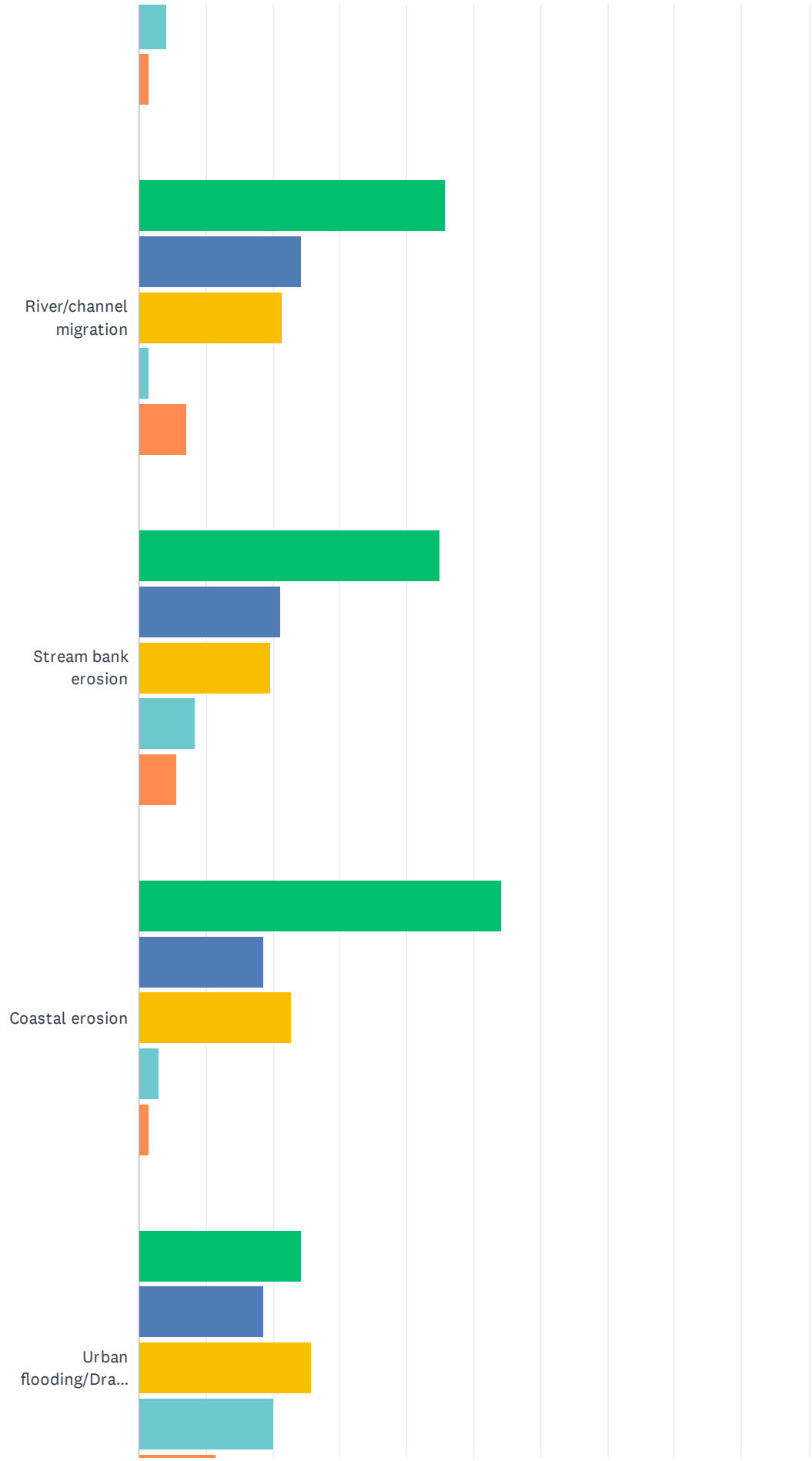


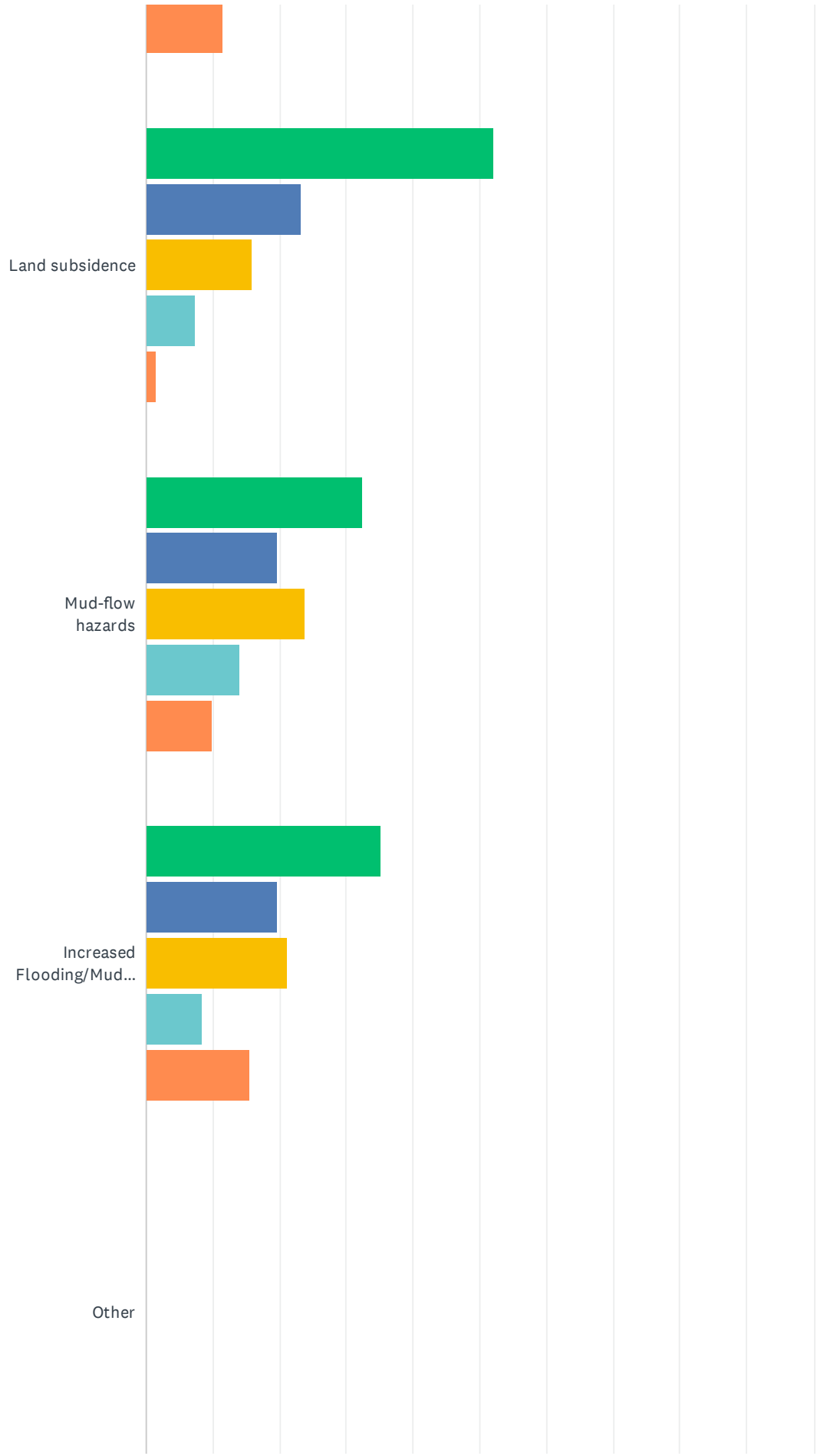
| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Purchased Flood Insurance | 30.00% | 21 |
| Identified utility shutoffs | 47.14% | 33 |
| Sand bags | 25.71% | 18 |
| Prepared a disaster supply kit | 47.14% | 33 |
| Identified evacuation routes | 45.71% | 32 |
| Identified at least 2 methods for receiving emergency notifications and information during emergencies | 27.14% | 19 |
| Stored food and water above potential flood levels | 51.43% | 36 |
| Stored flashlights and batteries | 62.86% | 44 |
| Stored a battery-powered radio | 35.71% | 25 |
| Stored medical supplies (first aid kit, medications) | 48.57% | 34 |
| Purchased flood insurance | 1.43% | 1 |
| None | 15.71% | 11 |
| Other (please specify) | 8.57% | 6 |
| Total Respondents: 70 | | |

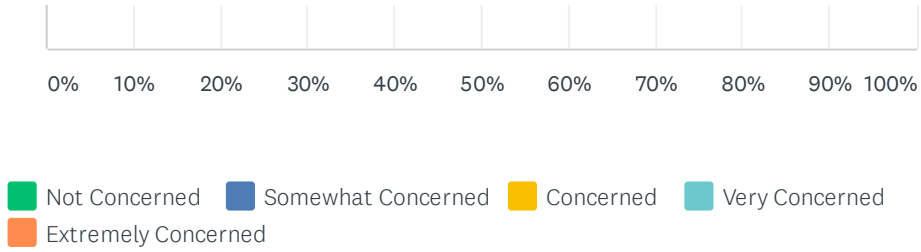
# Q9 How concerned are you about the following flood related hazards in Los Angeles County? (Check one response for each hazard)

Answered: 71 Skipped: 5




River/channel migration
Stream bank erosion
Coastal erosion
Urban flooding/Dra...

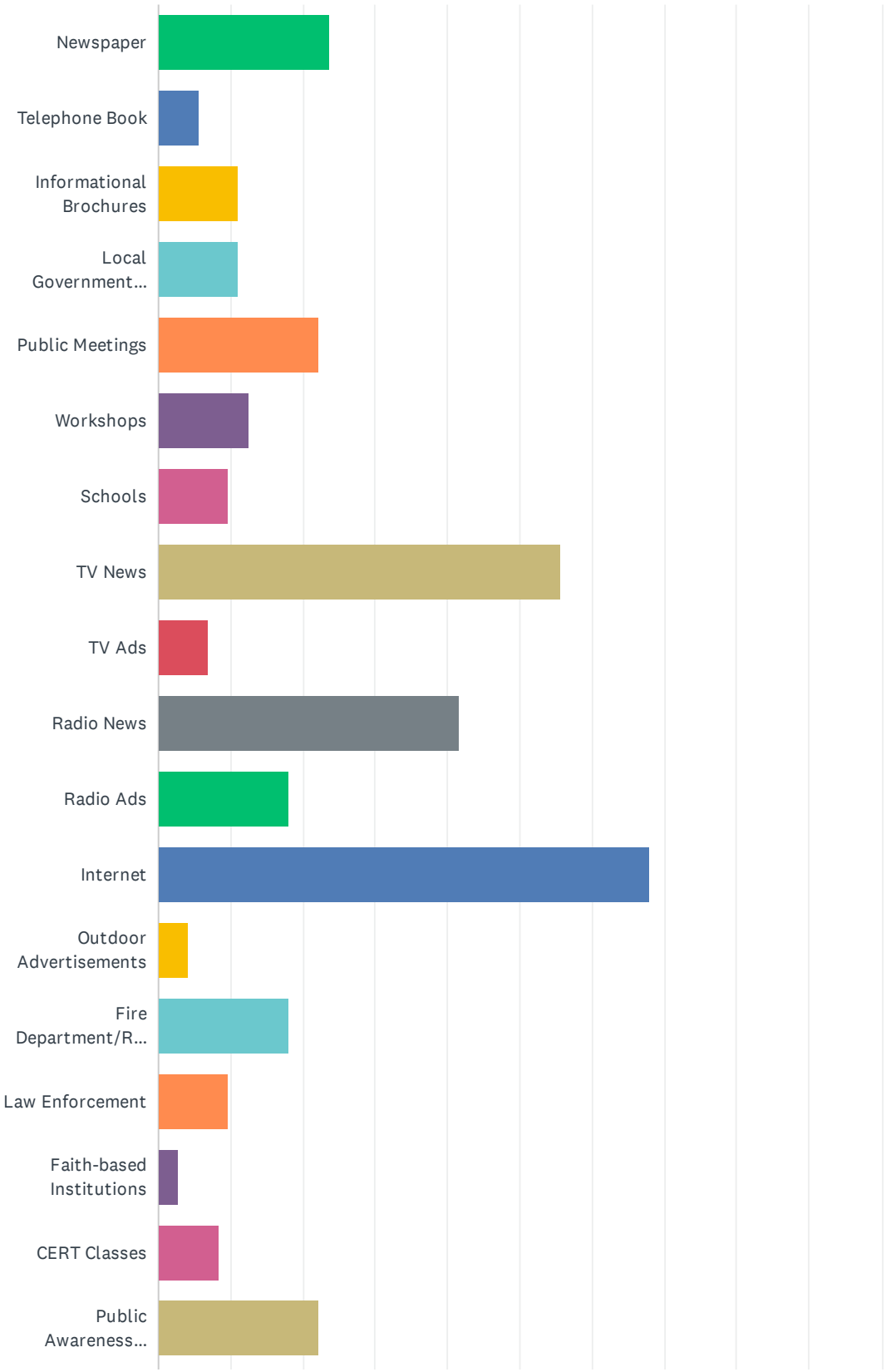

Land subsidence
Mud-flow hazards
Increased Flooding/Mud...
Other



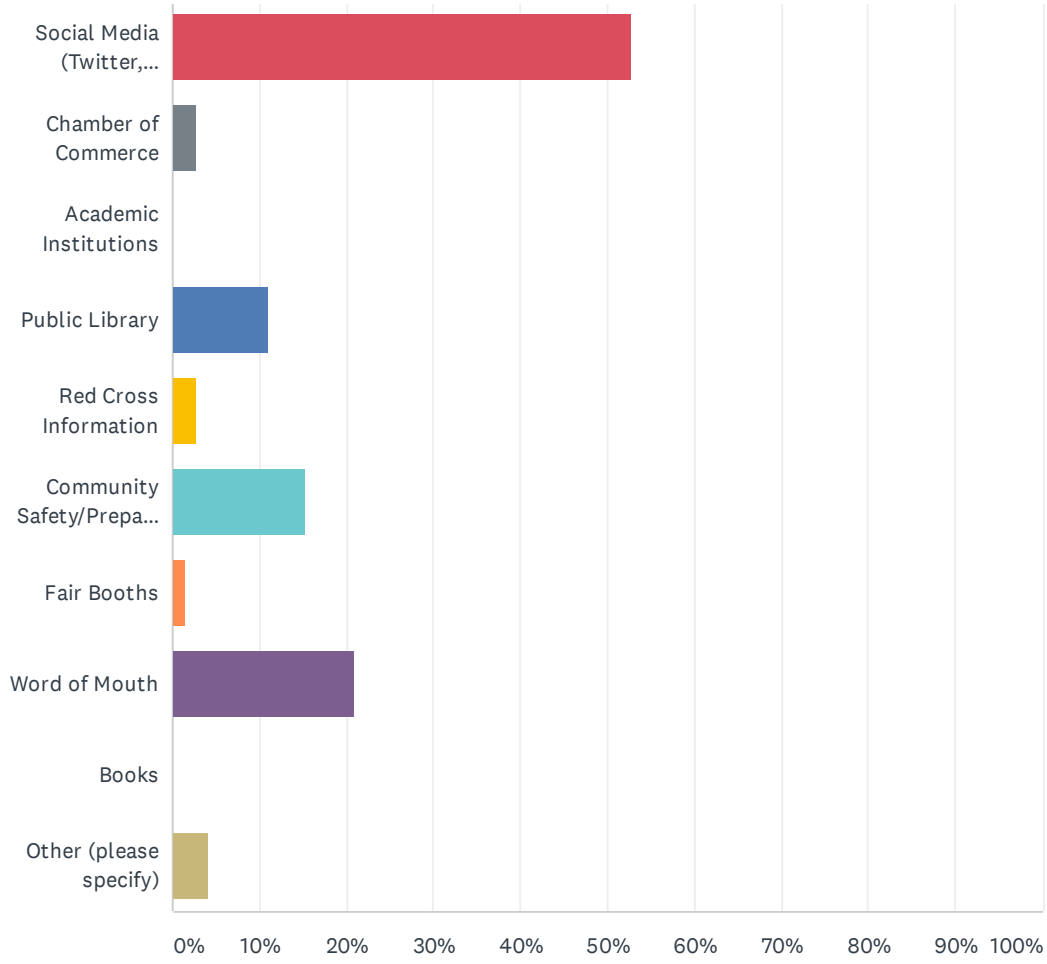

| | NOT CONCERNED | SOMEWHAT CONCERNED | CONCERNED | VERY CONCERNED | EXTREMELY CONCERNED | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|---|
| Climate change impacts | 34.29%<br>24 | 14.29%<br>10 | 21.43%<br>15 | 18.57%<br>13 | 11.43%<br>8 | 70 | 2.59 |
| Tsunami | 67.14%<br>47 | 12.86%<br>9 | 11.43%<br>8 | 7.14%<br>5 | 1.43%<br>1 | 70 | 1.63 |
| Groundwater flooding | 45.07%<br>32 | 23.94%<br>17 | 25.35%<br>18 | 1.41%<br>1 | 4.23%<br>3 | 71 | 1.96 |
| Coastal flooding | 58.57%<br>41 | 20.00%<br>14 | 15.71%<br>11 | 4.29%<br>3 | 1.43%<br>1 | 70 | 1.70 |
| River/channel migration | 45.71%<br>32 | 24.29%<br>17 | 21.43%<br>15 | 1.43%<br>1 | 7.14%<br>5 | 70 | 2.00 |
| Stream bank erosion | 45.07%<br>32 | 21.13%<br>15 | 19.72%<br>14 | 8.45%<br>6 | 5.63%<br>4 | 71 | 2.08 |
| Coastal erosion | 54.29%<br>38 | 18.57%<br>13 | 22.86%<br>16 | 2.86%<br>2 | 1.43%<br>1 | 70 | 1.79 |
| Urban flooding/Drainage issues | 24.29%<br>17 | 18.57%<br>13 | 25.71%<br>18 | 20.00%<br>14 | 11.43%<br>8 | 70 | 2.76 |
| Land subsidence | 52.17%<br>36 | 23.19%<br>16 | 15.94%<br>11 | 7.25%<br>5 | 1.45%<br>1 | 69 | 1.83 |
| Mud-flow hazards | 32.39%<br>23 | 19.72%<br>14 | 23.94%<br>17 | 14.08%<br>10 | 9.86%<br>7 | 71 | 2.49 |
| Increased Flooding/Mudflows because of recent fire(s) | 35.21%<br>25 | 19.72%<br>14 | 21.13%<br>15 | 8.45%<br>6 | 15.49%<br>11 | 71 | 2.49 |
| Other | 0.00%<br>0 | 0.00%<br>0 | 0.00%<br>0 | 0.00%<br>0 | 0.00%<br>0 | 0 | 0.00 |

# Q10 Choose up to five (5) of the following methods you think are most effective for providing flood hazard and disaster information:

Answered: 72 Skipped: 4



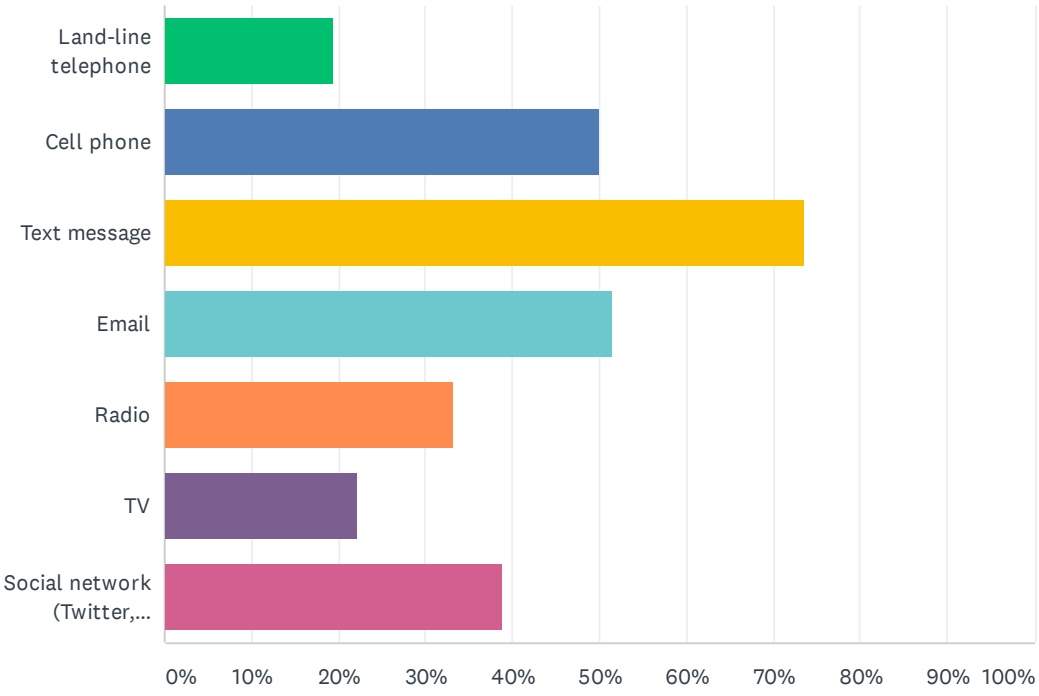
Los Angeles County 2020 Floodplain Management Plan Update <br>Flood Preparedness Questionnaire



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Newspaper | 23.61% | 17 |
| Telephone Book | 5.56% | 4 |
| Informational Brochures | 11.11% | 8 |
| Local Government Newsletters | 11.11% | 8 |
| Public Meetings | 22.22% | 16 |
| Workshops | 12.50% | 9 |
| Schools | 9.72% | 7 |
| TV News | 55.56% | 40 |
| TV Ads | 6.94% | 5 |
| Radio News | 41.67% | 30 |
| Radio Ads | 18.06% | 13 |
| Internet | 68.06% | 49 |
| Outdoor Advertisements | 4.17% | 3 |
| Fire Department/Rescue | 18.06% | 13 |
| Law Enforcement | 9.72% | 7 |
| Faith-based Institutions | 2.78% | 2 |
| CERT Classes | 8.33% | 6 |
| Public Awareness Campaign (e.g., Flood Awareness Week, Winter Storm Preparedness Month) | 22.22% | 16 |
| Social Media (Twitter, Facebook, Nextdoor, etc.) | 52.78% | 38 |
| Chamber of Commerce | 2.78% | 2 |
| Academic Institutions | 0.00% | 0 |
| Public Library | 11.11% | 8 |
| Red Cross Information | 2.78% | 2 |
| Community Safety/Preparedness Events | 15.28% | 11 |
| Fair Booths | 1.39% | 1 |
| Word of Mouth | 20.83% | 15 |
| Books | 0.00% | 0 |
| Other (please specify) | 4.17% | 3 |
| Total Respondents: 72 | | |

# Q11 Which methods are best for you and your household or business to receive urgent information or instructions ?

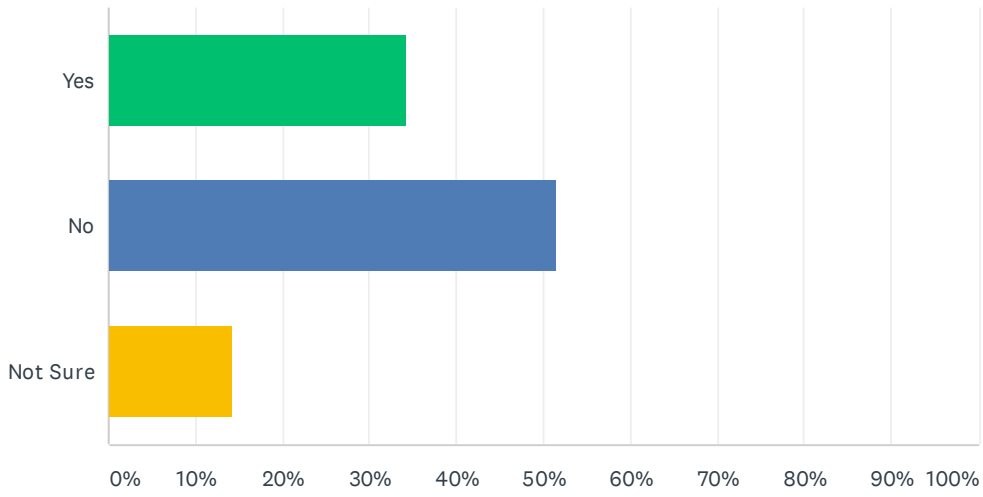
Answered: 72 Skipped: 4




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Land-line telephone | 19.44% | 14 |
| Cell phone | 50.00% | 36 |
| Text message | 73.61% | 53 |
| Email | 51.39% | 37 |
| Radio | 33.33% | 24 |
| TV | 22.22% | 16 |
| Social network (Twitter, Facebook, etc.) | 38.89% | 28 |
| Total Respondents: 72 | | |

# Q12 Do you have flood insurance?

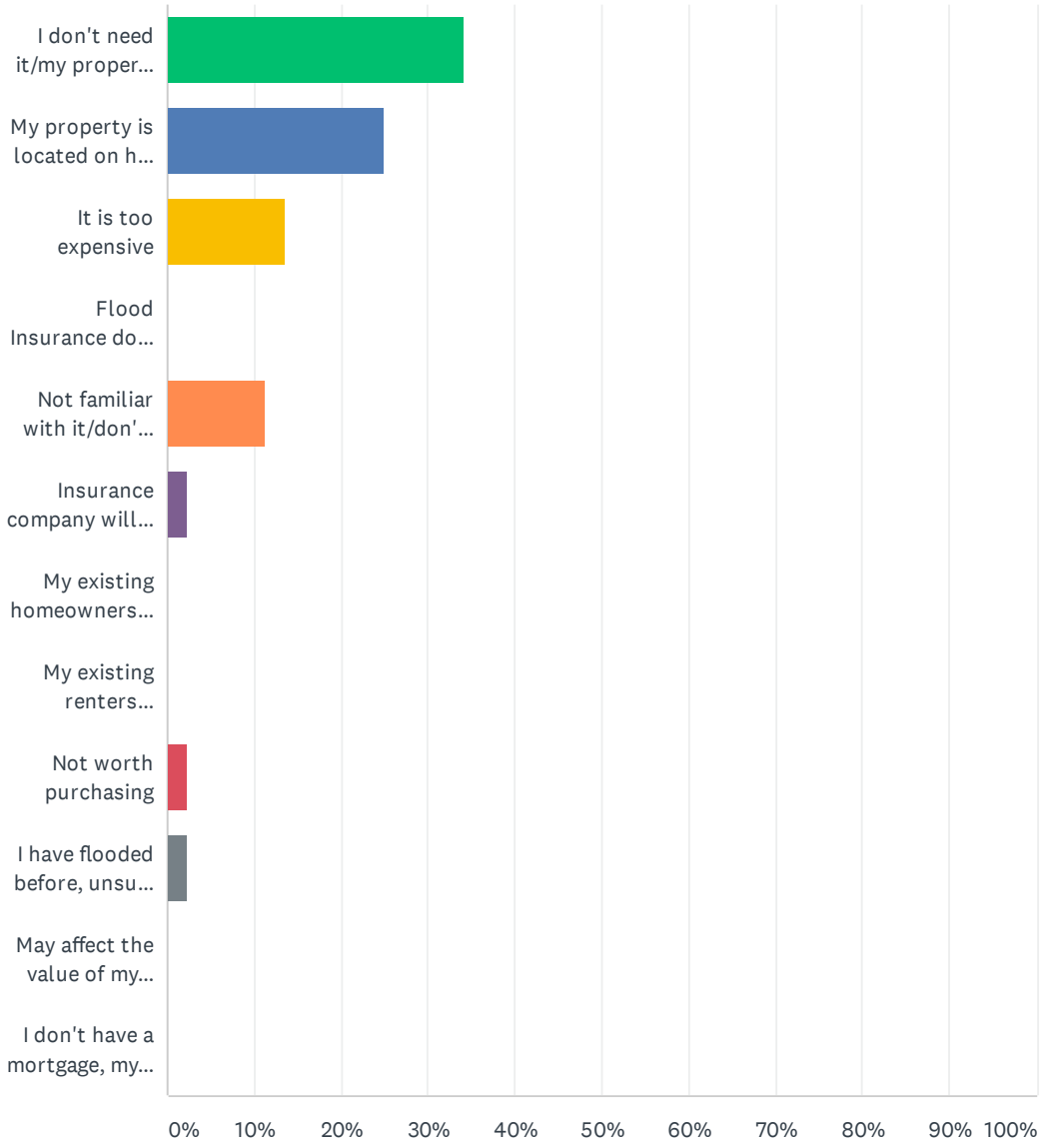
Answered: 70 Skipped: 6




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 34.29% | 24 |
| No | 51.43% | 36 |
| Not Sure | 14.29% | 10 |
| TOTAL | | 70 |

# Q13 If you do NOT have flood insurance, what is the primary reason?

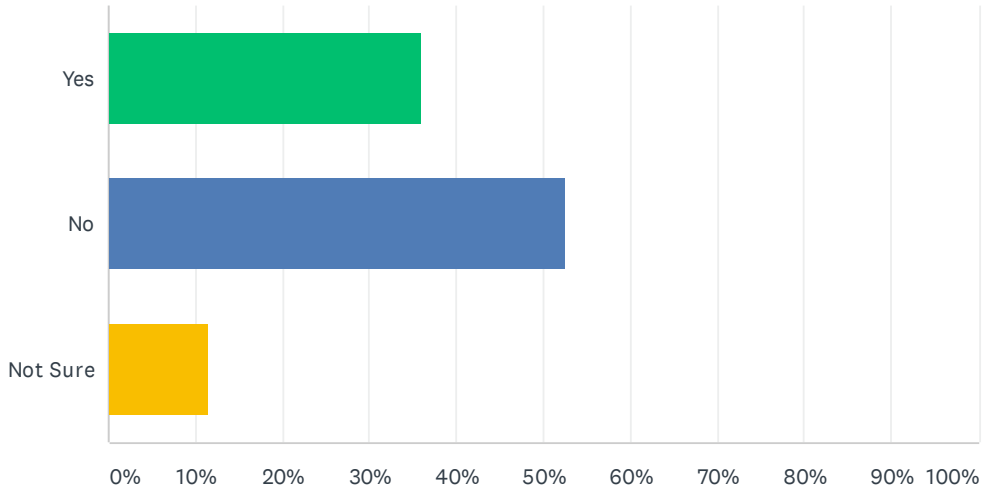
Answered: 44 Skipped: 32



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| I don't need it/my property has never flooded | 34.09% | 15 |
| My property is located on high ground | 25.00% | 11 |
| It is too expensive | 13.64% | 6 |
| Flood Insurance does not provide enough coverage | 0.00% | 0 |
| Not familiar with it/don't know about it. | 11.36% | 5 |
| Insurance company will not provide coverage | 2.27% | 1 |
| My existing homeowners insurance provides coverage | 0.00% | 0 |
| My existing renters insurance provides coverage | 0.00% | 0 |
| Not worth purchasing | 2.27% | 1 |
| I have flooded before, unsure if I qualify for coverage | 2.27% | 1 |
| May affect the value of my property | 0.00% | 0 |
| I don't have a mortgage, my home is paid off | 0.00% | 0 |
| TOTAL | | 44 |

# Q14 When you moved into your property, did you consider the impact a potential flood could have on that property?

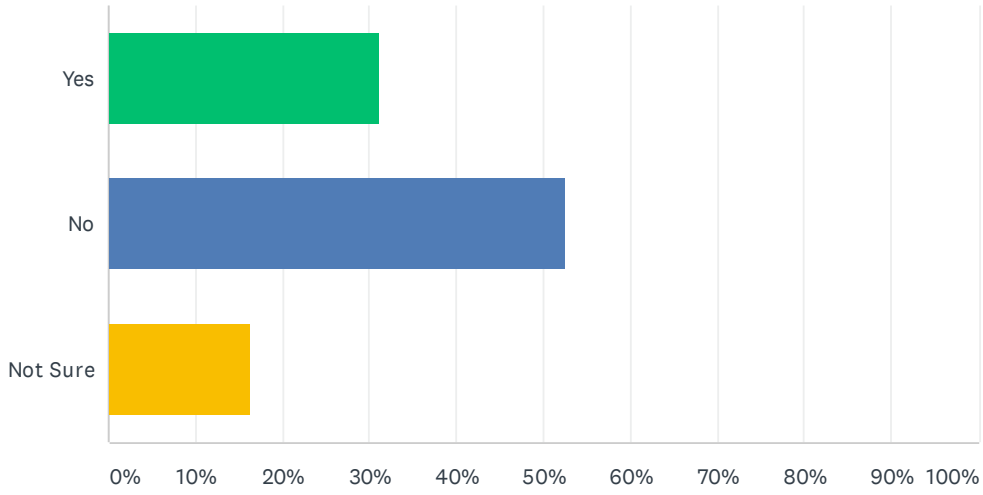
Answered: 61 Skipped: 15




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 36.07% | 22 |
| No | 52.46% | 32 |
| Not Sure | 11.48% | 7 |
| TOTAL | | 61 |

# Q15 Was the presence of a flood hazard disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your property?

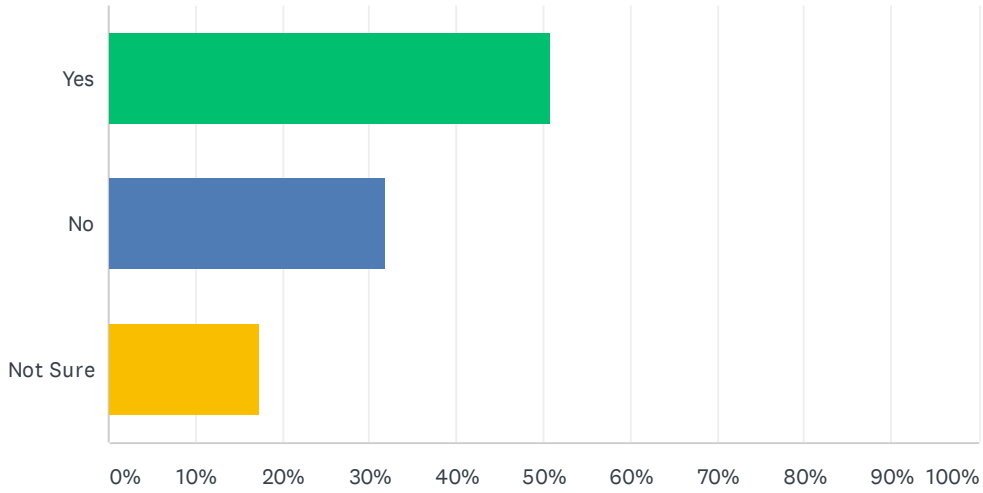
Answered: 61 Skipped: 15




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 31.15% | 19 |
| No | 52.46% | 32 |
| Not Sure | 16.39% | 10 |
| TOTAL | | 61 |

# Q16 Would the disclosure of the flood hazard have influenced your decision to buy or rent a property?

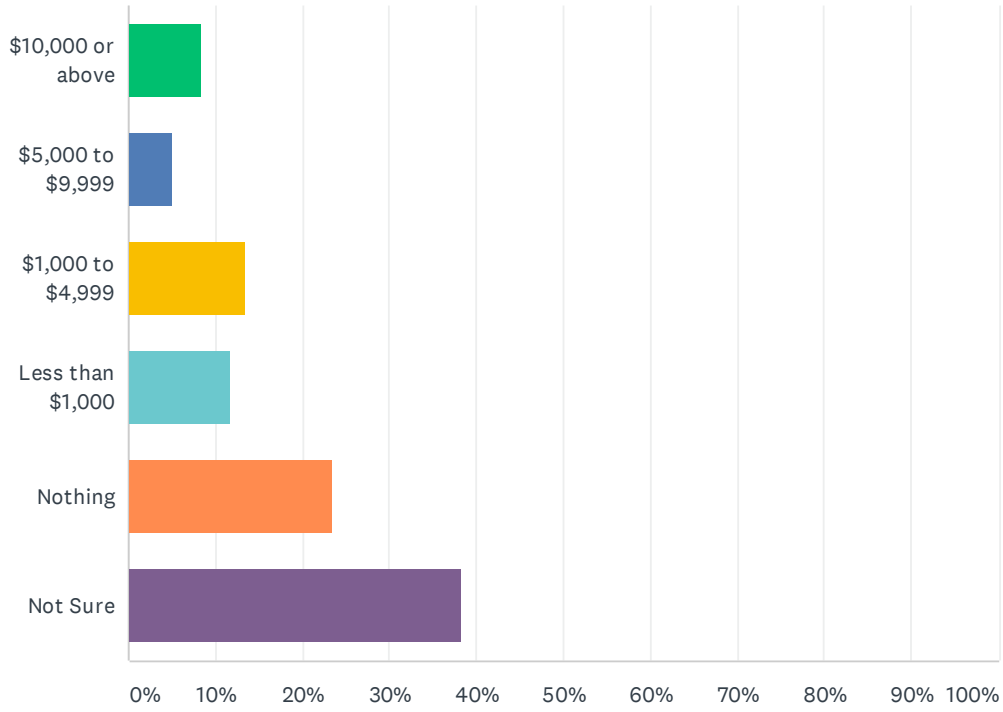
Answered: 63 Skipped: 13




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 50.79% | 32 |
| No | 31.75% | 20 |
| Not Sure | 17.46% | 11 |
| TOTAL | | 63 |

# Q17 How much money are you willing to spend to retrofit your property to reduce flood risk (e.g., elevating a structure above flood level, flood-proofing a non-residential structure, building berms or flood-walls)?

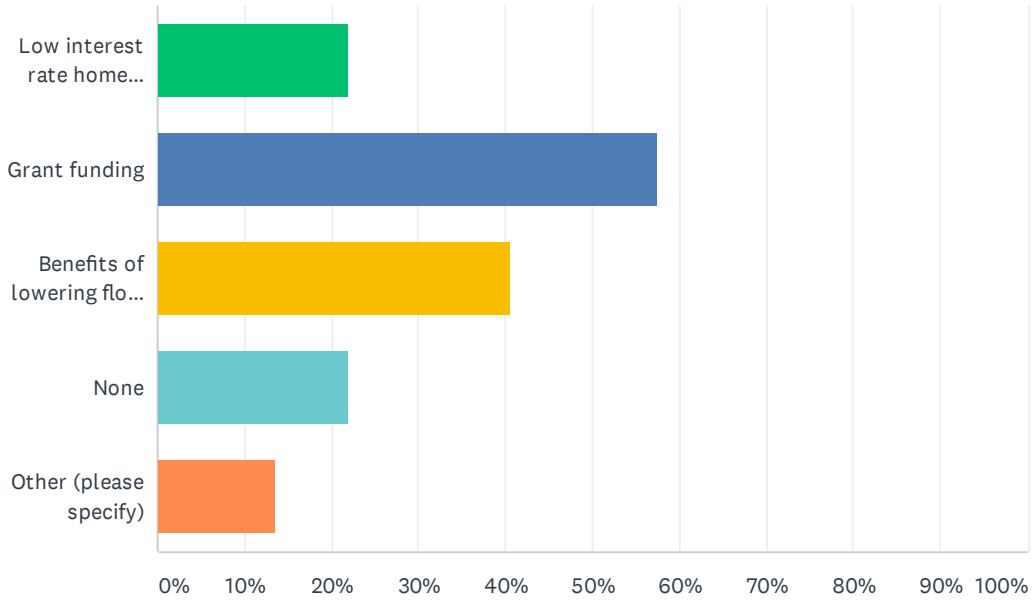
Answered: 60 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $10,000 or above | 8.33% | 5 |
| $5,000 to $9,999 | 5.00% | 3 |
| $1,000 to $4,999 | 13.33% | 8 |
| Less than $1,000 | 11.67% | 7 |
| Nothing | 23.33% | 14 |
| Not Sure | 38.33% | 23 |
| TOTAL | | 60 |

# Q18 Which of the following incentives would encourage you to spend money to retrofit your home or place of business to protect against flood disasters? (Check all that apply)

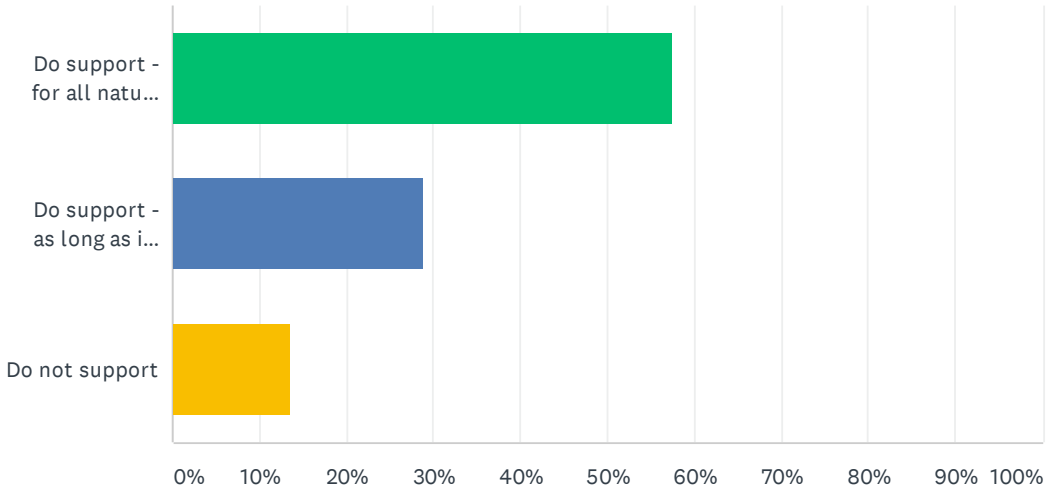
Answered: 59 Skipped: 17




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Low interest rate home improvement loan | 22.03% | 13 |
| Grant funding | 57.63% | 34 |
| Benefits of lowering flood insurance premium | 40.68% | 24 |
| None | 22.03% | 13 |
| Other (please specify) | 13.56% | 8 |
| Total Respondents: 59 | | |

# Q19 Do you support the preservation of natural land that contains a flood hazard?

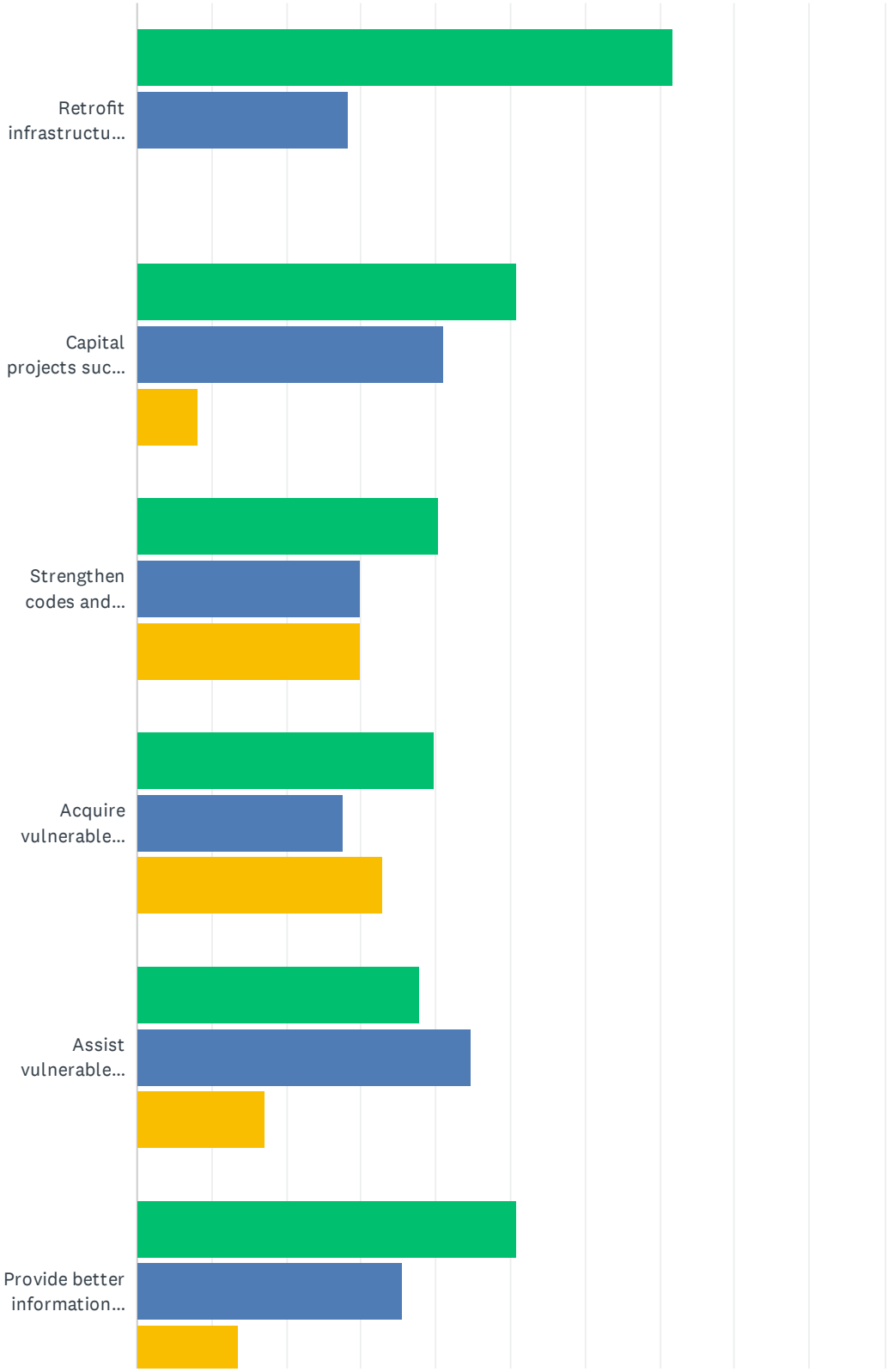
Answered: 59 Skipped: 17

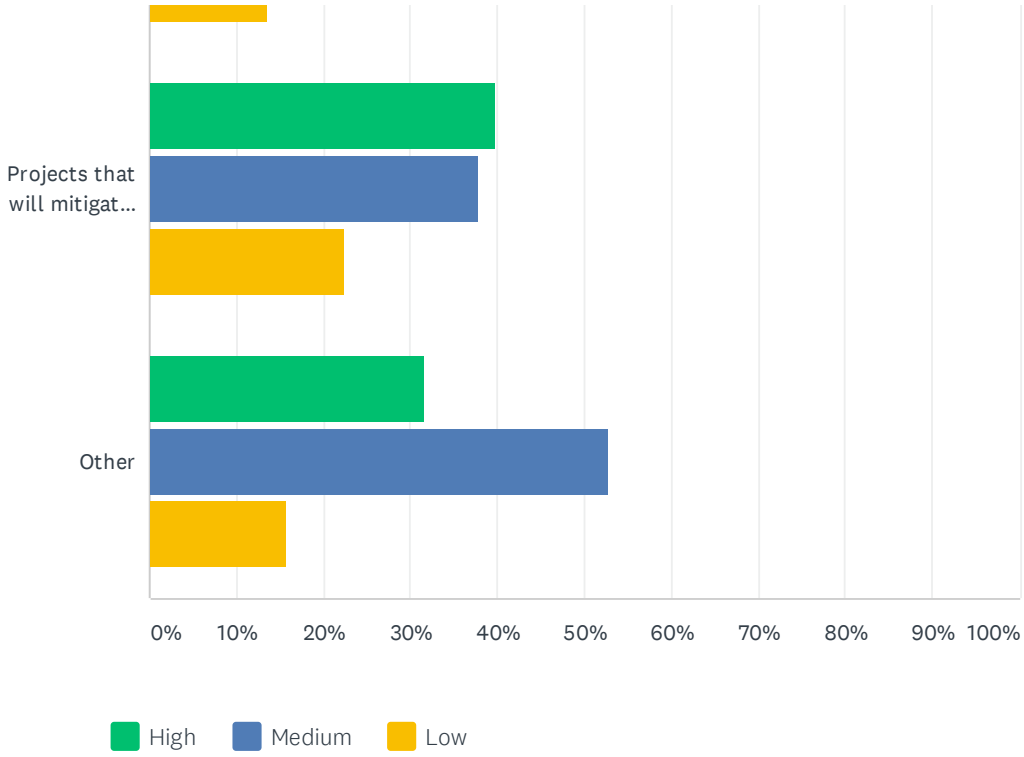



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Do support - for all natural lands | 57.63% | 34 |
| Do support - as long as it is not my property | 28.81% | 17 |
| Do not support | 13.56% | 8 |
| TOTAL | | 59 |

# Q20 What types of projects do you believe the County, State or Federal government agencies should consider to reduce damage and disruption from flooding?

Answered: 61 Skipped: 15

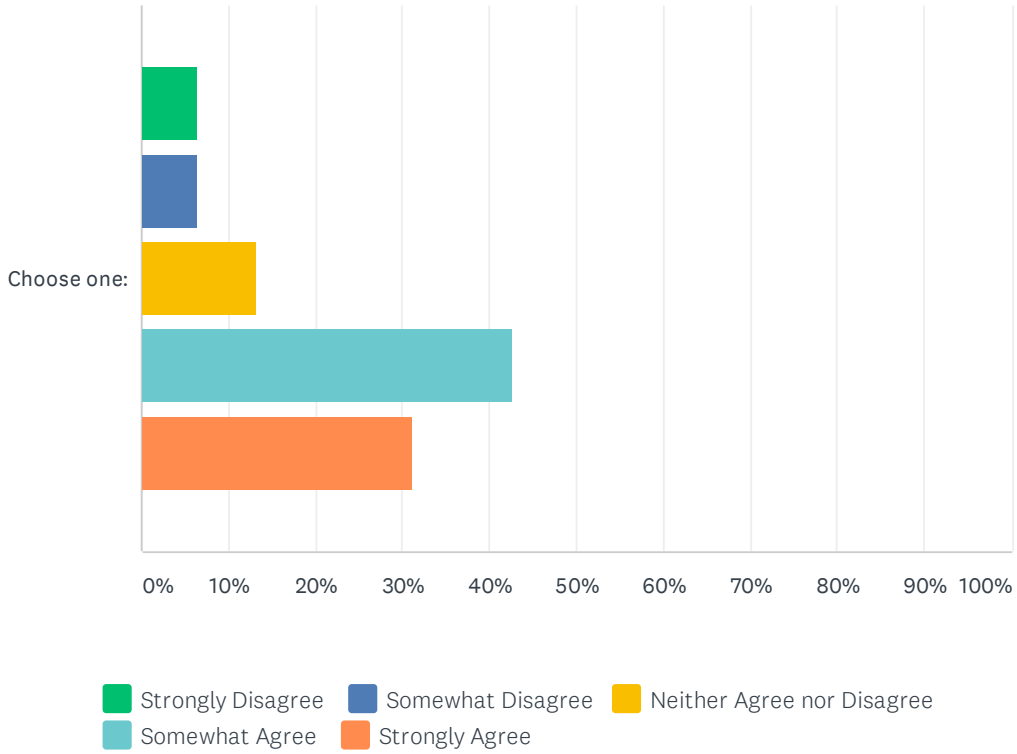





| | HIGH | MEDIUM | LOW | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|
| Retrofit infrastructure, such as improving culverts, bridges, and local drainage. | 71.67%<br>43 | 28.33%<br>17 | 0.00%<br>0 | 60 | 1.28 |
| Capital projects such as dams, levees, flood walls and drainage improvements. | 50.82%<br>31 | 40.98%<br>25 | 8.20%<br>5 | 61 | 1.57 |
| Strengthen codes and regulations to include higher regulatory standards in flood hazard areas. | 40.35%<br>23 | 29.82%<br>17 | 29.82%<br>17 | 57 | 1.89 |
| Acquire vulnerable properties and maintain as open space. | 39.66%<br>23 | 27.59%<br>16 | 32.76%<br>19 | 58 | 1.93 |
| Assist vulnerable property owners with securing funding for mitigation. | 37.93%<br>22 | 44.83%<br>26 | 17.24%<br>10 | 58 | 1.79 |
| Provide better information about flood risk to the public. | 50.85%<br>30 | 35.59%<br>21 | 13.56%<br>8 | 59 | 1.63 |
| Projects that will mitigate future flood impacts caused by climate change | 39.66%<br>23 | 37.93%<br>22 | 22.41%<br>13 | 58 | 1.83 |
| Other | 31.58%<br>6 | 52.63%<br>10 | 15.79%<br>3 | 19 | 1.84 |

# Q21 Please indicate how you feel about the following statement:It is the responsibility of government (local, state and federal) to provide education and awareness programs that promote actions by the community to reduce their exposure to the risks associated with flood hazards.

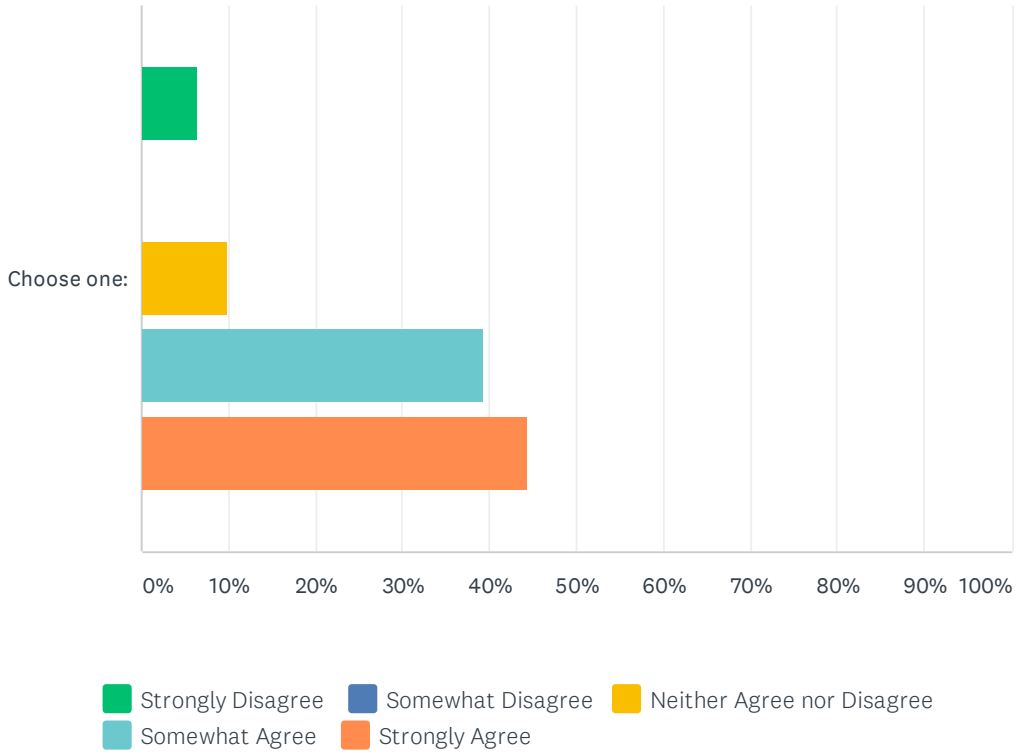
Answered: 61 Skipped: 15




| | STRONGLY DISAGREE | SOMEWHAT DISAGREE | NEITHER AGREE NOR DISAGREE | SOMEWHAT AGREE | STRONGLY AGREE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|---|
| Choose one: | 6.56%<br>4 | 6.56%<br>4 | 13.11%<br>8 | 42.62%<br>26 | 31.15%<br>19 | 61 | 3.85 |

# Q22 Please indicate how you feel about the following statement:It is my responsibility to educate myself and take actions that will reduce my exposure to the risks associated with flood hazards.

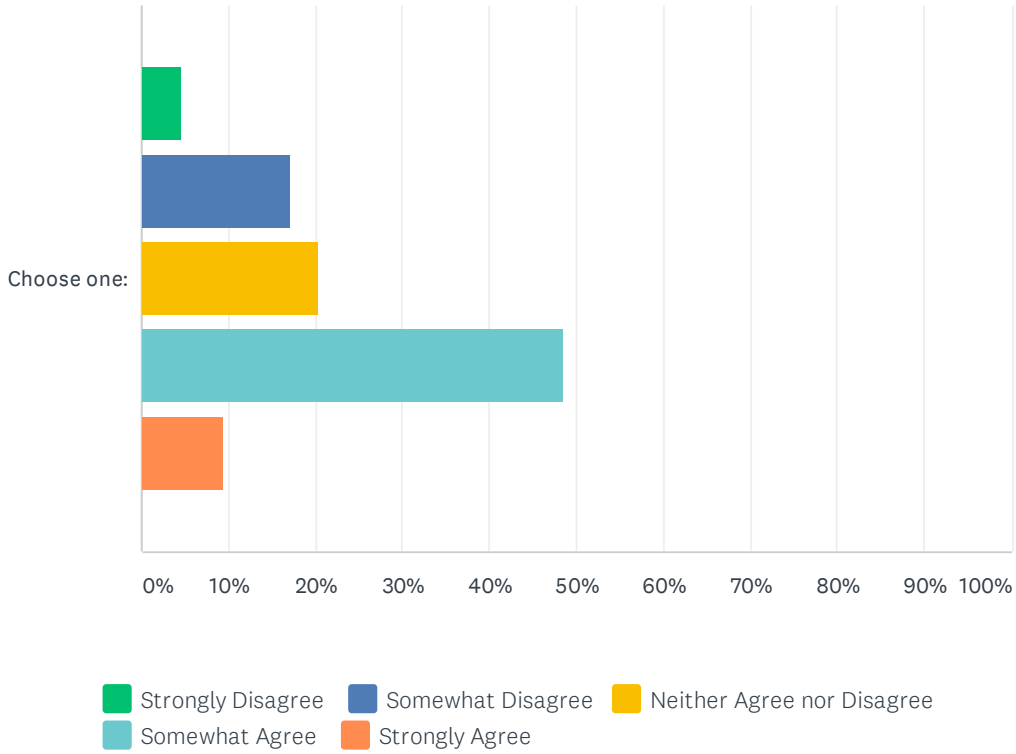
Answered: 61 Skipped: 15




| | STRONGLY DISAGREE | SOMEWHAT DISAGREE | NEITHER AGREE NOR DISAGREE | SOMEWHAT AGREE | STRONGLY AGREE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|---|
| Choose one: | 6.56%<br>4 | 0.00%<br>0 | 9.84%<br>6 | 39.34%<br>24 | 44.26%<br>27 | 61 | 4.15 |

# Q23 Please indicate how you feel about the following statement:Information about the risks associated with flood hazards is readily available and easy to locate.

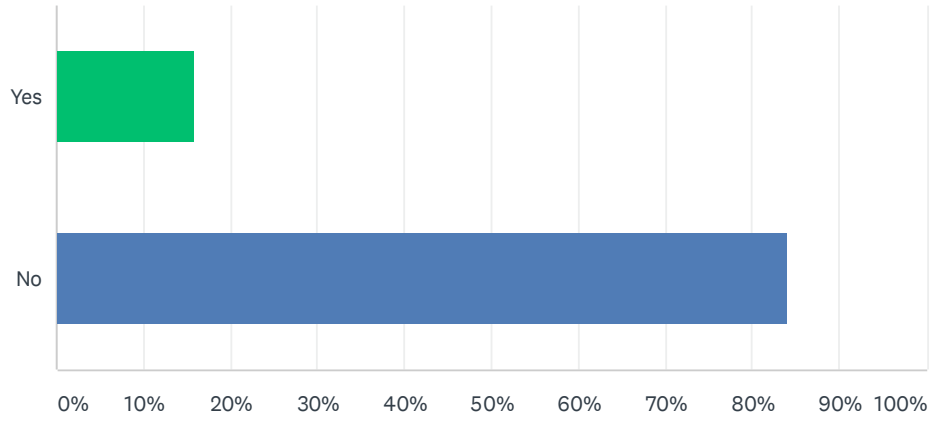
Answered: 64 Skipped: 12




| | STRONGLY DISAGREE | SOMEWHAT DISAGREE | NEITHER AGREE NOR DISAGREE | SOMEWHAT AGREE | STRONGLY AGREE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|---|
| Choose one: | 4.69%<br>3 | 17.19%<br>11 | 20.31%<br>13 | 48.44%<br>31 | 9.38%<br>6 | 64 | 3.41 |

# Q24 Are you aware of the current Floodplain Management Plan's programs and policies to reduce flooding hazards?

Answered: 63 Skipped: 13



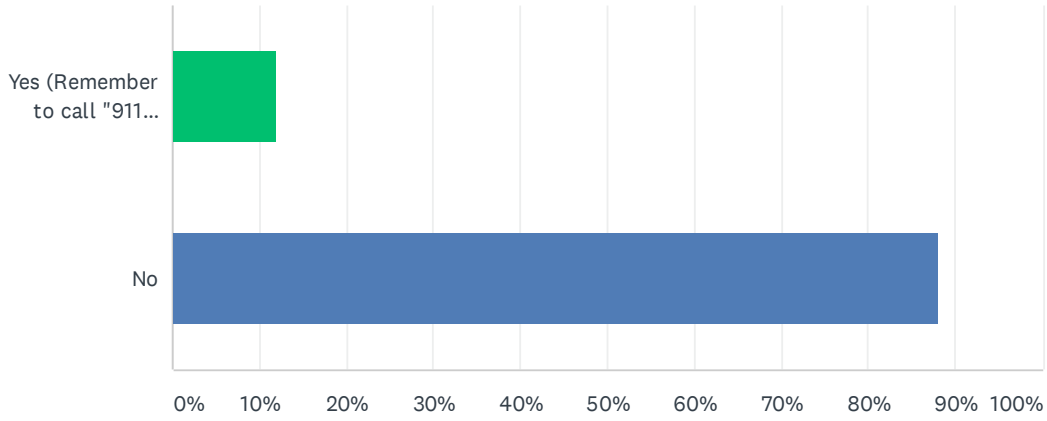

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 15.87% | 10 |
| No | 84.13% | 53 |
| TOTAL | | 63 |

# Q25 What is your zip code?

Answered: 57 Skipped: 19

# Q26 Do you have any special access or functional needs within your household or place of business that would require early warning or specialized response during disasters?

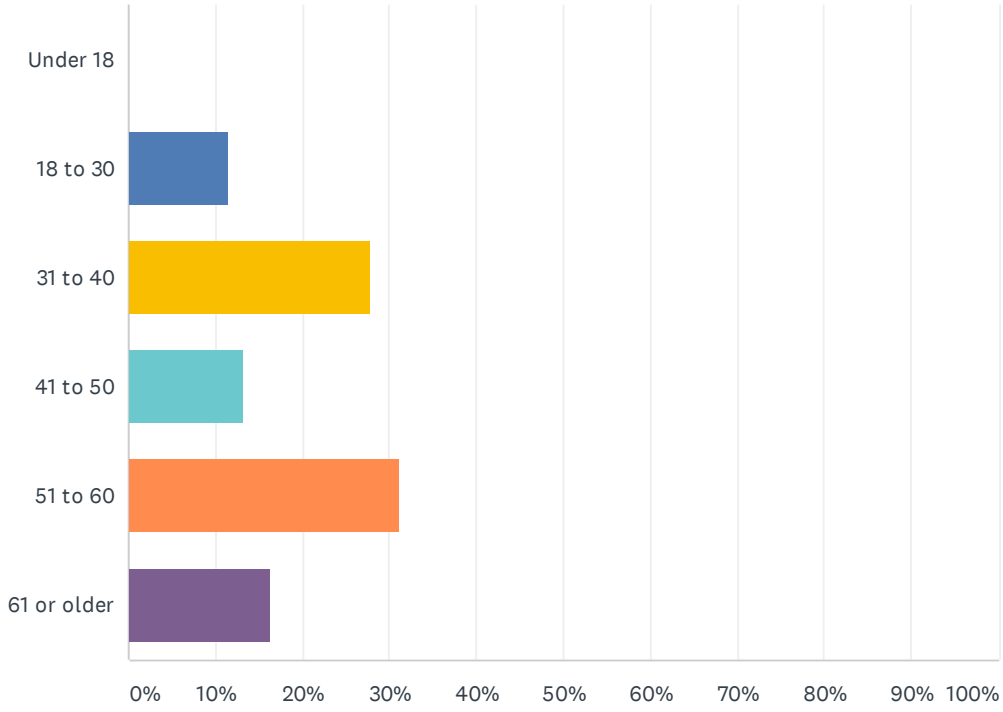
Answered: 59 Skipped: 17




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes (Remember to call "911" if assistance is needed during an emergency) | 11.86% | 7 |
| No | 88.14% | 52 |
| TOTAL | | 59 |

# Q27 Please indicate your age range:

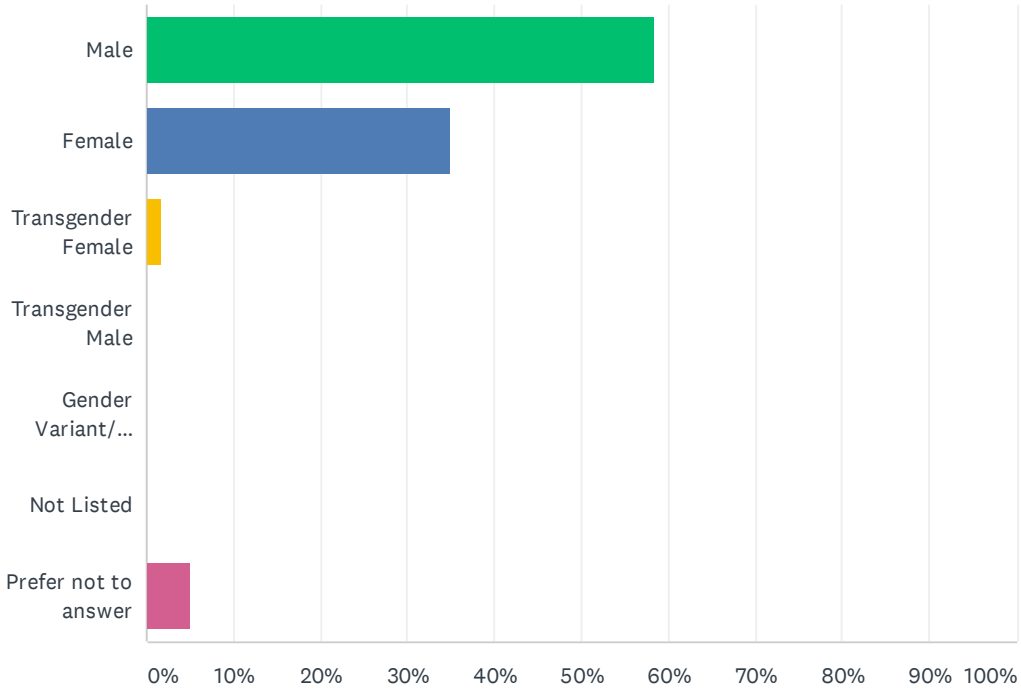
Answered: 61 Skipped: 15




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Under 18 | 0.00% | 0 |
| 18 to 30 | 11.48% | 7 |
| 31 to 40 | 27.87% | 17 |
| 41 to 50 | 13.11% | 8 |
| 51 to 60 | 31.15% | 19 |
| 61 or older | 16.39% | 10 |
| TOTAL | | 61 |

# Q28 Please indicate your gender:

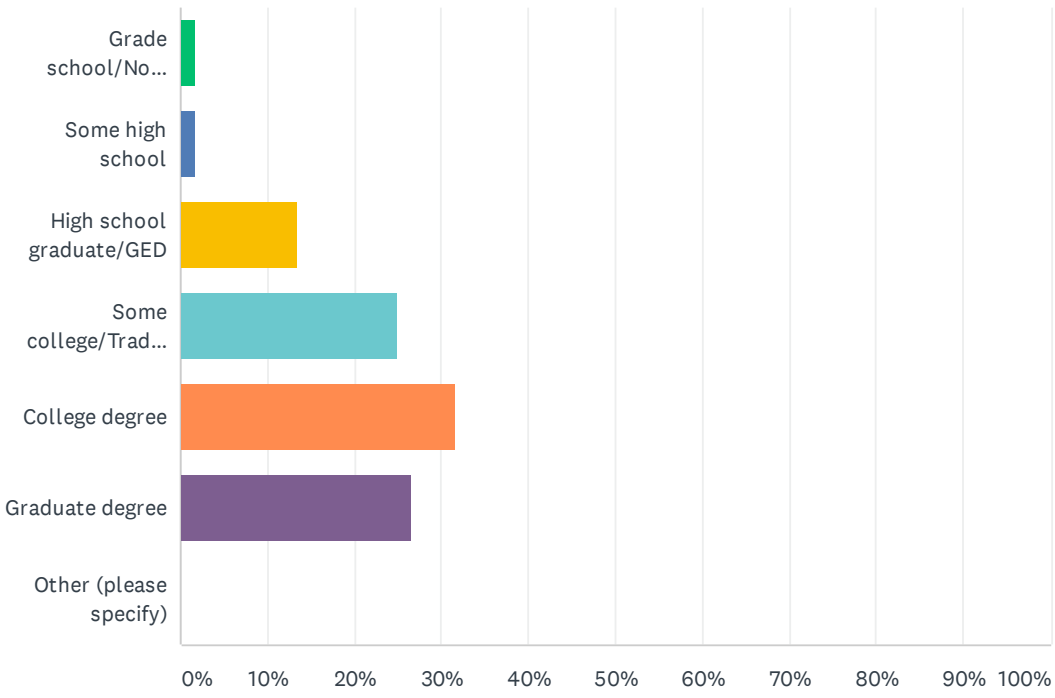
Answered: 60 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Male | 58.33% | 35 |
| Female | 35.00% | 21 |
| Transgender Female | 1.67% | 1 |
| Transgender Male | 0.00% | 0 |
| Gender Variant/ Non-conforming | 0.00% | 0 |
| Not Listed | 0.00% | 0 |
| Prefer not to answer | 5.00% | 3 |
| TOTAL | | 60 |

# Q29 Please indicate your highest level of education.

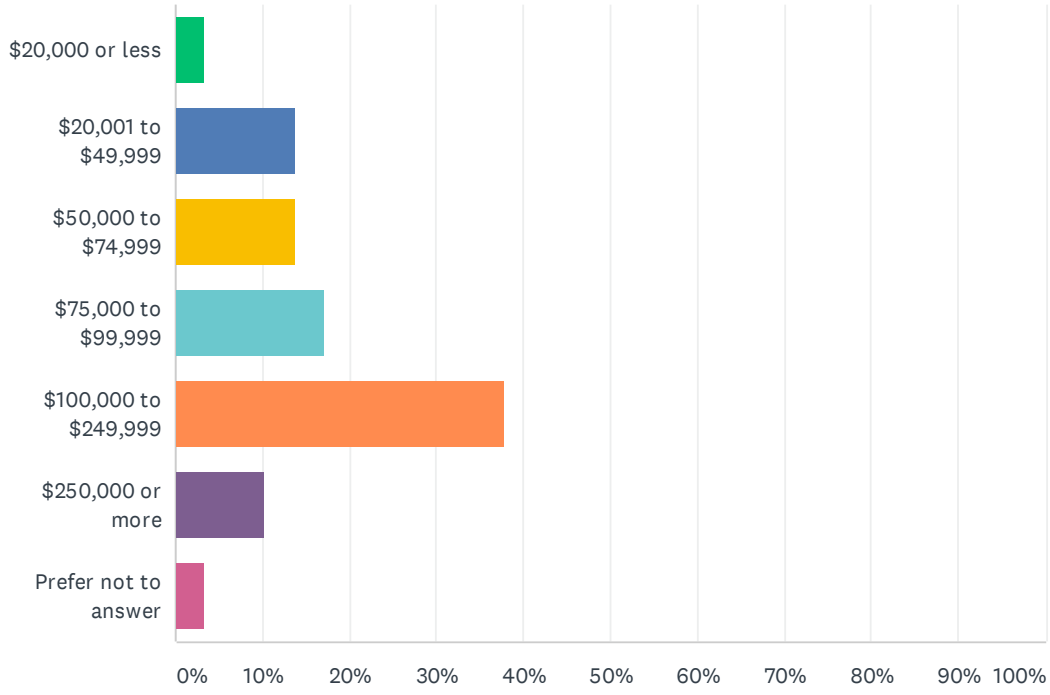
Answered: 60 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Grade school/No schooling | 1.67% | 1 |
| Some high school | 1.67% | 1 |
| High school graduate/GED | 13.33% | 8 |
| Some college/Trade school | 25.00% | 15 |
| College degree | 31.67% | 19 |
| Graduate degree | 26.67% | 16 |
| Other (please specify) | 0.00% | 0 |
| TOTAL | | 60 |

# Q30 How much is your gross household income?

Answered: 58 Skipped: 18




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $20,000 or less | 3.45% | 2 |
| $20,001 to $49,999 | 13.79% | 8 |
| $50,000 to $74,999 | 13.79% | 8 |
| $75,000 to $99,999 | 17.24% | 10 |
| $100,000 to $249,999 | 37.93% | 22 |
| $250,000 or more | 10.34% | 6 |
| Prefer not to answer | 3.45% | 2 |
| TOTAL | | 58 |

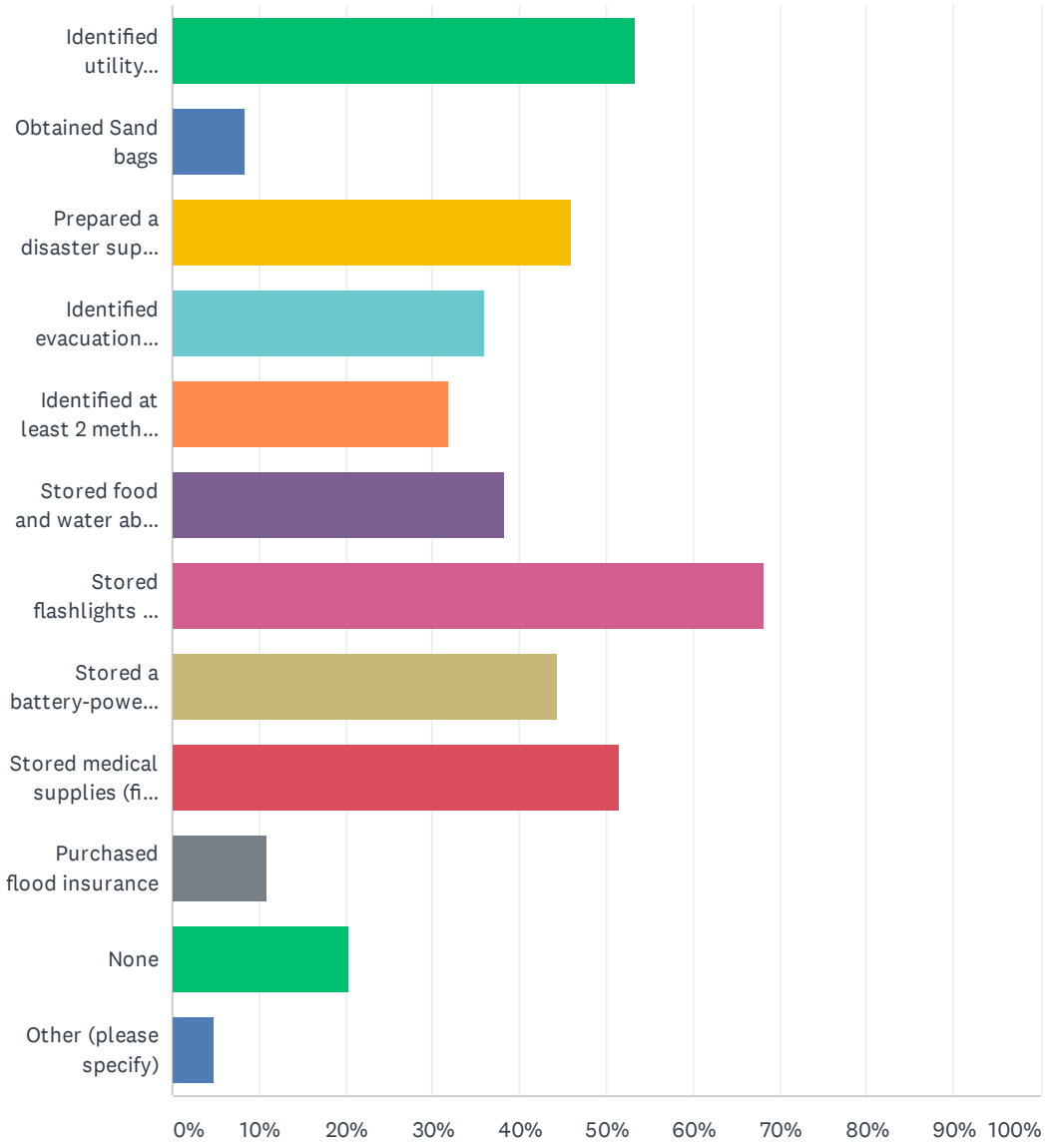
# Q31 Comments

Answered: 14 Skipped: 62

# City of Los Angeles Survey Results
# (English)

# Q1 Which of the following steps has your household taken to prepare for a flood event? (Check all that apply)

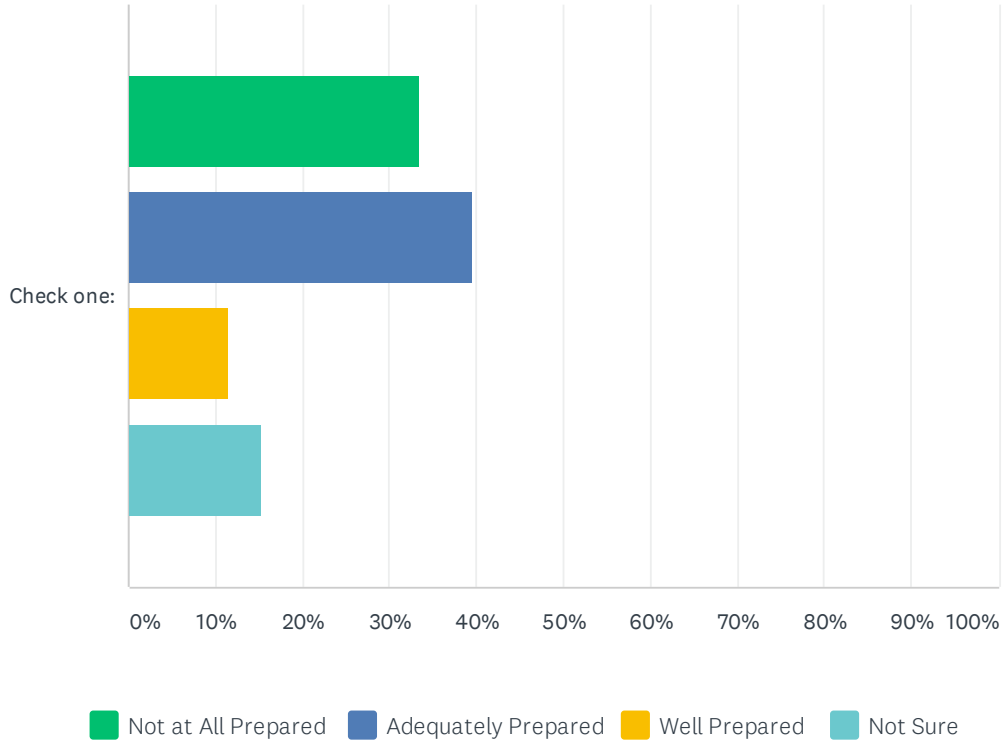
Answered: 167 Skipped: 2



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Identified utility shutoffs | 53.29% | 89 |
| Obtained Sand bags | 8.38% | 14 |
| Prepared a disaster supply kit | 46.11% | 77 |
| Identified evacuation routes | 35.93% | 60 |
| Identified at least 2 methods for receiving emergency notifications and information during emergencies | 31.74% | 53 |
| Stored food and water above potential flood levels | 38.32% | 64 |
| Stored flashlights and batteries | 68.26% | 114 |
| Stored a battery-powered radio | 44.31% | 74 |
| Stored medical supplies (first aid kit, medications) | 51.50% | 86 |
| Purchased flood insurance | 10.78% | 18 |
| None | 20.36% | 34 |
| Other (please specify) | 4.79% | 8 |
| Total Respondents: 167 | | |

# Q2 How prepared is your household to deal with a flood event?

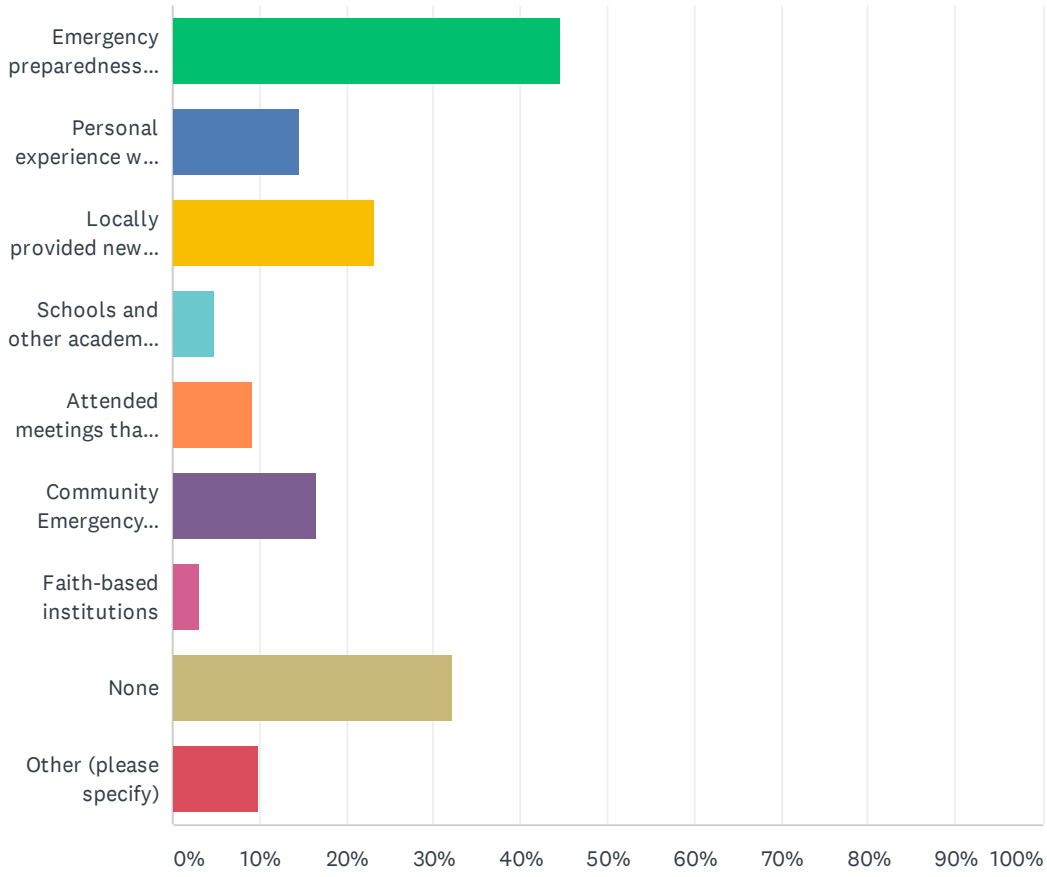
Answered: 164 Skipped: 5




| | NOT AT ALL PREPARED | ADEQUATELY PREPARED | WELL PREPARED | NOT SURE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Check one: | 33.54%<br>55 | 39.63%<br>65 | 11.59%<br>19 | 15.24%<br>25 | 164 | 3.02 |

# Q3 Which of the following have provided you with useful information to help you be prepared for a flood event? (Check all that apply)

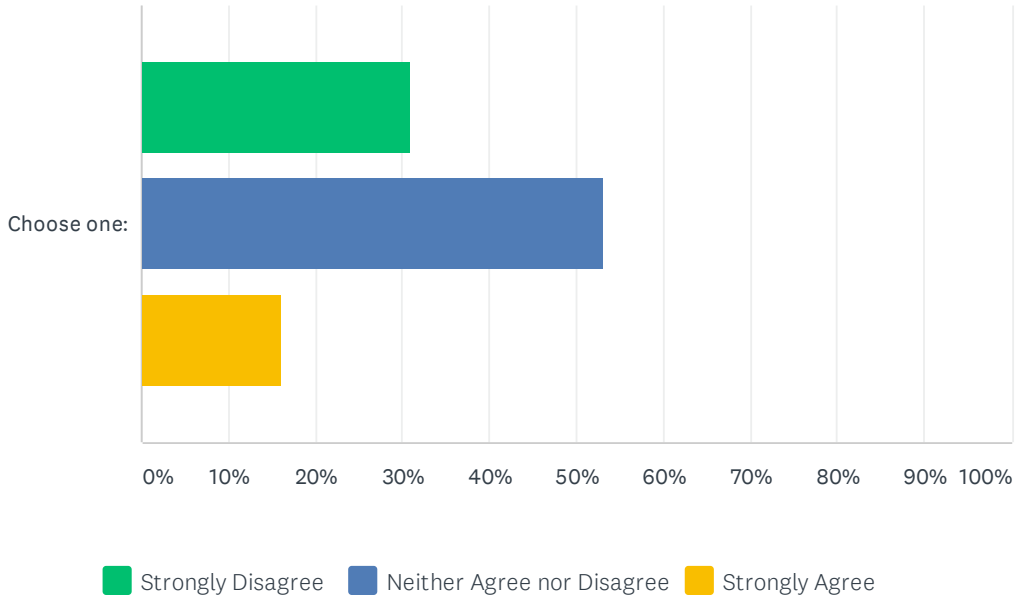
Answered: 164 Skipped: 5




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Emergency preparedness information from a government source (for example, federal, state, or local emergency management) | 44.51% | 73 |
| Personal experience with flood events | 14.63% | 24 |
| Locally provided news or other media information | 23.17% | 38 |
| Schools and other academic institutions | 4.88% | 8 |
| Attended meetings that have dealt with flood preparedness | 9.15% | 15 |
| Community Emergency Response Training (CERT) | 16.46% | 27 |
| Faith-based institutions | 3.05% | 5 |
| None | 32.32% | 53 |
| Other (please specify) | 9.76% | 16 |
| Total Respondents: 164 | | |

# Q4 Please indicate how you feel about the following statement:Information about the risks associated with flood hazards is readily available and easy to locate.

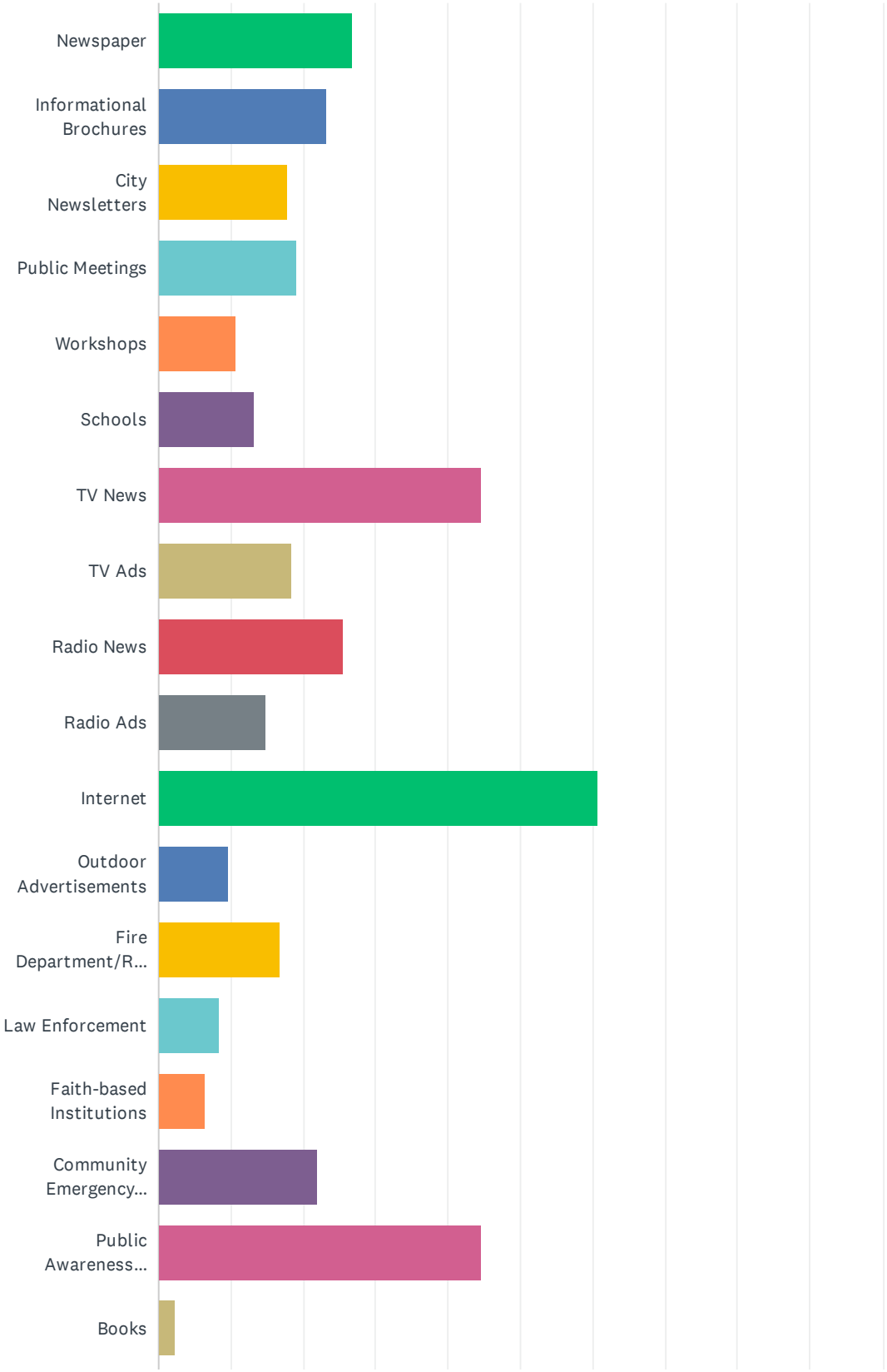
Answered: 162 Skipped: 7

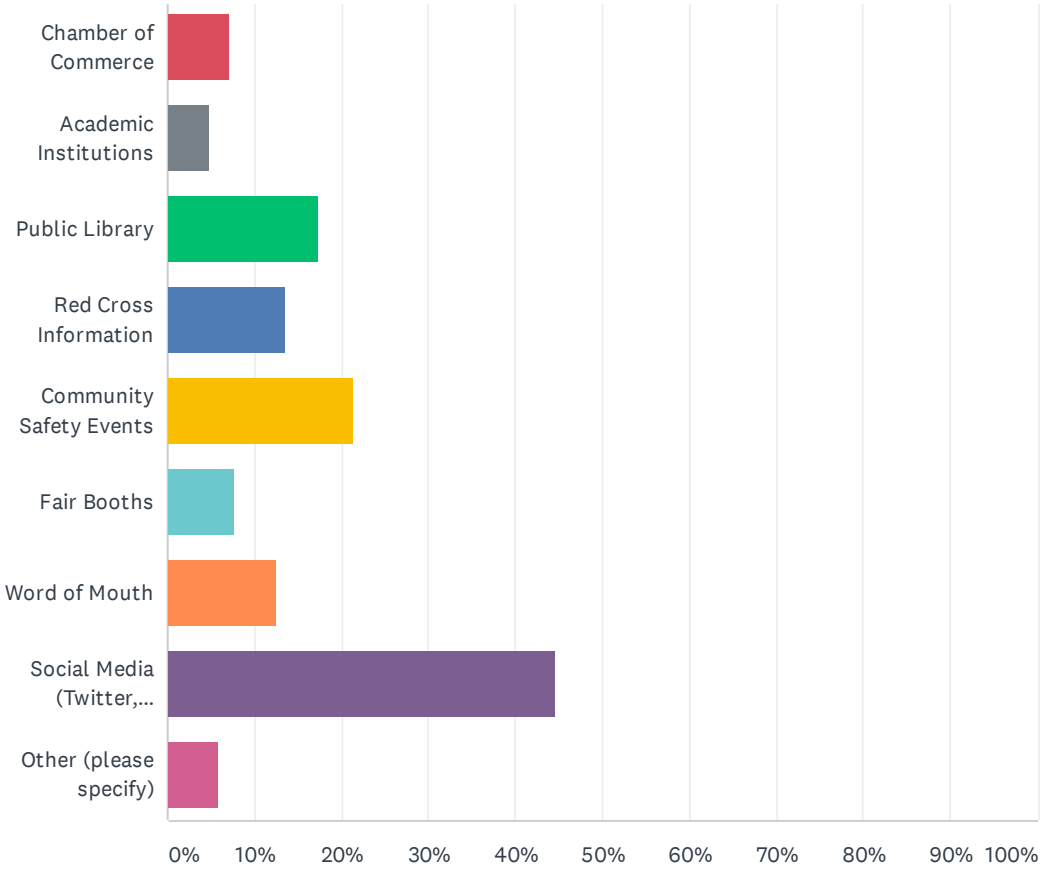



| | STRONGLY DISAGREE | NEITHER AGREE NOR DISAGREE | STRONGLY AGREE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|
| Choose one: | 30.86%<br>50 | 53.09%<br>86 | 16.05%<br>26 | 162 | 2.70 |

# Q5 Chose up to 5 of the following methods do you think are most effective for providing flood hazard and disaster information?

Answered: 168 Skipped: 1

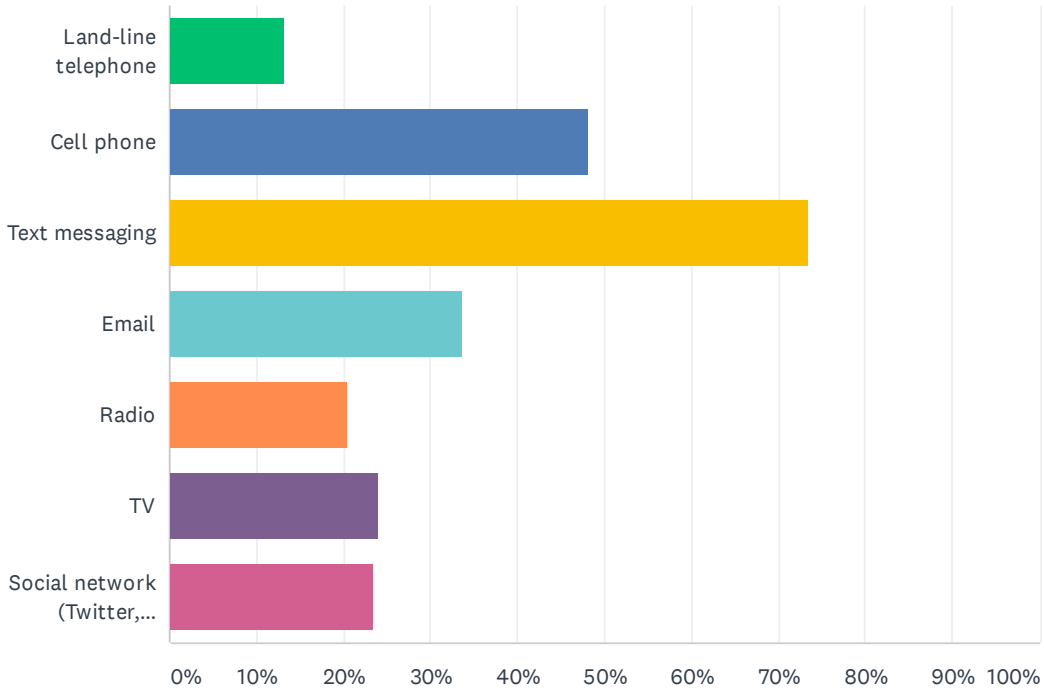



Chamber of Commerce
Academic Institutions
Public Library
Red Cross Information
Community Safety Events
Fair Booths
Word of Mouth
Social Media (Twitter,...
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Newspaper | 26.79% | 45 |
| Informational Brochures | 23.21% | 39 |
| City Newsletters | 17.86% | 30 |
| Public Meetings | 19.05% | 32 |
| Workshops | 10.71% | 18 |
| Schools | 13.10% | 22 |
| TV News | 44.64% | 75 |
| TV Ads | 18.45% | 31 |
| Radio News | 25.60% | 43 |
| Radio Ads | 14.88% | 25 |
| Internet | 60.71% | 102 |
| Outdoor Advertisements | 9.52% | 16 |
| Fire Department/Rescue | 16.67% | 28 |
| Law Enforcement | 8.33% | 14 |
| Faith-based Institutions | 6.55% | 11 |
| Community Emergency Response Team (CERT) Classes | 22.02% | 37 |
| Public Awareness Campaign (for example, Flood Awareness Week) | 44.64% | 75 |
| Books | 2.38% | 4 |
| Chamber of Commerce | 7.14% | 12 |
| Academic Institutions | 4.76% | 8 |
| Public Library | 17.26% | 29 |
| Red Cross Information | 13.69% | 23 |
| Community Safety Events | 21.43% | 36 |
| Fair Booths | 7.74% | 13 |
| Word of Mouth | 12.50% | 21 |
| Social Media (Twitter, Facebook, etc.) | 44.64% | 75 |
| Other (please specify) | 5.95% | 10 |
| Total Respondents: 168 | | |

# Q6 What method is best for you and your family to get time sensitive warning information or instructions for action?

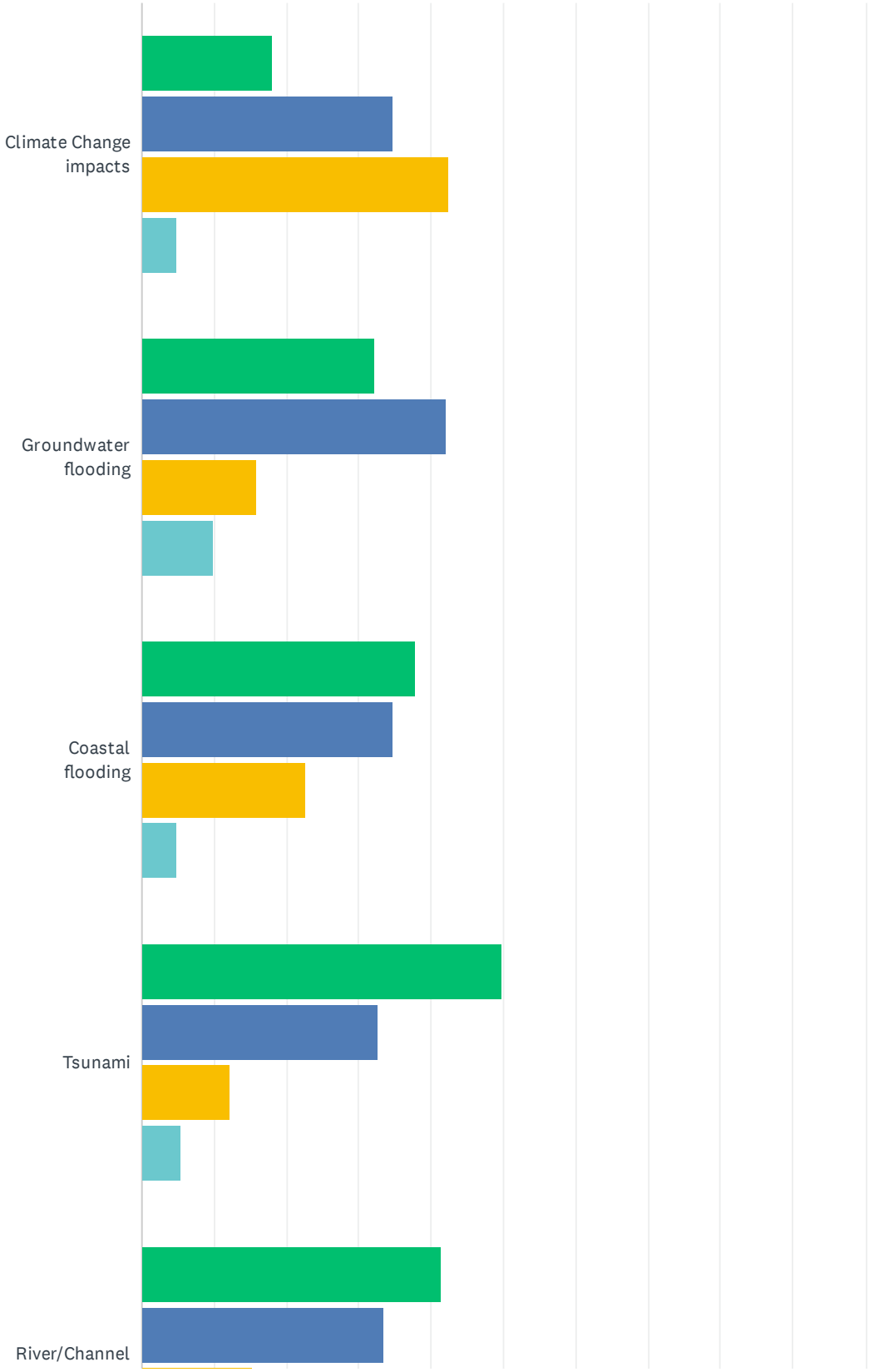
Answered: 166 Skipped: 3

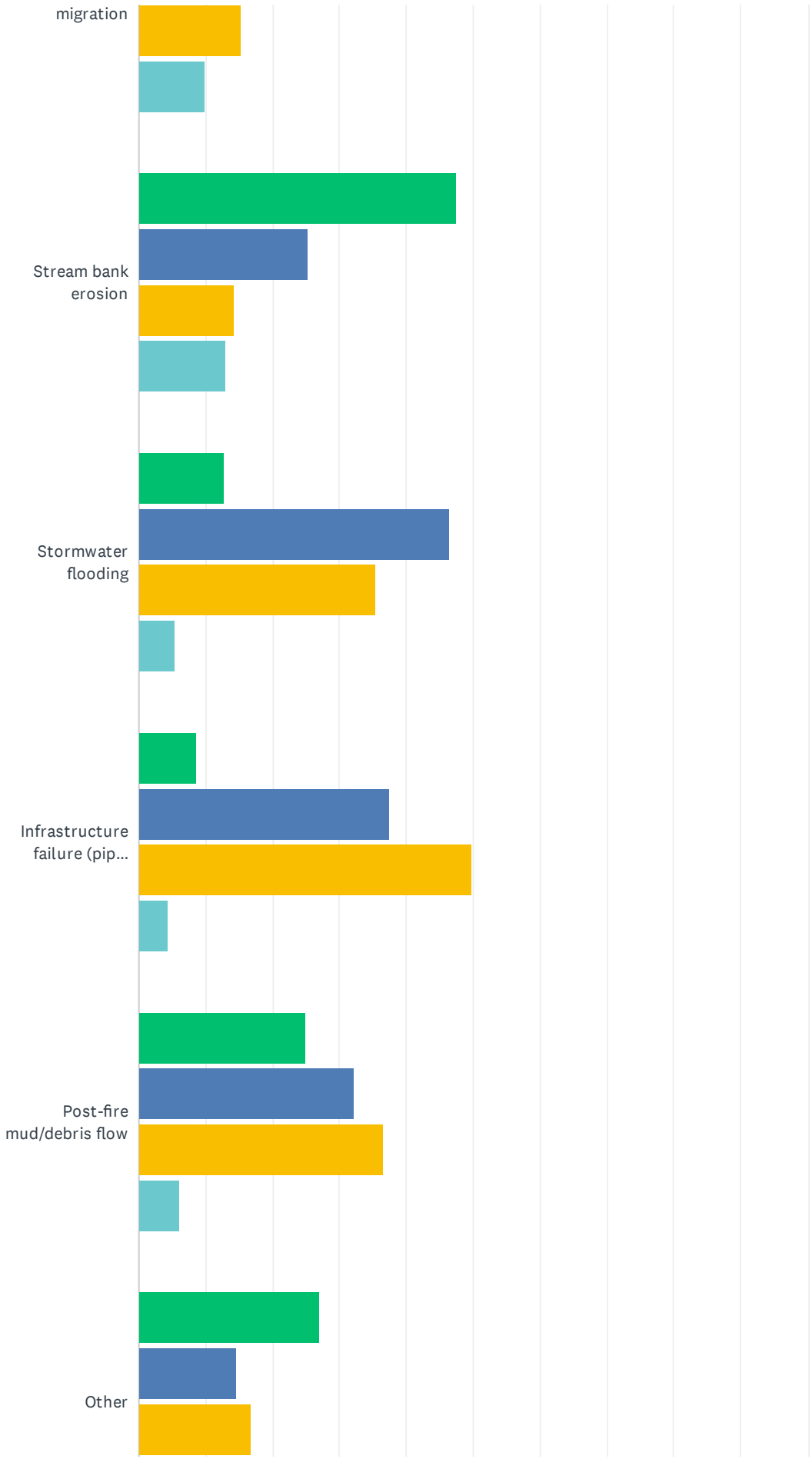


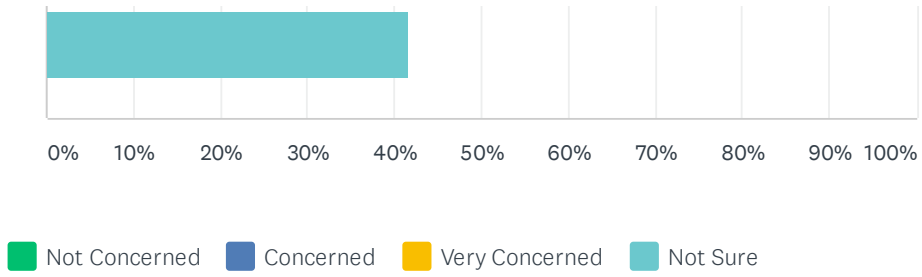

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Land-line telephone | 13.25% | 22 |
| Cell phone | 48.19% | 80 |
| Text messaging | 73.49% | 122 |
| Email | 33.73% | 56 |
| Radio | 20.48% | 34 |
| TV | 24.10% | 40 |
| Social network (Twitter, Facebook, etc.) | 23.49% | 39 |
| Total Respondents: 166 | | |

# Q7 How concerned are you about the following flood related hazards in Los Angeles? (Check one response for each hazard)

Answered: 168 Skipped: 1



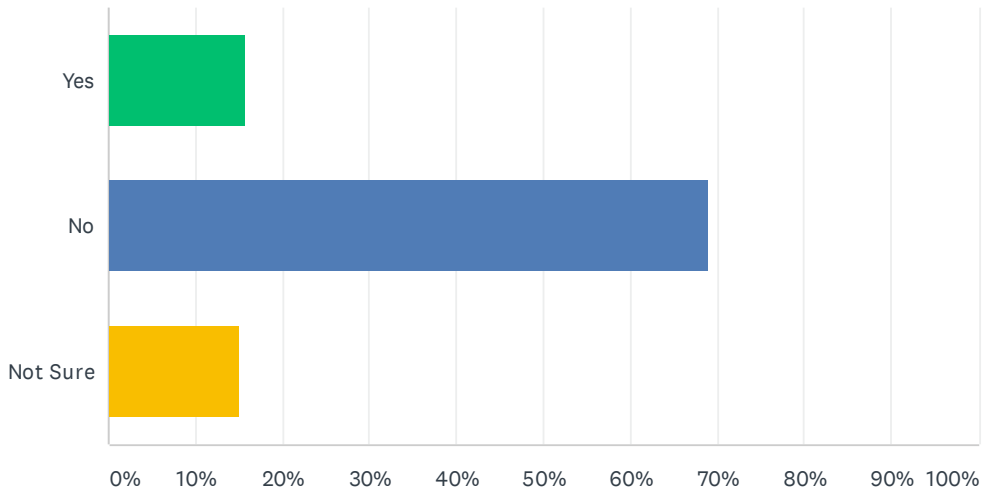

migration
Stream bank erosion
Stormwater flooding
Infrastructure failure (pip...
Post-fire mud/debris flow
Other




| | NOT CONCERNED | CONCERNED | VERY CONCERNED | NOT SURE | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Climate Change impacts | 17.96%<br>30 | 34.73%<br>58 | 42.51%<br>71 | 4.79%<br>8 | 167 | 3.63 |
| Groundwater flooding | 32.32%<br>53 | 42.07%<br>69 | 15.85%<br>26 | 9.76%<br>16 | 164 | 2.96 |
| Coastal flooding | 37.80%<br>62 | 34.76%<br>57 | 22.56%<br>37 | 4.88%<br>8 | 164 | 2.84 |
| Tsunami | 49.70%<br>82 | 32.73%<br>54 | 12.12%<br>20 | 5.45%<br>9 | 165 | 2.41 |
| River/Channel migration | 41.46%<br>68 | 33.54%<br>55 | 15.24%<br>25 | 9.76%<br>16 | 164 | 2.77 |
| Stream bank erosion | 47.53%<br>77 | 25.31%<br>41 | 14.20%<br>23 | 12.96%<br>21 | 162 | 2.72 |
| Stormwater flooding | 12.80%<br>21 | 46.34%<br>76 | 35.37%<br>58 | 5.49%<br>9 | 164 | 3.62 |
| Infrastructure failure (pipes, tanks) | 8.59%<br>14 | 37.42%<br>61 | 49.69%<br>81 | 4.29%<br>7 | 163 | 3.95 |
| Post-fire mud/debris flow | 25.00%<br>41 | 32.32%<br>53 | 36.59%<br>60 | 6.10%<br>10 | 164 | 3.41 |
| Other | 27.08%<br>13 | 14.58%<br>7 | 16.67%<br>8 | 41.67%<br>20 | 48 | 4.04 |

# Q8 Do you have flood insurance?

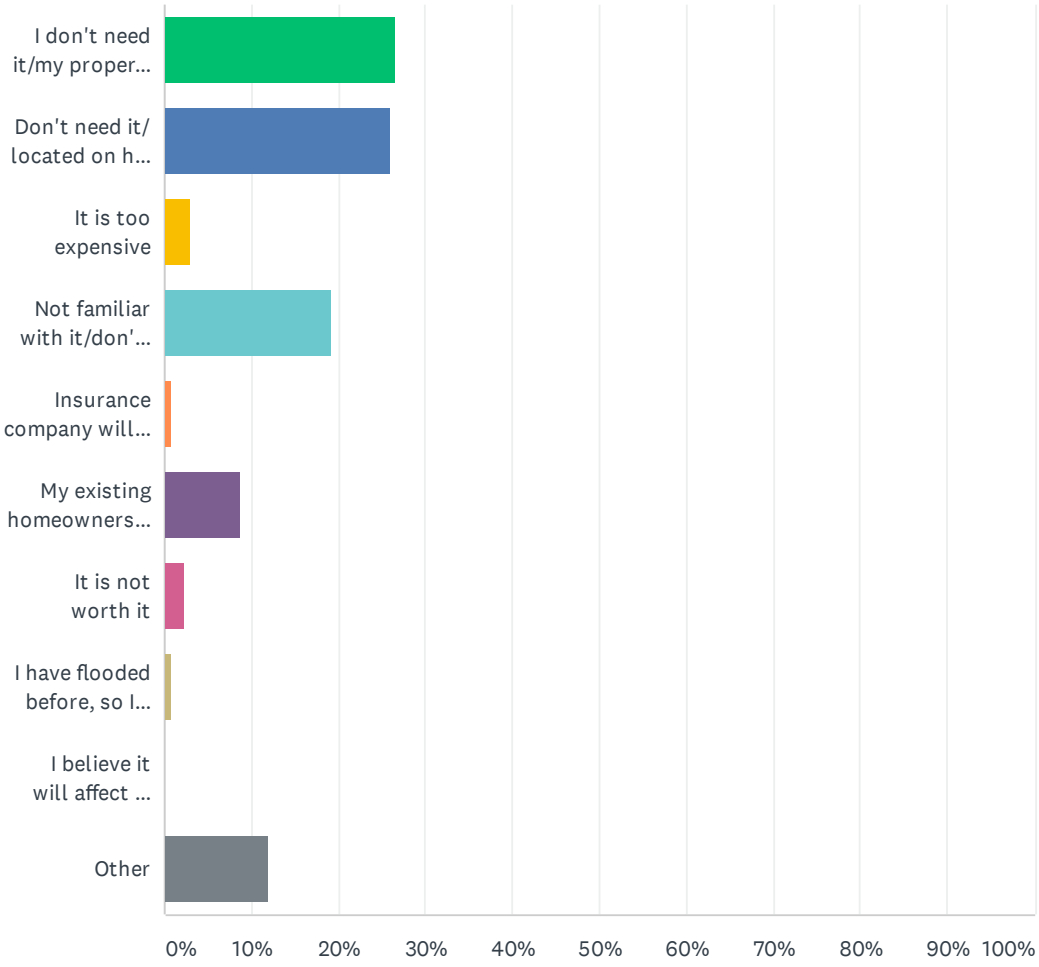
Answered: 165 Skipped: 4




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 15.76% | 26 |
| No | 69.09% | 114 |
| Not Sure | 15.15% | 25 |
| TOTAL | | 165 |

# Q9 If you do not have flood insurance, what is the primary reason?

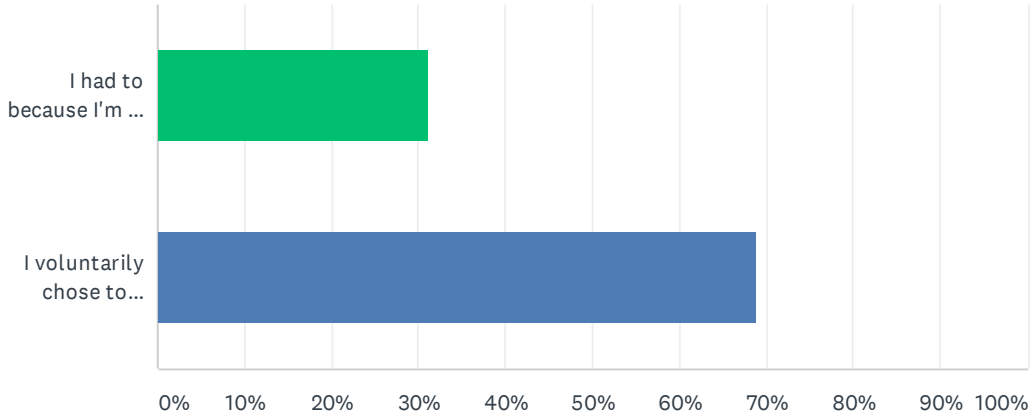
Answered: 135 Skipped: 34




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| I don't need it/my property has never flooded | 26.67% | 36 |
| Don't need it/ located on high ground | 25.93% | 35 |
| It is too expensive | 2.96% | 4 |
| Not familiar with it/don't know about it. | 19.26% | 26 |
| Insurance company will not provide coverage | 0.74% | 1 |
| My existing homeowners insurance provides coverage | 8.89% | 12 |
| It is not worth it | 2.22% | 3 |
| I have flooded before, so I did not think I qualified for coverage | 0.74% | 1 |
| I believe it will affect the value of my property | 0.00% | 0 |
| Other | 11.85% | 16 |
| TOTAL | | 135 |

# Q10 If you have flood insurance,why did you purchase it?

Answered: 32 Skipped: 137



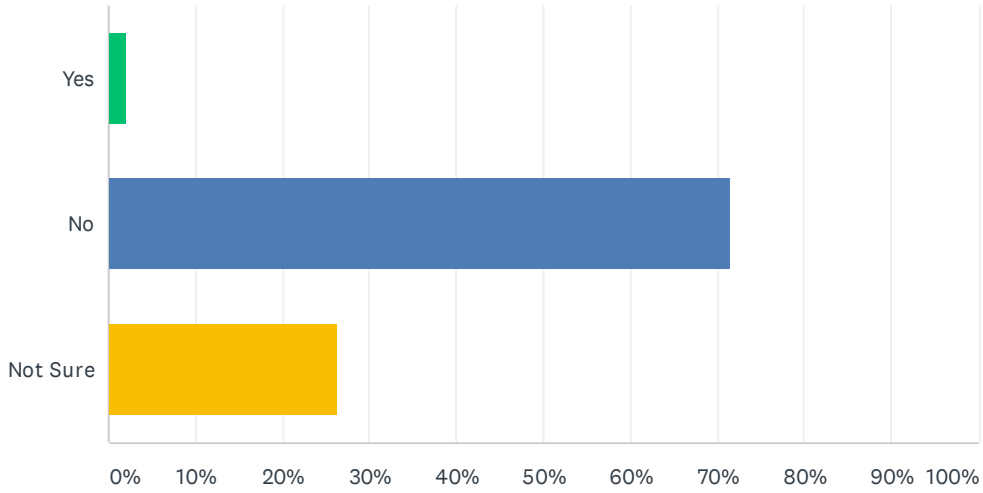

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| I had to because I'm in a flood prone area | 31.25% | 10 |
| I voluntarily chose to purchase it | 68.75% | 22 |
| Total Respondents: 32 | | |

# Q11 Please tell us why you voluntarily chose to purchase flood insurance, please tell us why.

Answered: 20 Skipped: 149

# Q12 Do you or did you have problems getting homeowners/renters insurance due to flood risk?

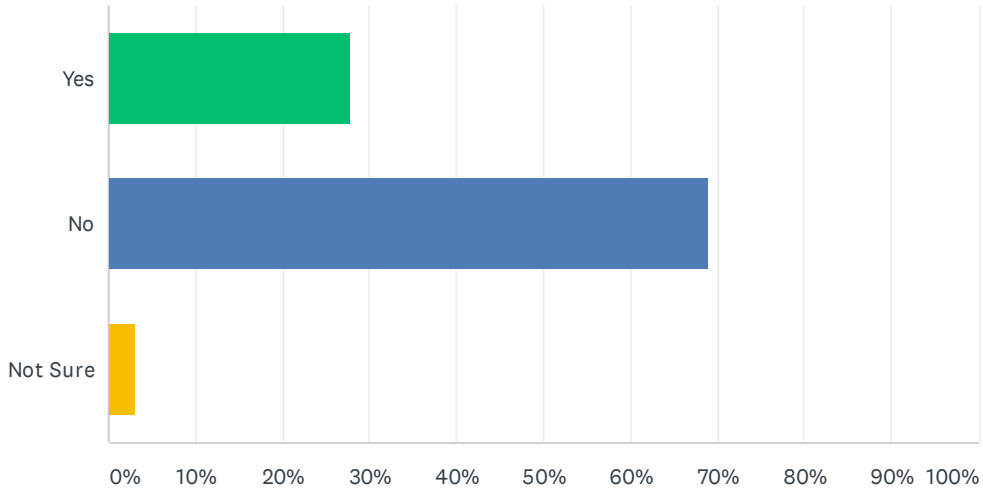
Answered: 144 Skipped: 25




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 2.08% | 3 |
| No | 71.53% | 103 |
| Not Sure | 26.39% | 38 |
| TOTAL | | 144 |

# Q13 When you moved into your home, did you consider the impact a flood could have on your home?

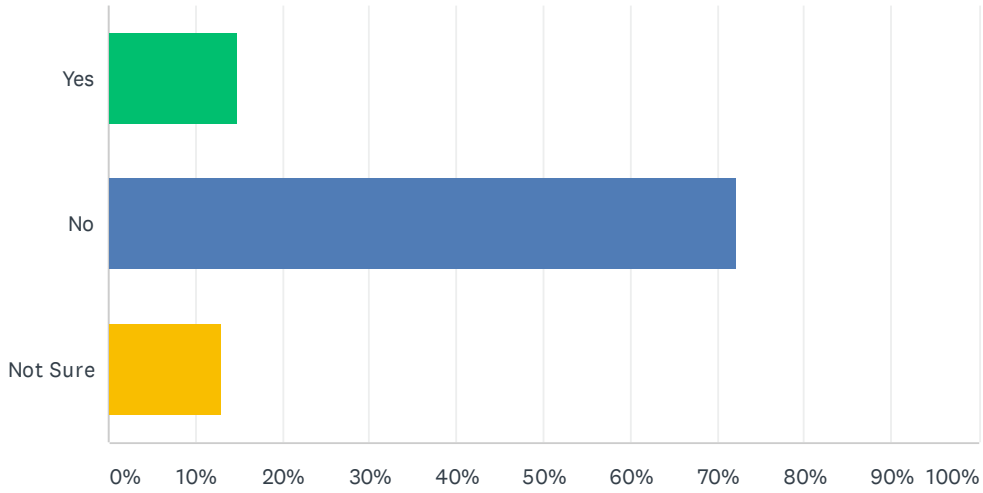
Answered: 155 Skipped: 14




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 27.74% | 43 |
| No | 69.03% | 107 |
| Not Sure | 3.23% | 5 |
| TOTAL | | 155 |

# Q14 Was the presence of a flood hazard disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?

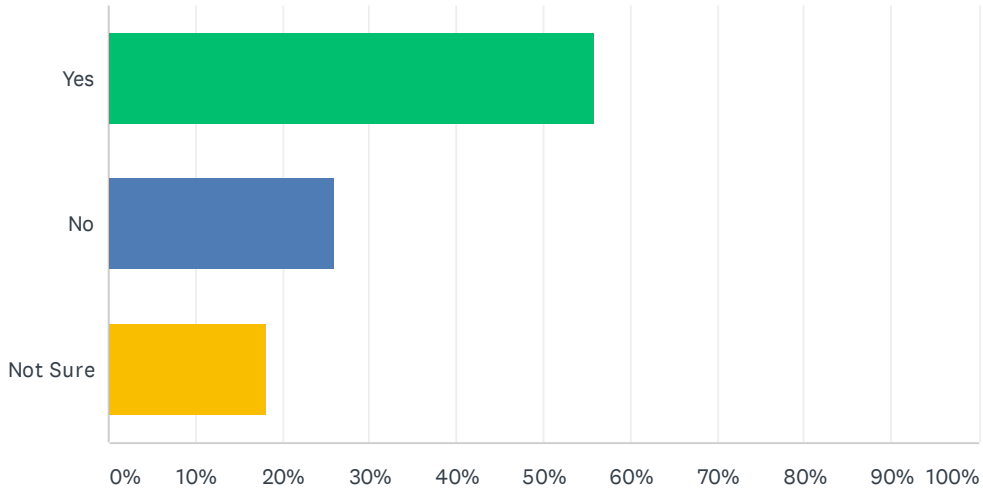
Answered: 155 Skipped: 14




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 14.84% | 23 |
| No | 72.26% | 112 |
| Not Sure | 12.90% | 20 |
| TOTAL | | 155 |

# Q15 Would the disclosure of the flood hazard have influenced your decision to buy or rent a home?

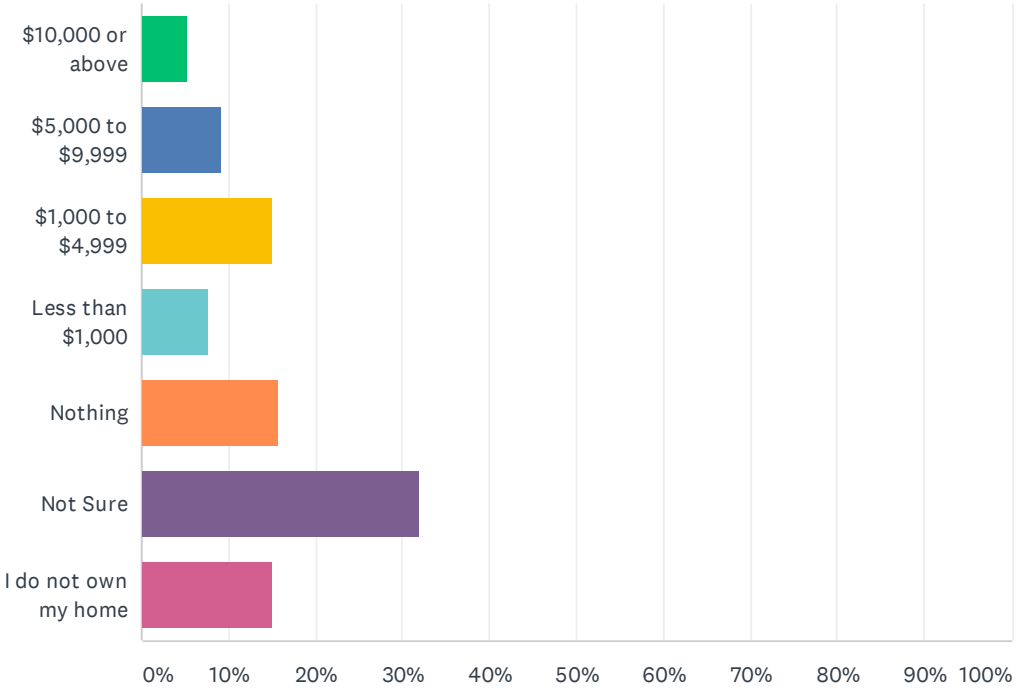
Answered: 154 Skipped: 15




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 55.84% | 86 |
| No | 25.97% | 40 |
| Not Sure | 18.18% | 28 |
| TOTAL | | 154 |

# Q16 How much money would you be willing to spend to retrofit your home to reduce risks associated with flood disasters? (for example, by elevating a home above flood level, flood-proofing, building berms or floodwalls)

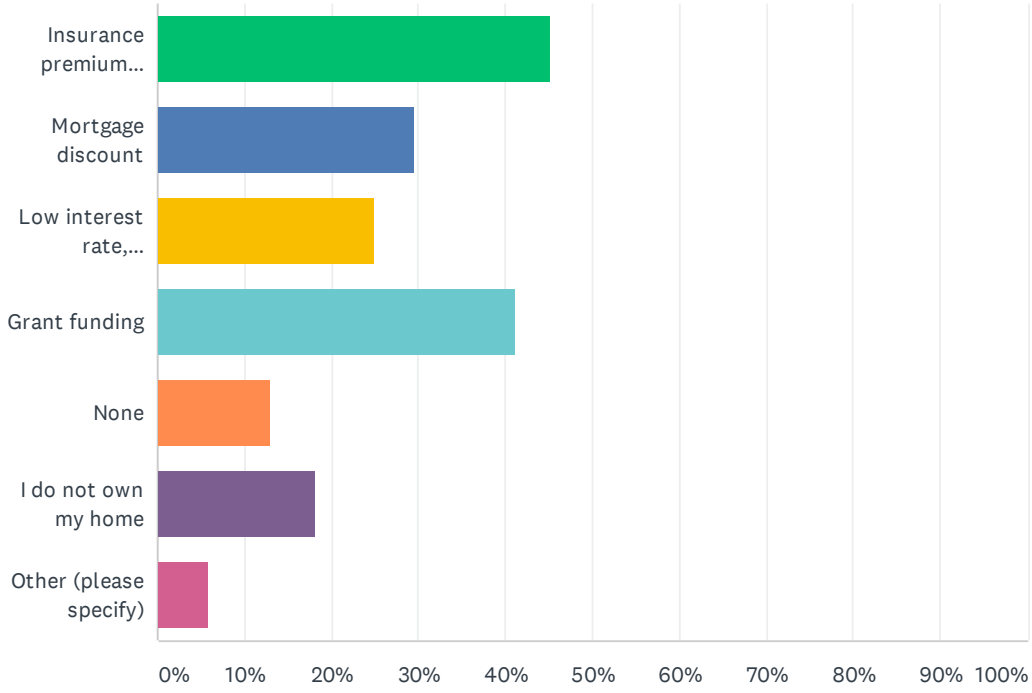
Answered: 153 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $10,000 or above | 5.23% | 8 |
| $5,000 to $9,999 | 9.15% | 14 |
| $1,000 to $4,999 | 15.03% | 23 |
| Less than $1,000 | 7.84% | 12 |
| Nothing | 15.69% | 24 |
| Not Sure | 32.03% | 49 |
| I do not own my home | 15.03% | 23 |
| TOTAL | | 153 |

# Q17 Which of the following incentives would encourage you to spend money to retrofit your home to protect against flood disasters? (Check all that apply)

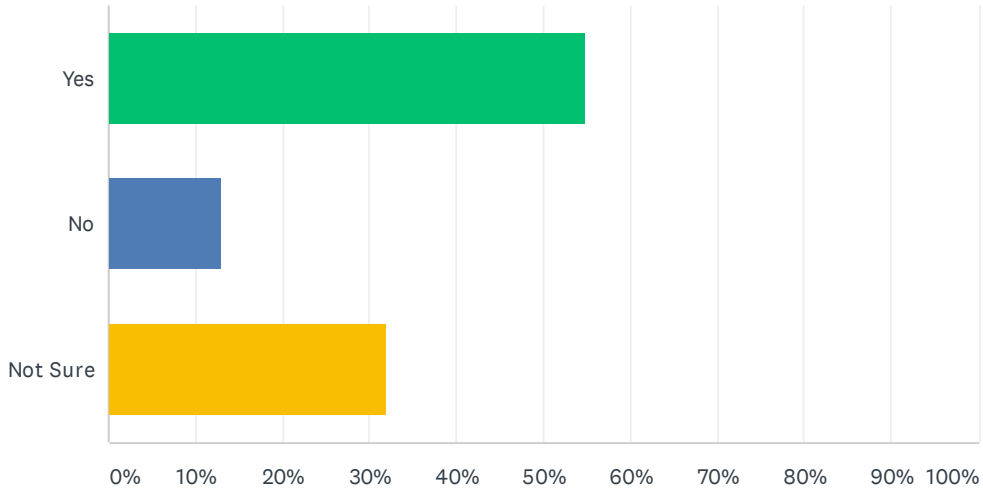
Answered: 153 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Insurance premium discount | 45.10% | 69 |
| Mortgage discount | 29.41% | 45 |
| Low interest rate, home-improvement loan | 24.84% | 38 |
| Grant funding | 41.18% | 63 |
| None | 13.07% | 20 |
| I do not own my home | 18.30% | 28 |
| Other (please specify) | 5.88% | 9 |
| Total Respondents: 153 | | |

# Q18 If your property were located in a designated “high flood hazard” area or had received repetitive damages from flood events, would you consider a "buyout” offered by a public agency?

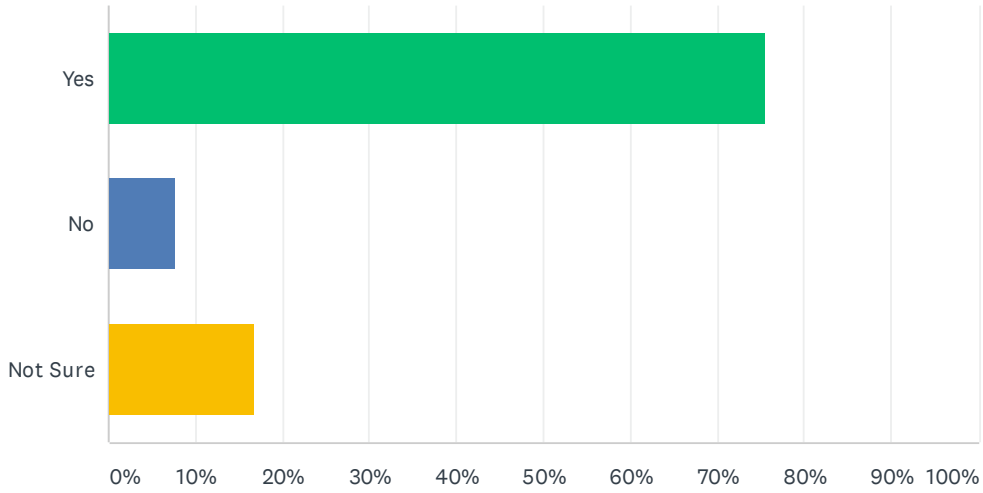
Answered: 153 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 54.90% | 84 |
| No | 13.07% | 20 |
| Not Sure | 32.03% | 49 |
| TOTAL | | 153 |

# Q19 Do you support the regulation (restriction) of land uses within known, high risk, flood hazard areas?

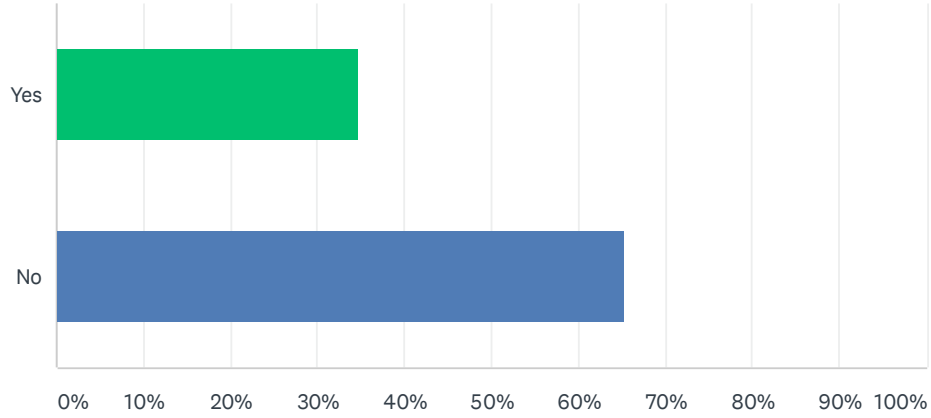
Answered: 155 Skipped: 14




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 75.48% | 117 |
| No | 7.74% | 12 |
| Not Sure | 16.77% | 26 |
| TOTAL | | 155 |

# Q20 Are you aware of the current Floodplain Management Plan's programs and policies to reduce flooding hazards such as:The National Flood Insurance Program, Flood Alert/Warning, Disaster Assistance and grant programs?

Answered: 153 Skipped: 16



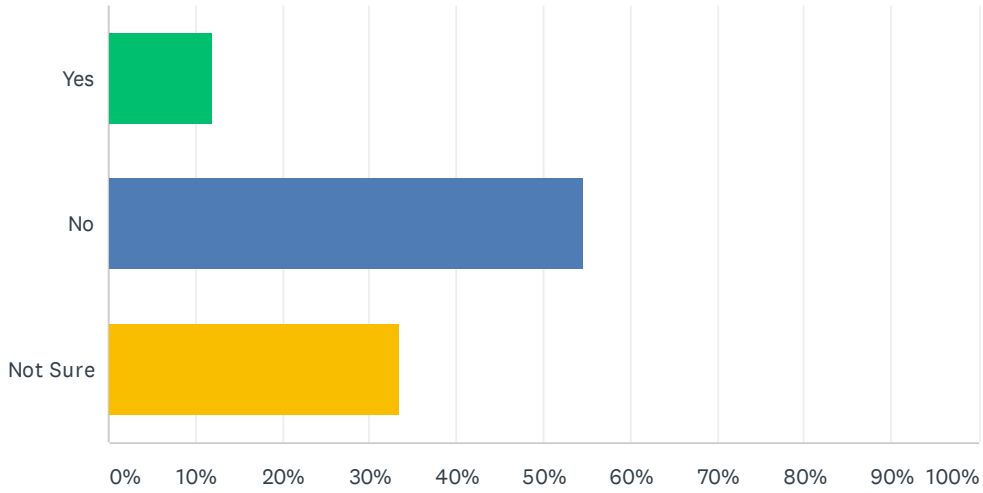

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 34.64% | 53 |
| No | 65.36% | 100 |
| TOTAL | | 153 |

# Q21 Where in Los Angeles do you live? Please provide your zip code, nearest cross streets or neighborhood.

Answered: 148 Skipped: 21

# Q22 Do you live in a known floodplain or an area that has been subject to flooding?

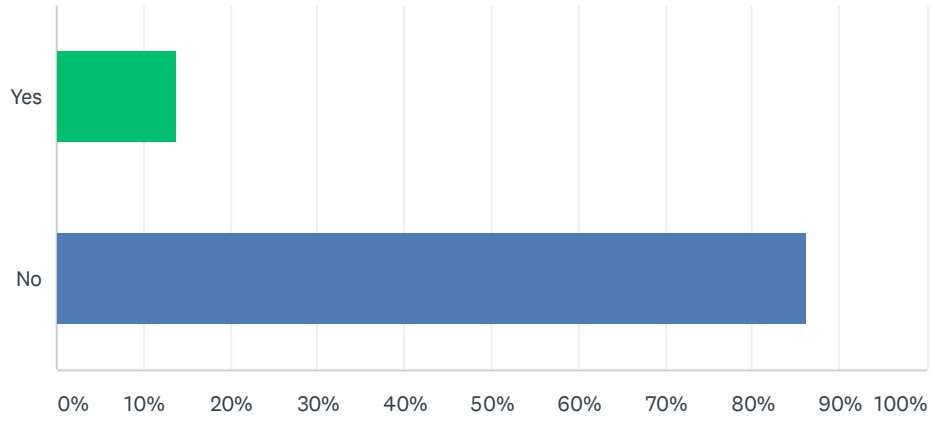
Answered: 152 Skipped: 17




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 11.84% | 18 |
| No | 54.61% | 83 |
| Not Sure | 33.55% | 51 |
| TOTAL | | 152 |

# Q23 Do you have any access or functional needs within your household that would require early warning or response during disasters?

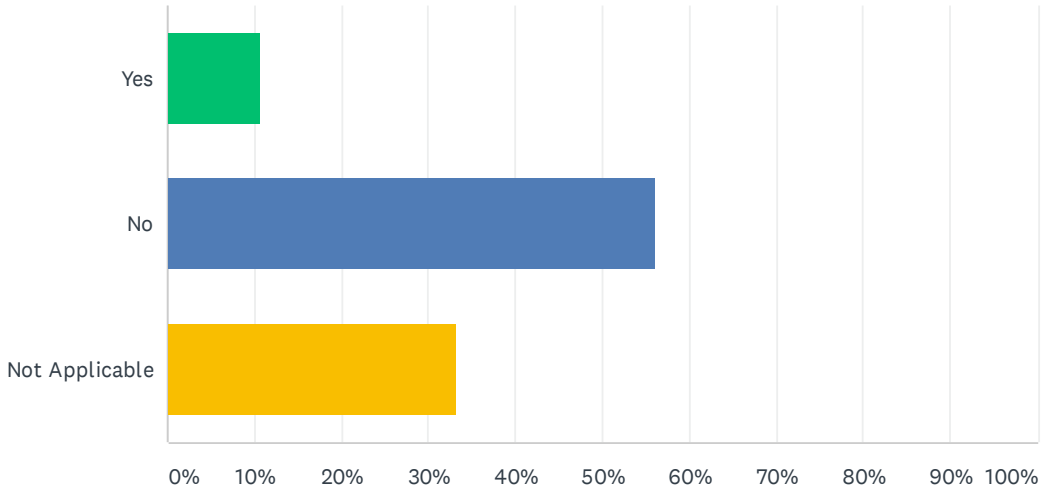
Answered: 153 Skipped: 16




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 13.73% | 21 |
| No | 86.27% | 132 |
| TOTAL | | 153 |

# Q24 Would you like personnel from the City Emergency Management to contact you regarding your access and functional needs? If yes, please enter your contact information in the following text box.

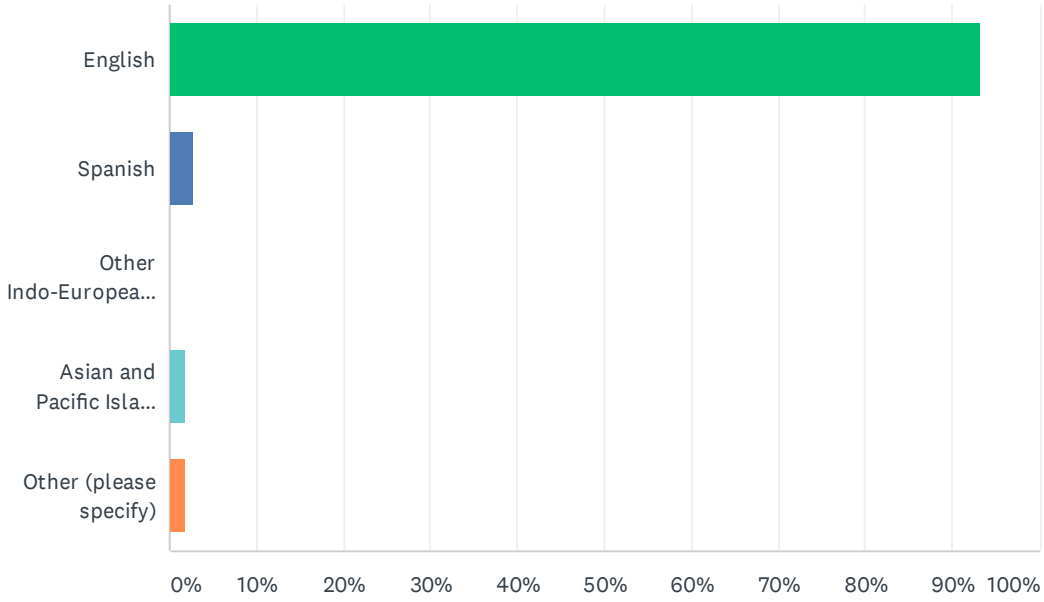
Answered: 150 Skipped: 19




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 10.67% | 16 |
| No | 56.00% | 84 |
| Not Applicable | 33.33% | 50 |
| TOTAL | | 150 |

# Q25 Please indicate the primary language spoken in your household.

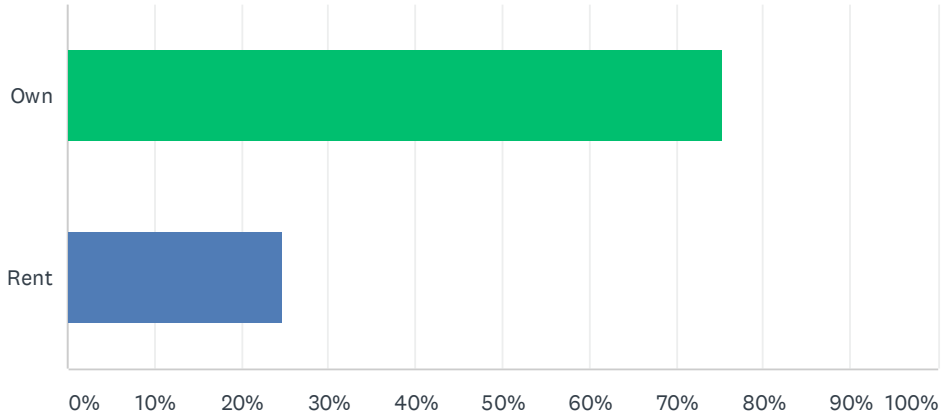
Answered: 151 Skipped: 18




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| English | 93.38% | 141 |
| Spanish | 2.65% | 4 |
| Other Indo-European Languages | 0.00% | 0 |
| Asian and Pacific Island Languages | 1.99% | 3 |
| Other (please specify) | 1.99% | 3 |
| TOTAL | | 151 |

# Q26 Do you own or rent your place of residence?

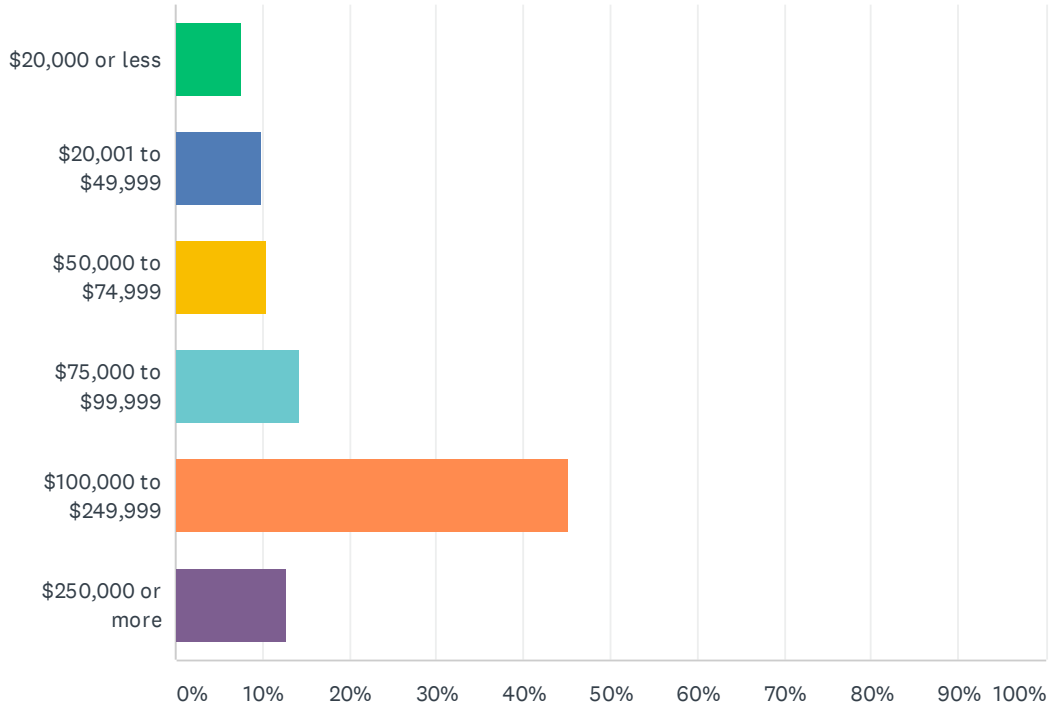
Answered: 150 Skipped: 19




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Own | 75.33% | 113 |
| Rent | 24.67% | 37 |
| TOTAL | | 150 |

# Q27 How much is your gross household income?

Answered: 133 Skipped: 36




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $20,000 or less | 7.52% | 10 |
| $20,001 to $49,999 | 9.77% | 13 |
| $50,000 to $74,999 | 10.53% | 14 |
| $75,000 to $99,999 | 14.29% | 19 |
| $100,000 to $249,999 | 45.11% | 60 |
| $250,000 or more | 12.78% | 17 |
| TOTAL | | 133 |

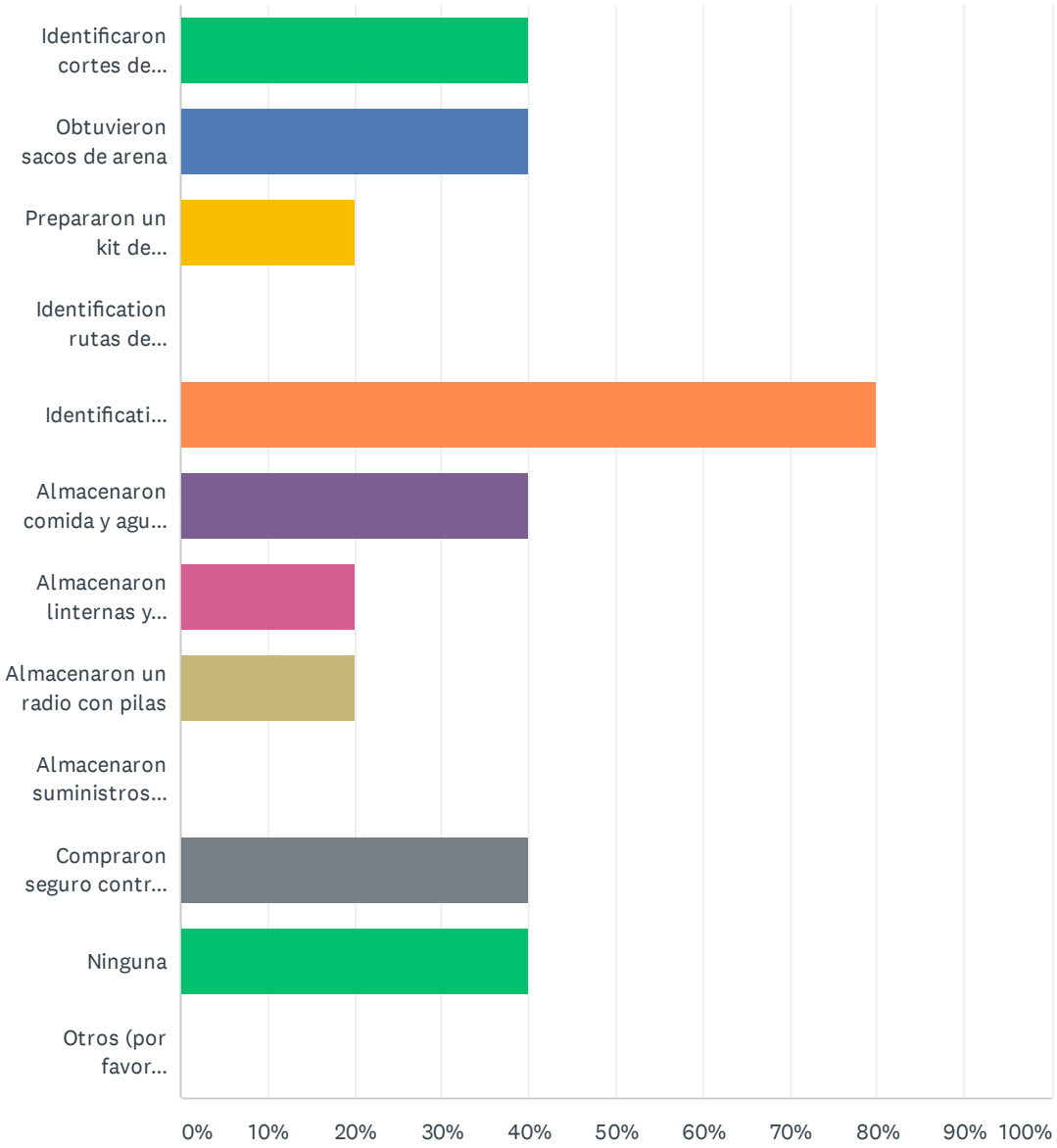
# Q28 Comments

Answered: 24 Skipped: 145

# City of Los Angeles Survey Results
# (Spansh)

# Q1 ¿Cuál de los siguientes pasos ha tomado su hogar para prepararse para un evento de inundación?(Marque todo lo que corresponda)

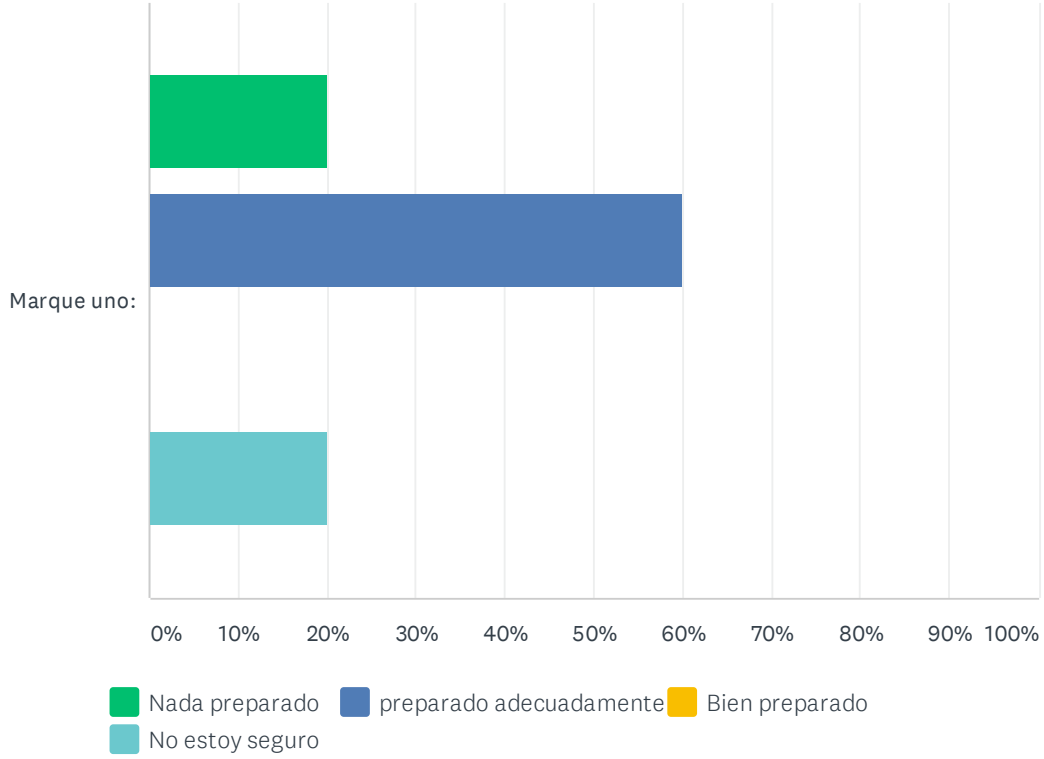
Answered: 5 Skipped: 0


Identificaron cortes de...
Obtuvieron sacos de arena
Prepararon un kit de...
Identification rutas de...
Identificati...
Almacenaron comida y agu...
Almacenaron linternas y...
Almacenaron un radio con pilas
Almacenaron suministros...
Compraron seguro contr...
Ninguna
Otros (por favor...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Identificaron cortes de servicios públicos | 40.00% | 2 |
| Obtuvieron sacos de arena | 40.00% | 2 |
| Prepararon un kit de suministros para desastres | 20.00% | 1 |
| Identification rutas de evacuación | 0.00% | 0 |
| Identification al menos 2 métodos para recibir notificaciones e información de emergencia durante emergencias | 80.00% | 4 |
| Almacenaron comida y agua por encima de los niveles potenciales de inundación. | 40.00% | 2 |
| Almacenaron linternas y baterías | 20.00% | 1 |
| Almacenaron un radio con pilas | 20.00% | 1 |
| Almacenaron suministros médicos (kit de primeros auxilios, medicamentos) | 0.00% | 0 |
| Compraron seguro contra inundaciones | 40.00% | 2 |
| Ninguna | 40.00% | 2 |
| Otros (por favor especifica) | 0.00% | 0 |
| Total Respondents: 5 | | |

# Q2 ¿Qué tan preparado está su hogar para enfrentar un evento de inundación?

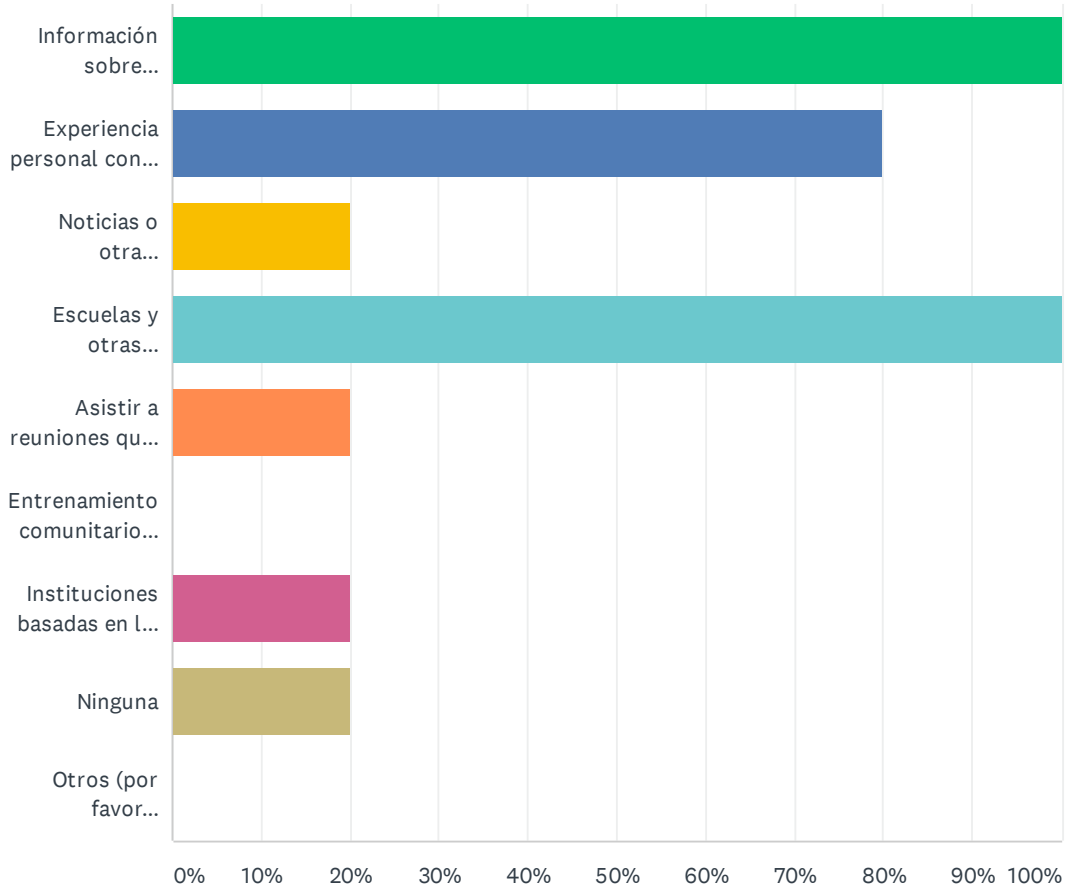
Answered: 5 Skipped: 0




| | NADA PREPARADO | PREPARADO ADECUADAMENTE | BIEN PREPARADO | NO ESTOY SEGURO | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Marque uno: | 20.00%<br>1 | 60.00%<br>3 | 0.00%<br>0 | 20.00%<br>1 | 5 | 3.20 |

# Q3 ¿Cual de los siguientes le ha proporcionado información útil para ayudarlo a estar preparado para un evento inundación? (Marque todo lo que corresponda)

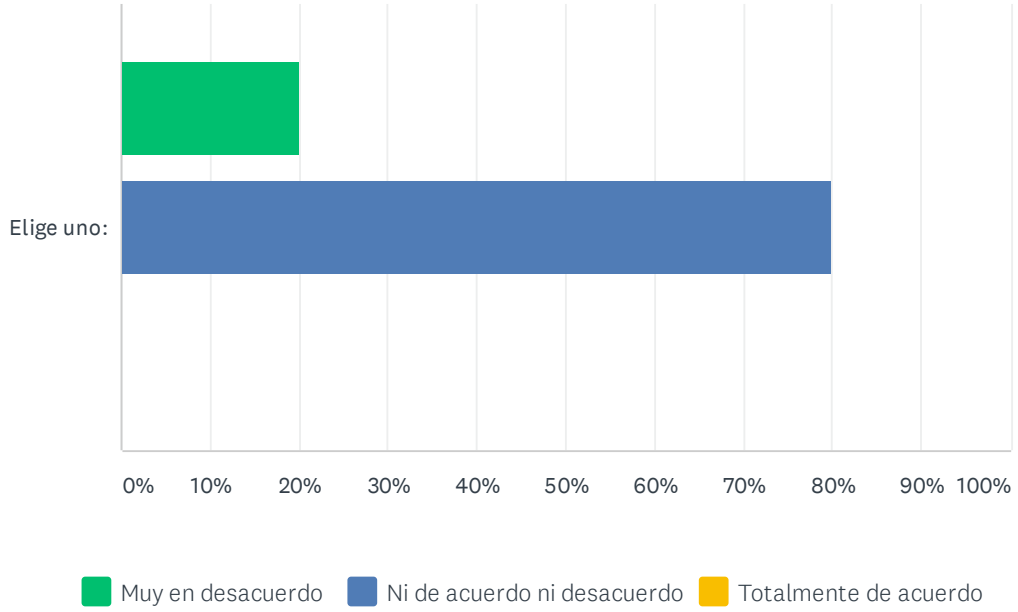
Answered: 5 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Información sobre preparación para emergencias de una fuente gubernamental (por ejemplo, manejo de emergencia federal, estatal, o local) | 100.00% | 5 |
| Experiencia personal con eventos de inundación. | 80.00% | 4 |
| Noticias o otra información de los medios proporcionadas localmente | 20.00% | 1 |
| Escuelas y otras instituciones académicas | 100.00% | 5 |
| Asistir a reuniones que se han ocupado de la preparación para inundaciones | 20.00% | 1 |
| Entrenamiento comunitario respuesta de emergencias (CERT) | 0.00% | 0 |
| Instituciones basadas en la fe | 20.00% | 1 |
| Ninguna | 20.00% | 1 |
| Otros (por favor especifica) | 0.00% | 0 |
| Total Respondents: 5 | | |

# Q4 Indique cómo se siente como la siguiente declaración:Información sobre los riesgos asociados con las inundaciones está disponible y es fácil de localizar.

Answered: 5 Skipped: 0

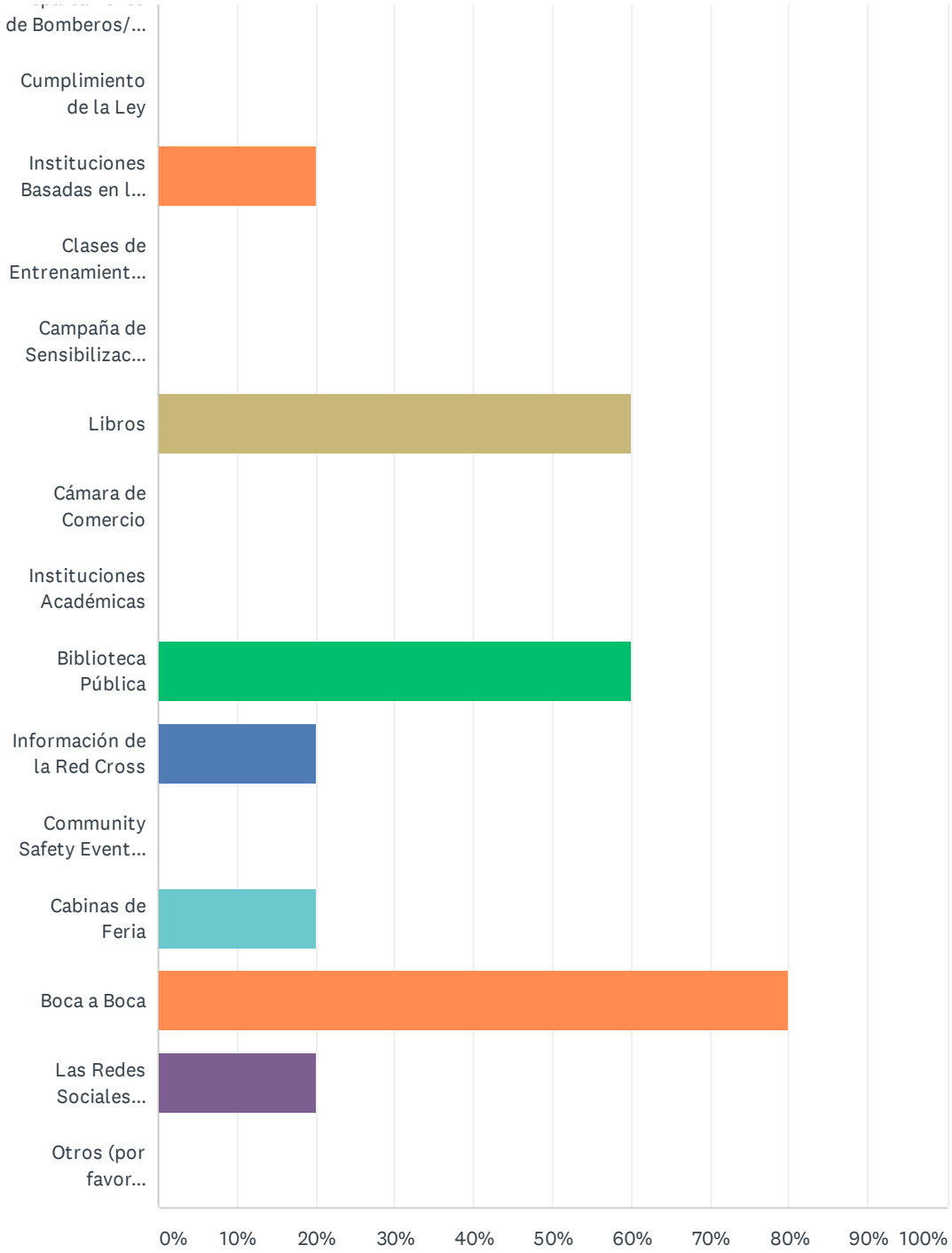



| | MUY EN DESACUERDO | NI DE ACUERDO NI DESACUERDO | TOTALMENTE DE ACUERDO | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|
| Elige uno: | 20.00%<br>1 | 80.00%<br>4 | 0.00%<br>0 | 5 | 2.60 |

# Q5 Elige hasta 5 de los siguientes métodos que creas que son los más efectivos para proporcionar información sobre inundaciones y desastres.

Answered: 5 Skipped: 0



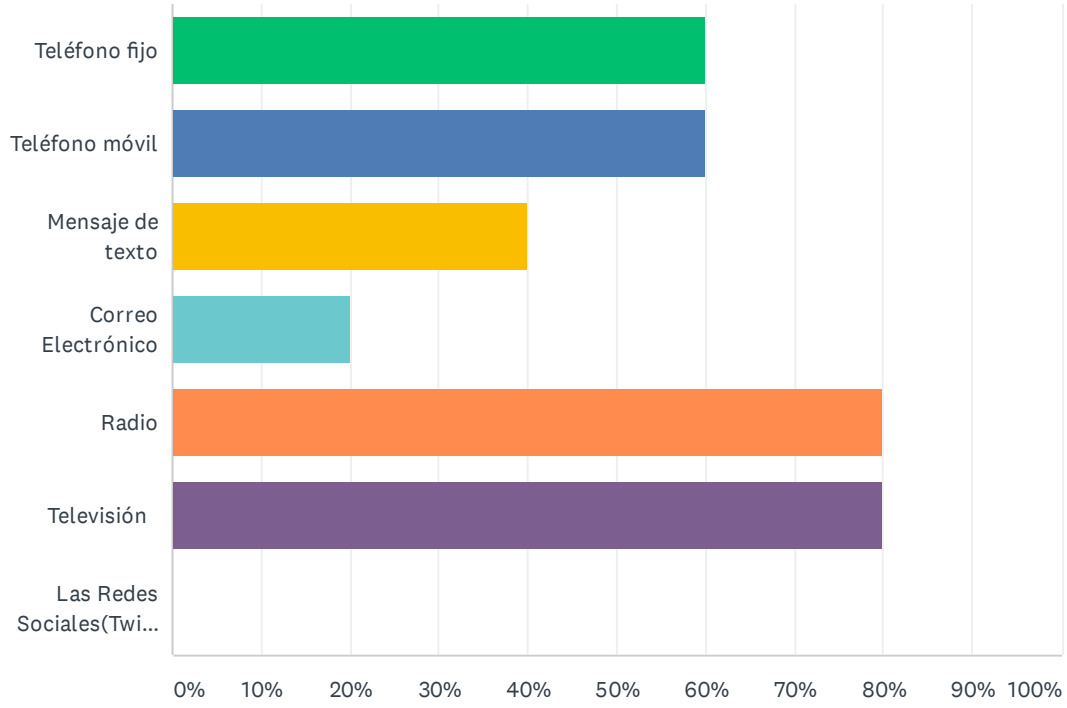

de Bomberos/...
Cumplimiento de la Ley
Instituciones Basadas en l...
Clases de Entrenamient...
Campaña de Sensibilizac...
Libros
Cámara de Comercio
Instituciones Académicas
Biblioteca Pública
Información de la Red Cross
Community Safety Event...
Cabinas de Feria
Boca a Boca
Las Redes Sociales...
Otros (por favor...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Periódico | 20.00% | 1 |
| Folletos Informativos | 20.00% | 1 |
| Boletines de la Ciudad | 0.00% | 0 |
| Reuniones Públicas | 20.00% | 1 |
| Talleres | 60.00% | 3 |
| Escuelas | 60.00% | 3 |
| Noticiero | 40.00% | 2 |
| Anuncios de Televisión | 20.00% | 1 |
| Noticias de Radio | 20.00% | 1 |
| Anuncios de Radio | 0.00% | 0 |
| Internet | 40.00% | 2 |
| Anuncios al Aire Libre | 0.00% | 0 |
| Departamento de Bomberos/ Rescate | 0.00% | 0 |
| Cumplimiento de la Ley | 0.00% | 0 |
| Instituciones Basadas en la Fey | 20.00% | 1 |
| Clases de Entrenamiento Comunitario Respuestas de Emergencias (CERT) | 0.00% | 0 |
| Campaña de Sensibilización Pública (Por Ejemplo, Semana de Concientización Sobre Inundaciones) | 0.00% | 0 |
| Libros | 60.00% | 3 |
| Cámara de Comercio | 0.00% | 0 |
| Instituciones Académicas | 0.00% | 0 |
| Biblioteca Pública | 60.00% | 3 |
| Información de la Red Cross | 20.00% | 1 |
| Community Safety Events Eventos de Seguridad Comunitaria | 0.00% | 0 |

| | | |
|---|---|---|
| Cabinas de Feria | 20.00% | 1 |
| Boca a Boca | 80.00% | 4 |
| Las Redes Sociales (Twitter, Facebook, etc.) | 20.00% | 1 |
| Otros (por favor especifica) | 0.00% | 0 |
| Total Respondents: 5 | | |

# Q6 ¿Qué método es mejor para usted y su familia para obtener información de advertencia o instrucciones de acción urgentes?

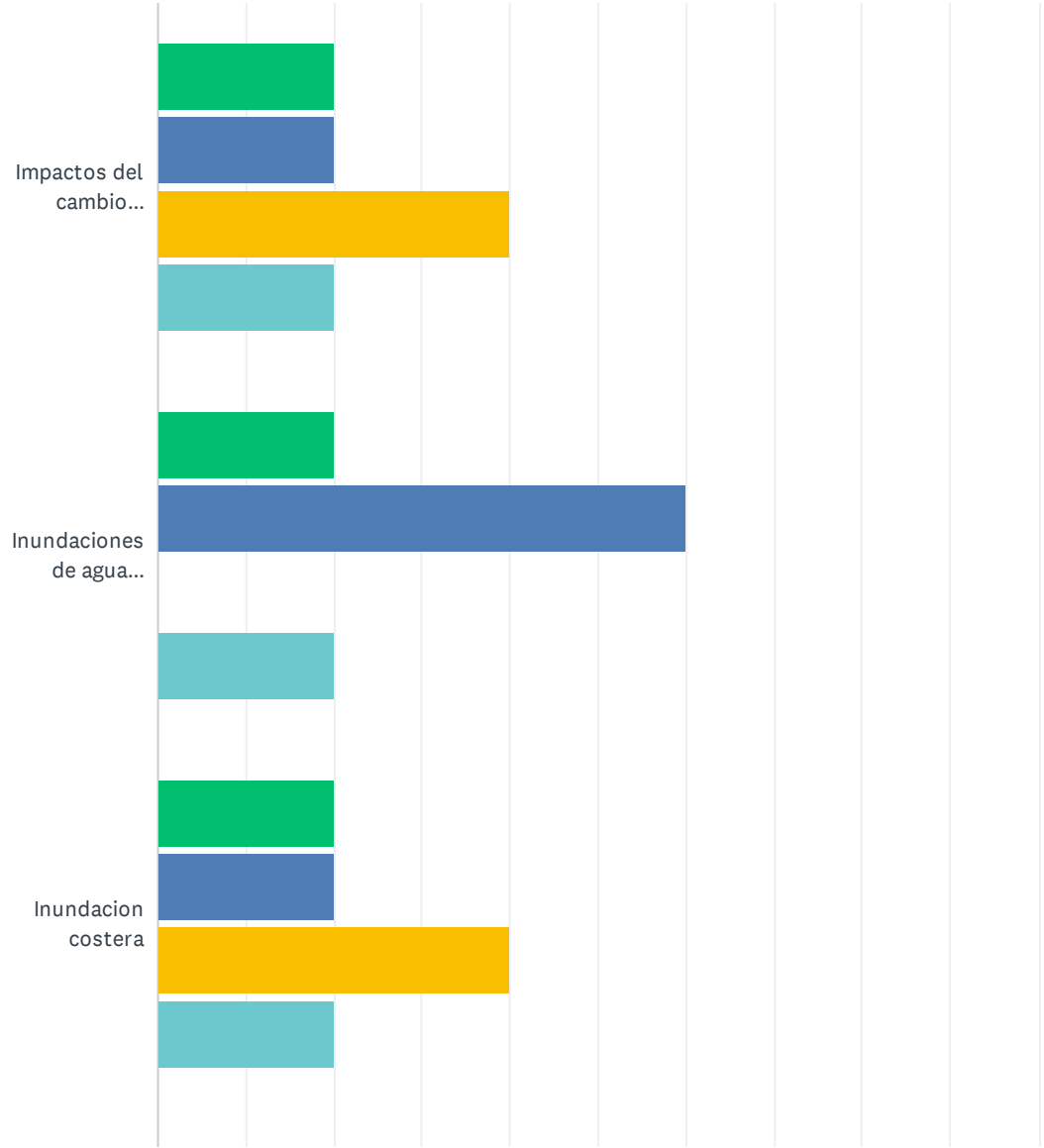
Answered: 5 Skipped: 0

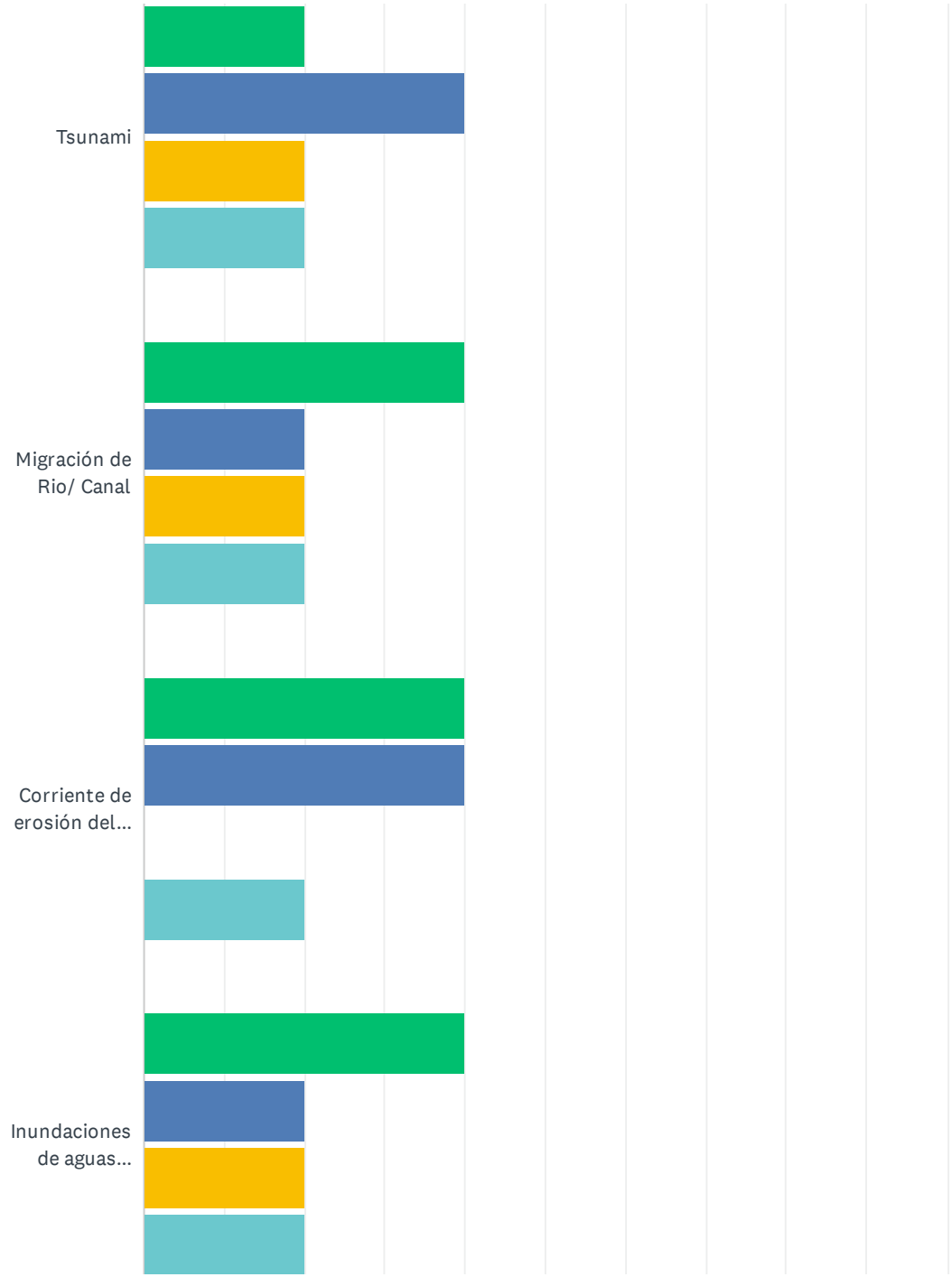


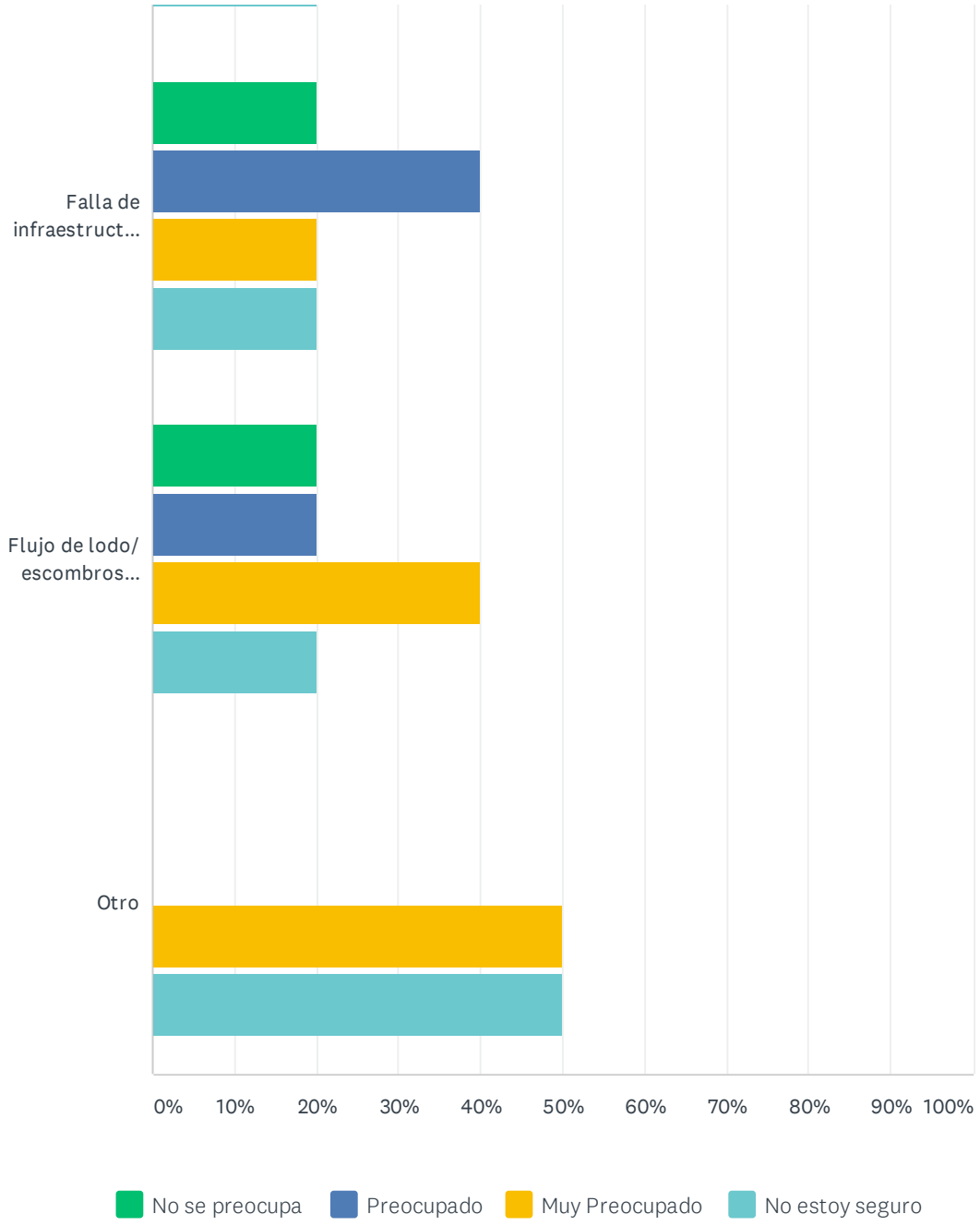
| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Teléfono fijo | 60.00% | 3 |
| Teléfono móvil | 60.00% | 3 |
| Mensaje de texto | 40.00% | 2 |
| Correo Electrónico | 20.00% | 1 |
| Radio | 80.00% | 4 |
| Televisión | 80.00% | 4 |
| Las Redes Sociales(Twitter, Facebook, etc.) | 0.00% | 0 |
| Total Respondents: 5 | | |

# Q7 ¿Que tan preocupado está usted por los siguientes peligros relacionados en Los Ángeles? (Marque una respuesta para cada peligro)

Answered: 5 Skipped: 0



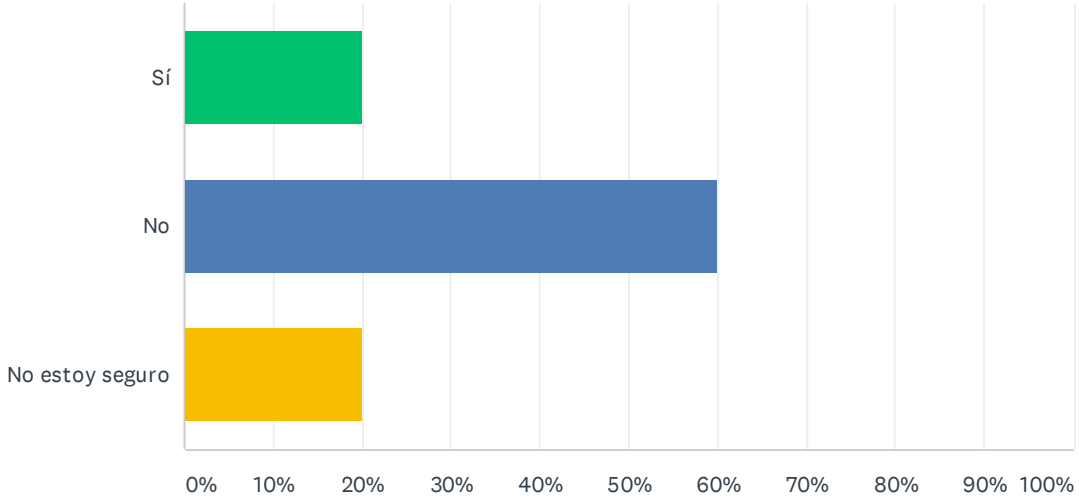

Tsunami
Migración de Rio/ Canal
Corriente de erosión del...
Inundaciones de aguas...


Falla de infraestruct...
Flujo de lodo/ escombros...
Otro
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
No se preocupa
Preocupado
Muy Preocupado
No estoy seguro

| | NO SE PREOCUPA | PREOCUPADO | MUY PREOCUPADO | NO ESTOY SEGURO | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Impactos del cambio climático | 20.00%<br>1 | 20.00%<br>1 | 40.00%<br>2 | 20.00%<br>1 | 5 | 4.00 |
| Inundaciones de agua subterráneas | 20.00%<br>1 | 60.00%<br>3 | 0.00%<br>0 | 20.00%<br>1 | 5 | 3.20 |
| Inundacion costera | 20.00%<br>1 | 20.00%<br>1 | 40.00%<br>2 | 20.00%<br>1 | 5 | 4.00 |
| Tsunami | 20.00%<br>1 | 40.00%<br>2 | 20.00%<br>1 | 20.00%<br>1 | 5 | 3.60 |
| Migración de Rio/ Canal | 40.00%<br>2 | 20.00%<br>1 | 20.00%<br>1 | 20.00%<br>1 | 5 | 3.20 |
| Corriente de erosión del banco | 40.00%<br>2 | 40.00%<br>2 | 0.00%<br>0 | 20.00%<br>1 | 5 | 2.80 |
| Inundaciones de aguas pluviales | 40.00%<br>2 | 20.00%<br>1 | 20.00%<br>1 | 20.00%<br>1 | 5 | 3.20 |
| Falla de infraestructura (tuberías, tanques) | 20.00%<br>1 | 40.00%<br>2 | 20.00%<br>1 | 20.00%<br>1 | 5 | 3.60 |
| Flujo de lodo/ escombros después del incendio | 20.00%<br>1 | 20.00%<br>1 | 40.00%<br>2 | 20.00%<br>1 | 5 | 4.00 |
| Otro | 0.00%<br>0 | 0.00%<br>0 | 50.00%<br>1 | 50.00%<br>1 | 2 | 5.50 |

# Q8 ¿Tienes seguro contra inundaciones?

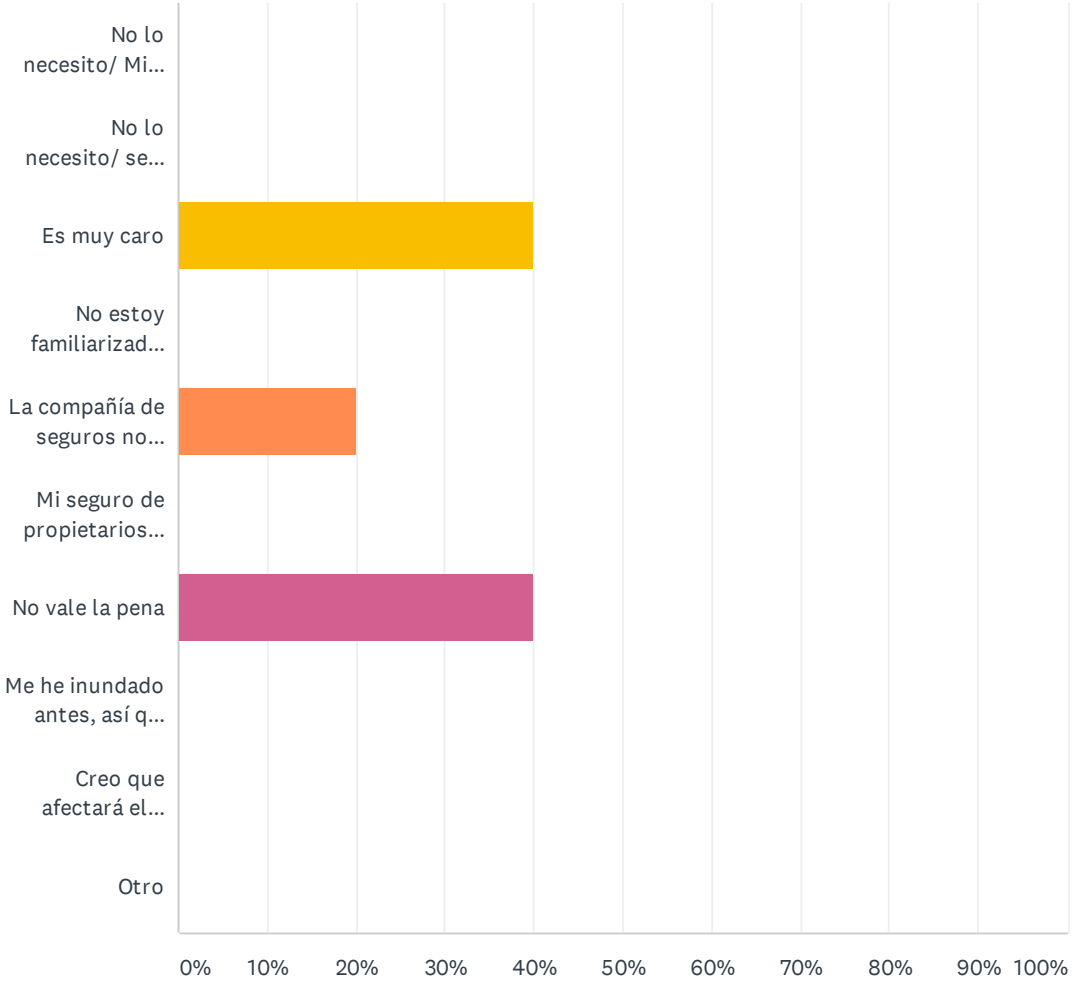
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 20.00% | 1 |
| No | 60.00% | 3 |
| No estoy seguro | 20.00% | 1 |
| TOTAL | | 5 |

# Q9 Si no tiene seguro contra inundaciones, ¿cual es la razón principal?

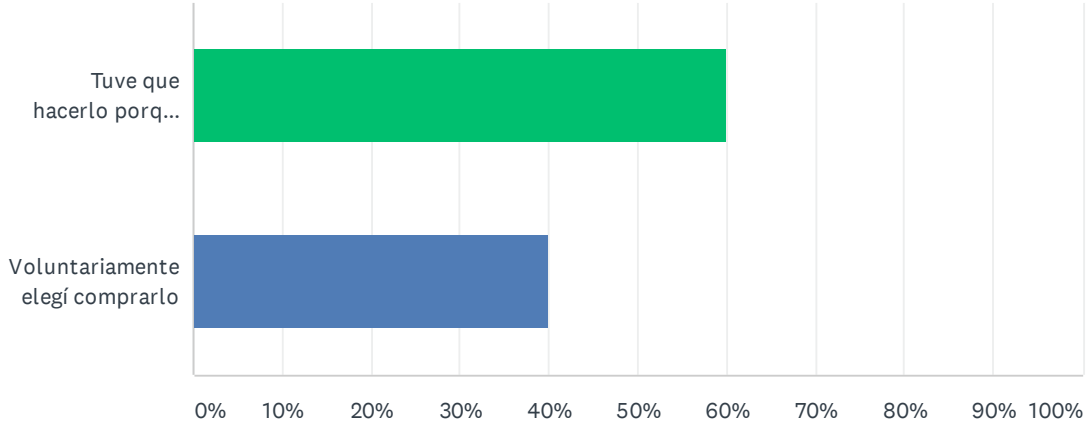
Answered: 5 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| No lo necesito/ Mi propiedad nunca ha sido inundada | 0.00% | 0 |
| No lo necesito/ se encuentra en terreno elevado | 0.00% | 0 |
| Es muy caro | 40.00% | 2 |
| No estoy familiarizado con eso/ no lo se sobre este tema | 0.00% | 0 |
| La compañía de seguros no proporciona cobertura | 20.00% | 1 |
| Mi seguro de propietarios de viviendas existente brinda cobertura | 0.00% | 0 |
| No vale la pena | 40.00% | 2 |
| Me he inundado antes, así que no califique para la cobertura | 0.00% | 0 |
| Creo que afectará el valor de mi propiedad | 0.00% | 0 |
| Otro | 0.00% | 0 |
| TOTAL | | 5 |

# Q10 Si tiene seguro contra inundaciones, ¿por qué lo compro?

Answered: 5 Skipped: 0



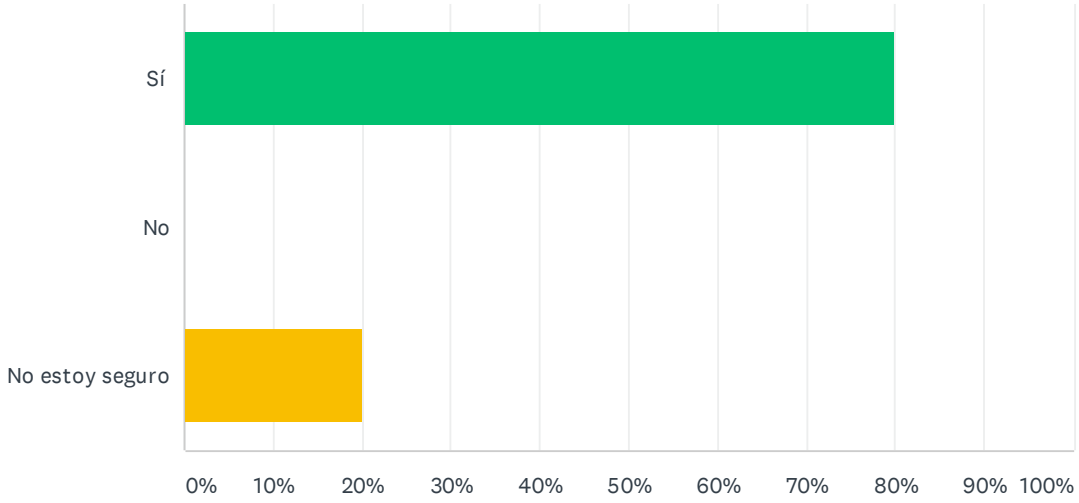

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Tuve que hacerlo porque estoy en un área propensa a inundaciones | 60.00% | 3 |
| Voluntariamente elegí comprarlo | 40.00% | 2 |
| Total Respondents: 5 | | |

# Q11 Díganos por qué elige voluntariamente comprar un seguro contra inundaciones

Answered: 0 Skipped: 5

# Q12 ¿Tiene o tuve problemas para obtener un seguro para propietarios/ inquilinos debido al riesgo de inundación?

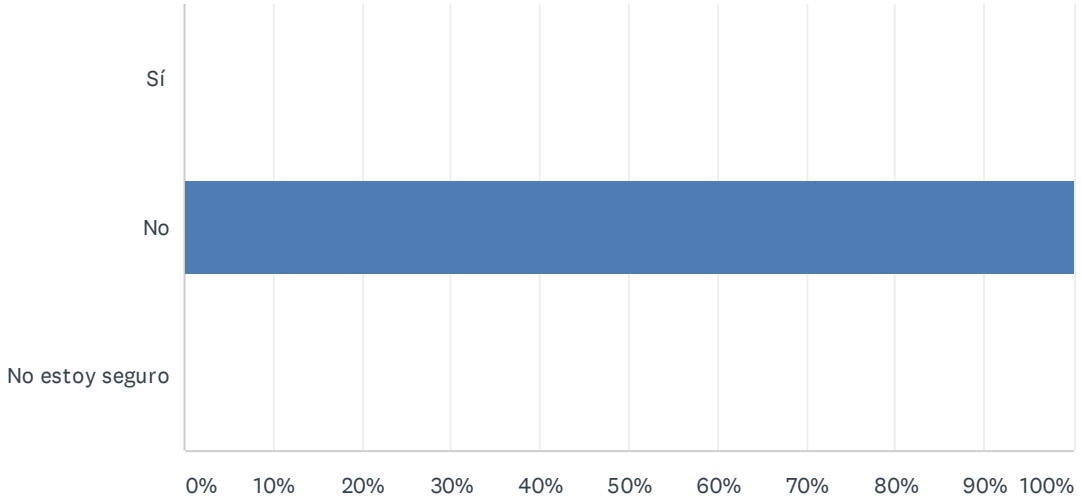
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 80.00% | 4 |
| No | 0.00% | 0 |
| No estoy seguro | 20.00% | 1 |
| TOTAL | | 5 |

# Q13 Cuando se mudó a su hogar, ¿consideró el impacto que una inundación podría tener en su hogar?

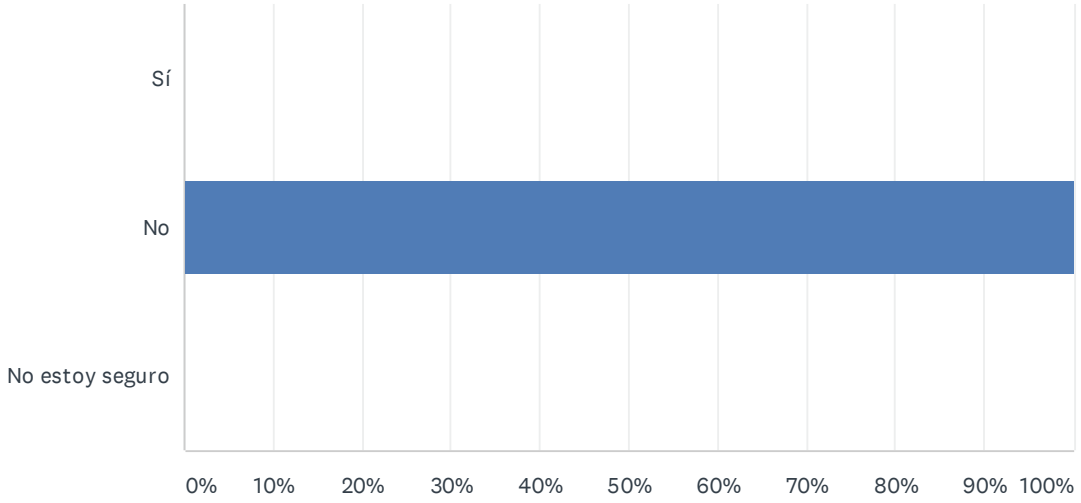
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 0.00% | 0 |
| No | 100.00% | 5 |
| No estoy seguro | 0.00% | 0 |
| TOTAL | | 5 |

# Q14 ¿Un agente de bienes raíces, vendedor o arrendador le reveló la presencia de un riesgo de inundación antes de comprar o mudarse a su casa?

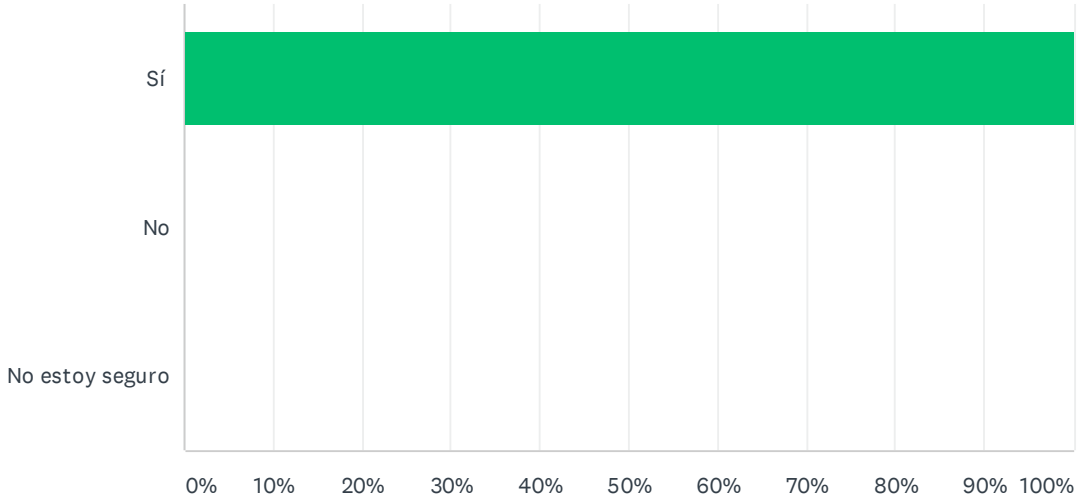
Answered: 4 Skipped: 1




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 0.00% | 0 |
| No | 100.00% | 4 |
| No estoy seguro | 0.00% | 0 |
| TOTAL | | 4 |

# Q15 ¿La divulgación del peligro de inundación habría influido en su decisión de comprar o alquilar una casa?

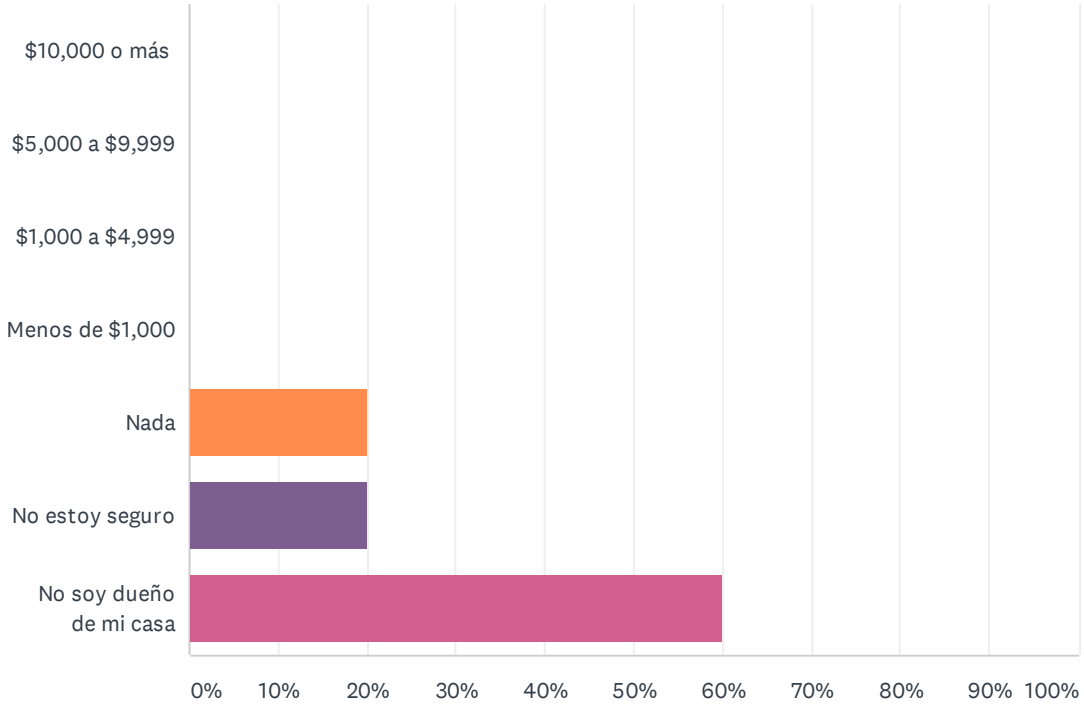
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 100.00% | 5 |
| No | 0.00% | 0 |
| No estoy seguro | 0.00% | 0 |
| TOTAL | | 5 |

# Q16 ¿Cuánto dinero estaría dispuesto a gastar para modernizar su hogar para reducir los riesgos asociados con las inundaciones? (por ejemplo, elevando una casa por encima del nivel de inundación, a prueba de inundaciones, construyendo bermas o muros de inundación)

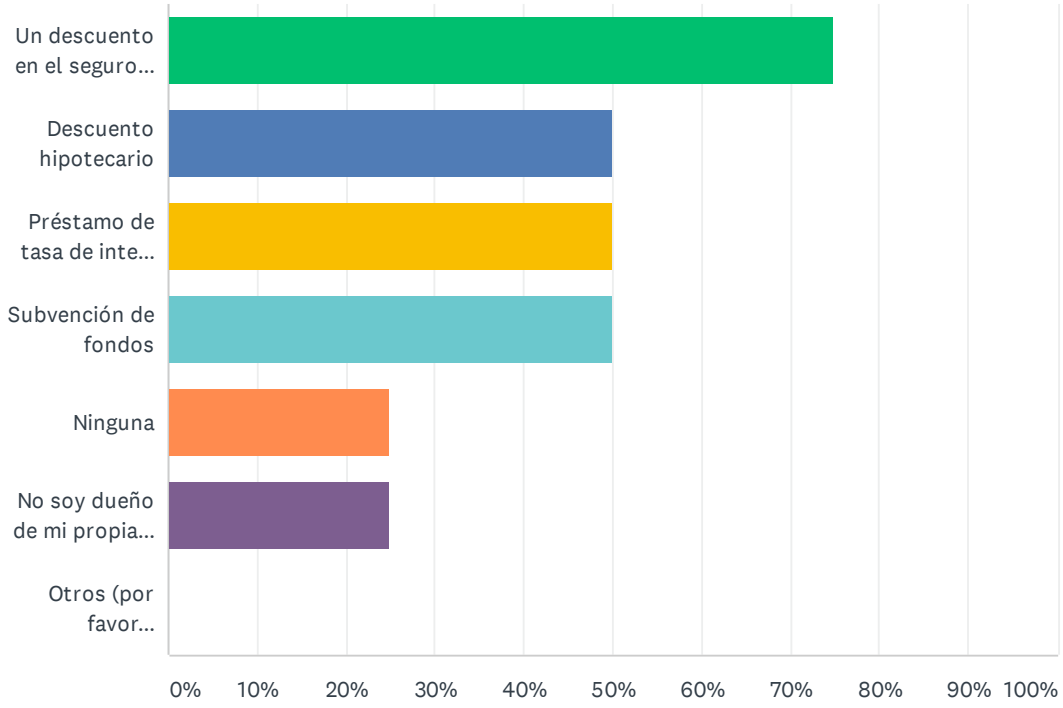
Answered: 5 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $10,000 o más | 0.00% | 0 |
| $5,000 a $9,999 | 0.00% | 0 |
| $1,000 a $4,999 | 0.00% | 0 |
| Menos de $1,000 | 0.00% | 0 |
| Nada | 20.00% | 1 |
| No estoy seguro | 20.00% | 1 |
| No soy dueño de mi casa | 60.00% | 3 |
| TOTAL | | 5 |

# Q17 ¿Cuál de los siguientes incentivos lo alentaría a gastar dinero para modernizar su hogar para protegerse contra desastres por inundaciones? (Marque todo lo que corresponda)

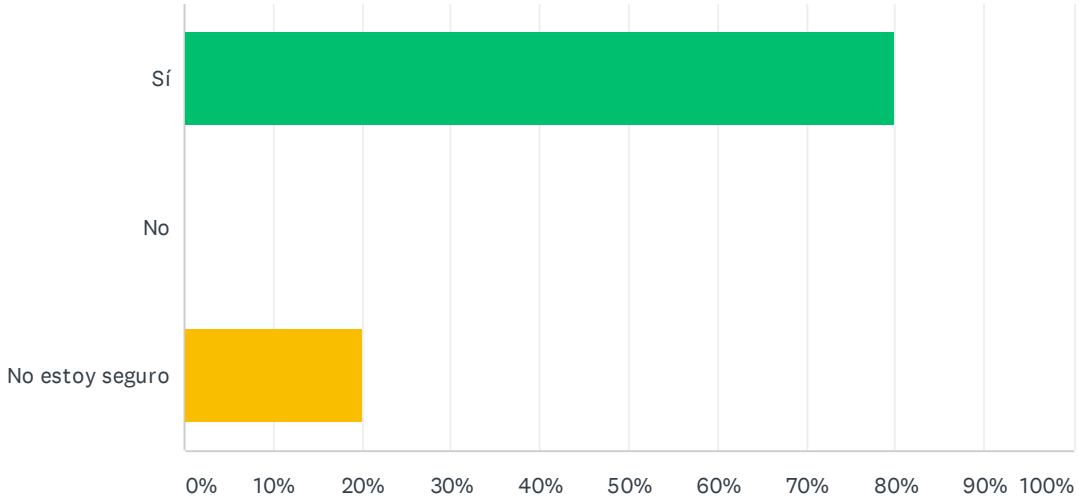
Answered: 4 Skipped: 1



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Un descuento en el seguro premium | 75.00% | 3 |
| Descuento hipotecario | 50.00% | 2 |
| Préstamo de tasa de interés baja/ préstamo de mejoras para el hogar | 50.00% | 2 |
| Subvención de fondos | 50.00% | 2 |
| Ninguna | 25.00% | 1 |
| No soy dueño de mi propia casa | 25.00% | 1 |
| Otros (por favor especifica) | 0.00% | 0 |
| Total Respondents: 4 | | |

# Q18 Si su propiedad estuviera ubicada en un área designada de “alto riesgo de inundación” o hubiera recibido daños repetitivos por eventos de inundación, ¿consideraría una "compra" ofrecida por una agencia pública?

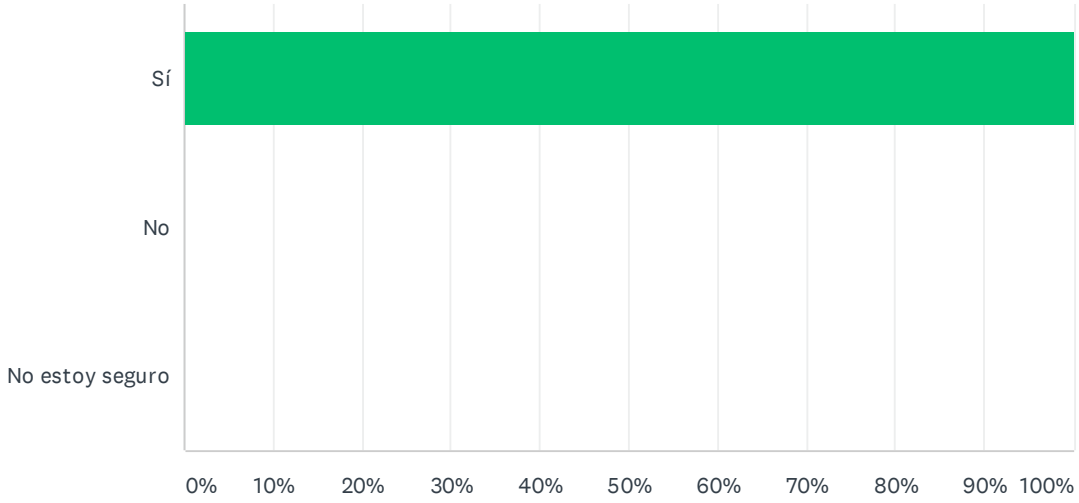
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 80.00% | 4 |
| No | 0.00% | 0 |
| No estoy seguro | 20.00% | 1 |
| TOTAL | | 5 |

# Q19 ¿Apoya la regulación (restricción) de los usos de la tierra dentro de áreas de inundación conocidas de alto riesgo?

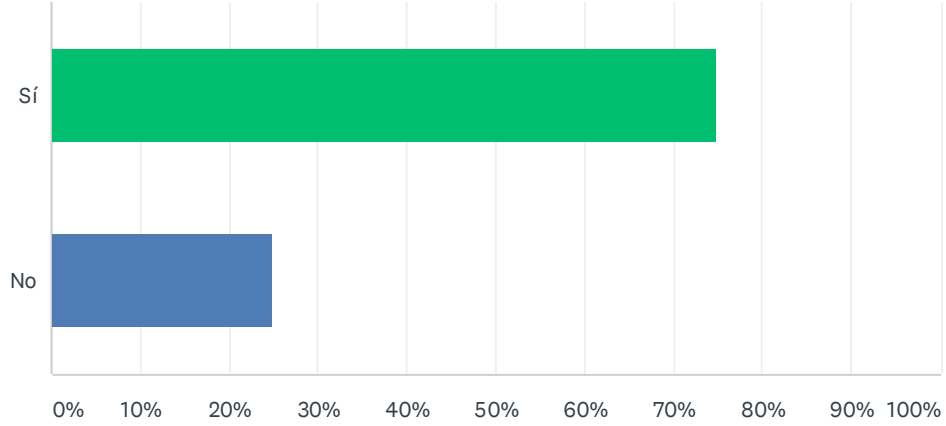
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 100.00% | 5 |
| No | 0.00% | 0 |
| No estoy seguro | 0.00% | 0 |
| TOTAL | | 5 |

# Q20 ¿Conoce los programas y políticas actuales del Plan de Manejo de Llanuras de Inundación para reducir los riesgos de inundación, tales como: El Programa Nacional de Seguro contra Inundaciones, Alerta / Advertencia de Inundaciones, Asistencia por Desastre y programas de subvenciones?

Answered: 4 Skipped: 1



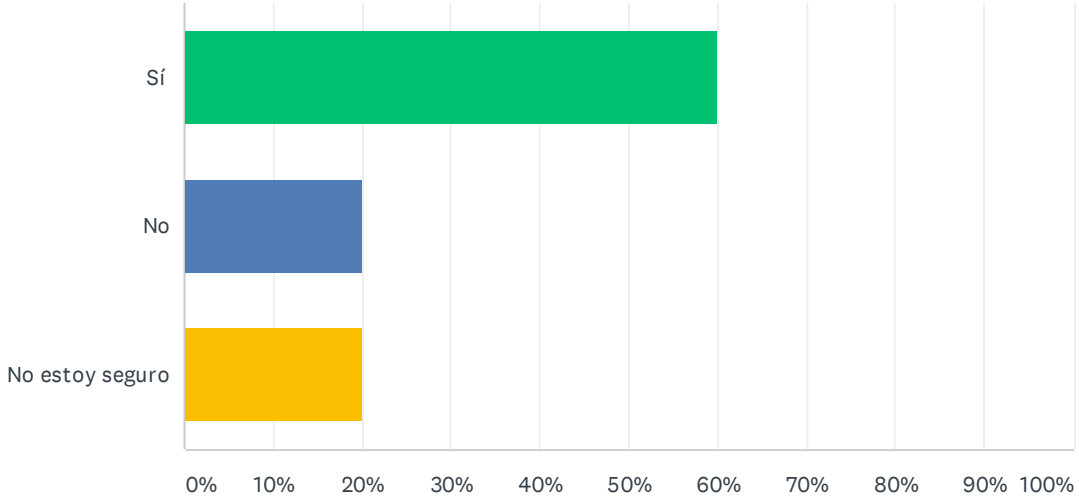

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 75.00% | 3 |
| No | 25.00% | 1 |
| TOTAL | | 4 |

# Q21 ¿Donde vives en Los Ángeles? Por favor proporcione su codigo postal, las calles más cercanos o su vecindario

Answered: 0 Skipped: 5

# Q22 ¿Vive en una llanura de inundación conocida o en un área que ha sido inundada?

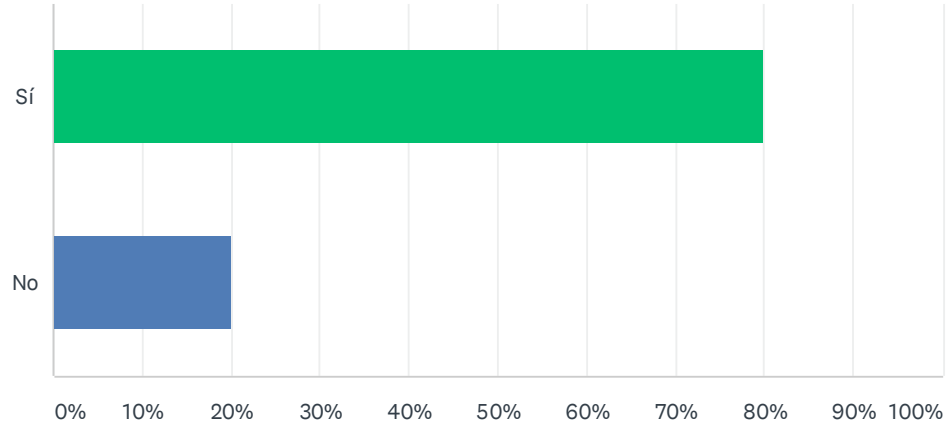
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 60.00% | 3 |
| No | 20.00% | 1 |
| No estoy seguro | 20.00% | 1 |
| TOTAL | | 5 |

# Q23 ¿Tiene alguna necesidad funcional o de acceso dentro de su hogar que requiera advertencia o respuesta temprana durante los desastres?

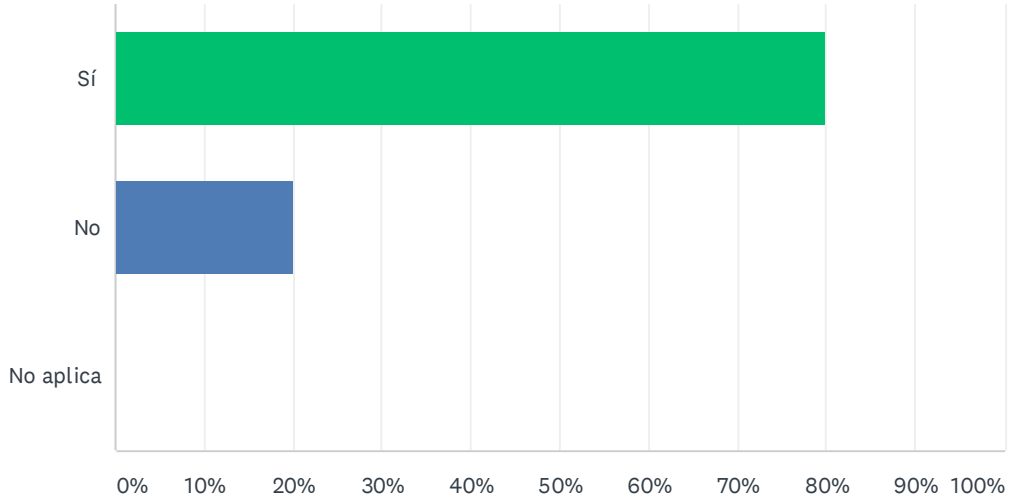
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 80.00% | 4 |
| No | 20.00% | 1 |
| TOTAL | | 5 |

# Q24 ¿Desea que el personal de la Administración de emergencias de la ciudad lo contacte con respecto a su acceso y necesidades funcionales? En caso afirmativo, ingrese su información de contacto en el siguiente cuadro de texto.

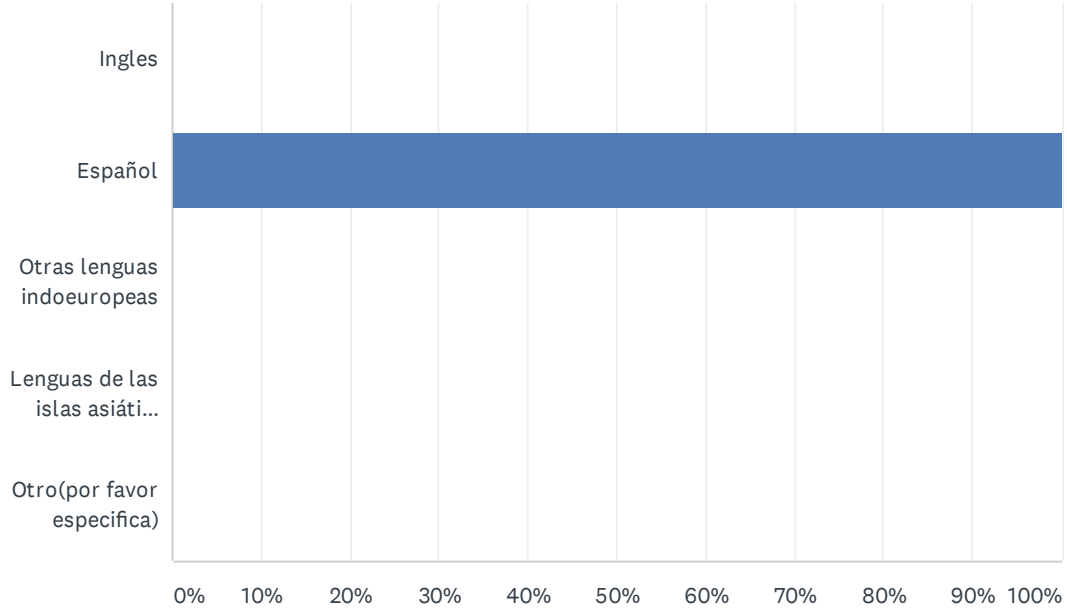
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Sí | 80.00% | 4 |
| No | 20.00% | 1 |
| No aplica | 0.00% | 0 |
| TOTAL | | 5 |

# Q25 Indique el idioma principal que se habla en su hogar

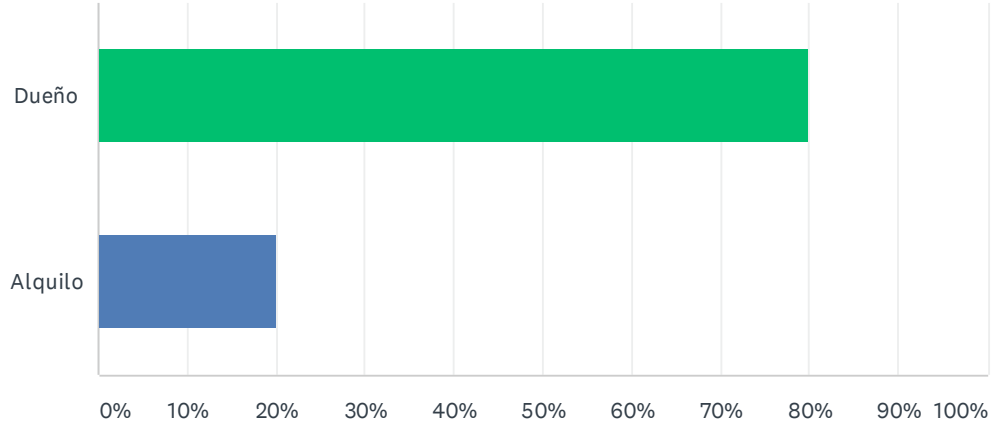
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Ingles | 0.00% | 0 |
| Español | 100.00% | 5 |
| Otras lenguas indoeuropeas | 0.00% | 0 |
| Lenguas de las islas asiáticas y del pacífico | 0.00% | 0 |
| Otro(por favor especifica) | 0.00% | 0 |
| TOTAL | | 5 |

# Q26 ¿Es dueño o alquila su lugar de resistencia?

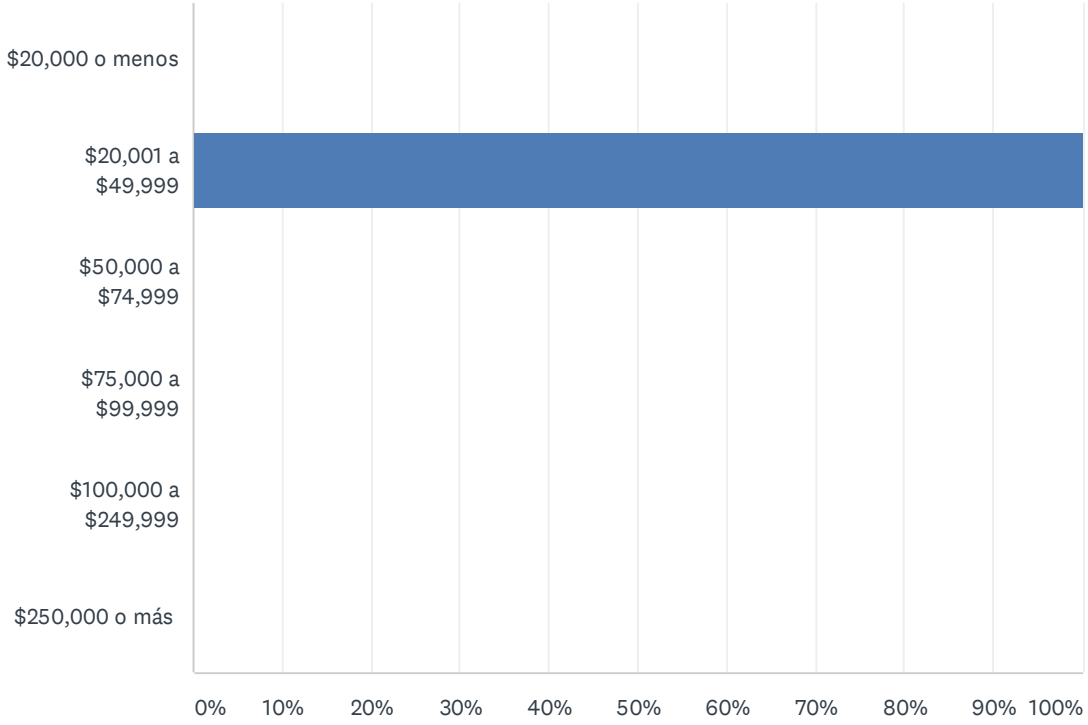
Answered: 5 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Dueño | 80.00% | 4 |
| Alquilo | 20.00% | 1 |
| TOTAL | | 5 |

# Q27 ¿Cuánto es el ingreso bruto de su hogar?

Answered: 5 Skipped: 0

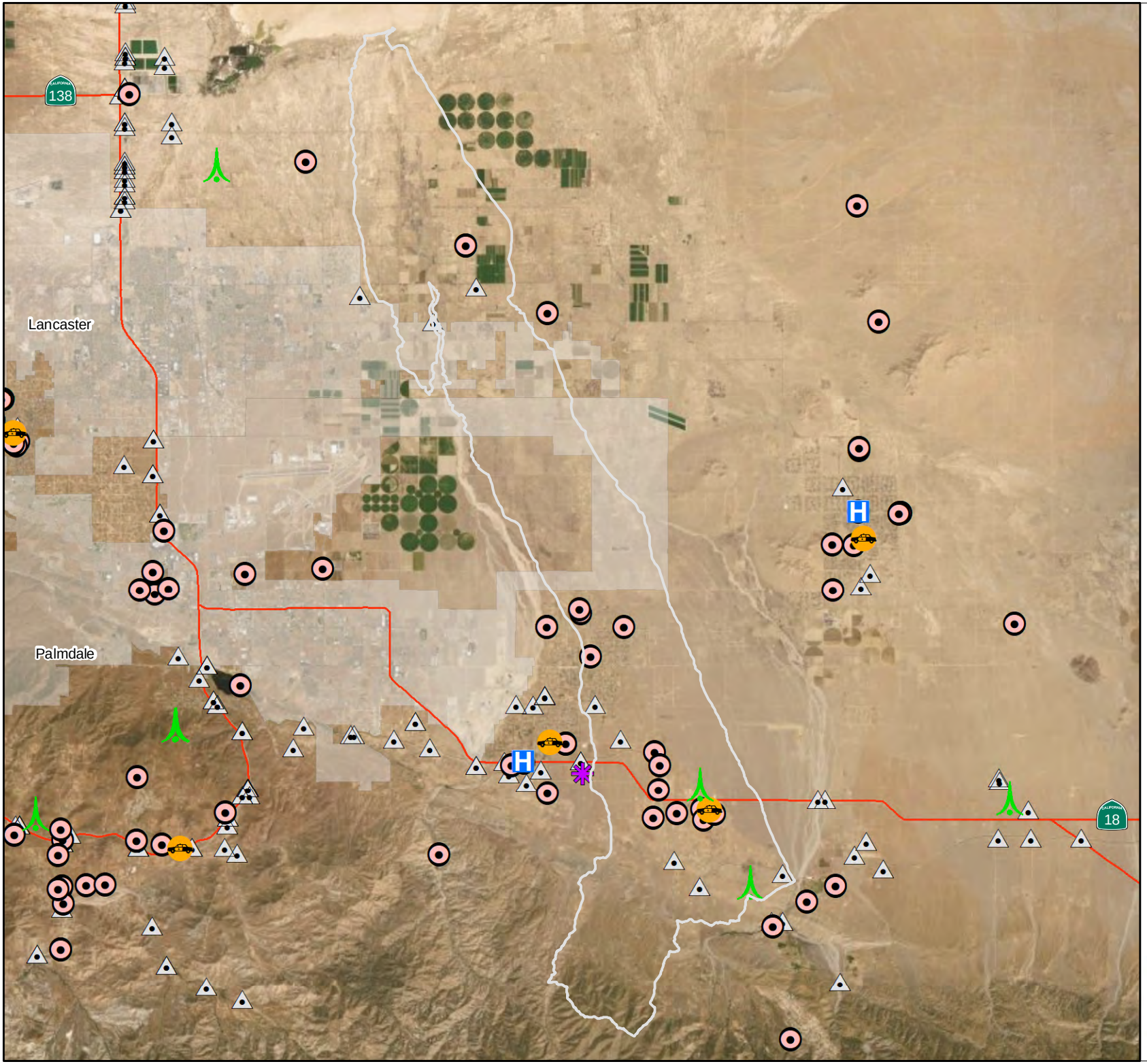


| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| $20,000 o menos | 0.00% | 0 |
| $20,001 a $49,999 | 100.00% | 5 |
| $50,000 a $74,999 | 0.00% | 0 |
| $75,000 a $99,999 | 0.00% | 0 |
| $100,000 a $249,999 | 0.00% | 0 |
| $250,000 o más | 0.00% | 0 |
| TOTAL | | 5 |

# Q28 Comentarios

Answered: 0 Skipped: 5

# Appendix D. Critical Facilities and Infrastructure Maps




# 1809020616 (Pearblossom) Watershed

## Critical Facilities

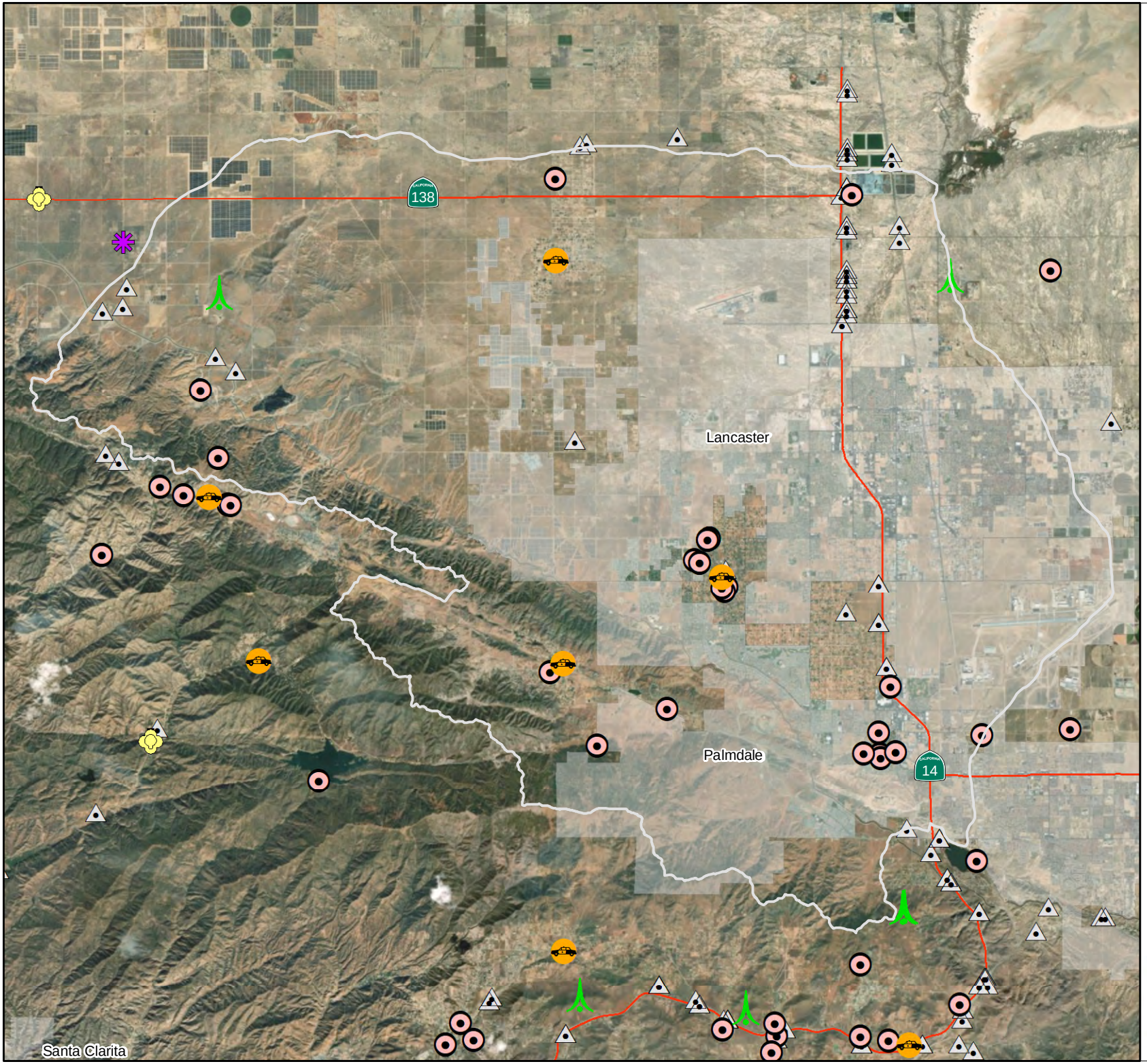
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 11,500 23,000

Meters
0 2,950 5,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Amargosa Creek Watershed

## Critical Facilities

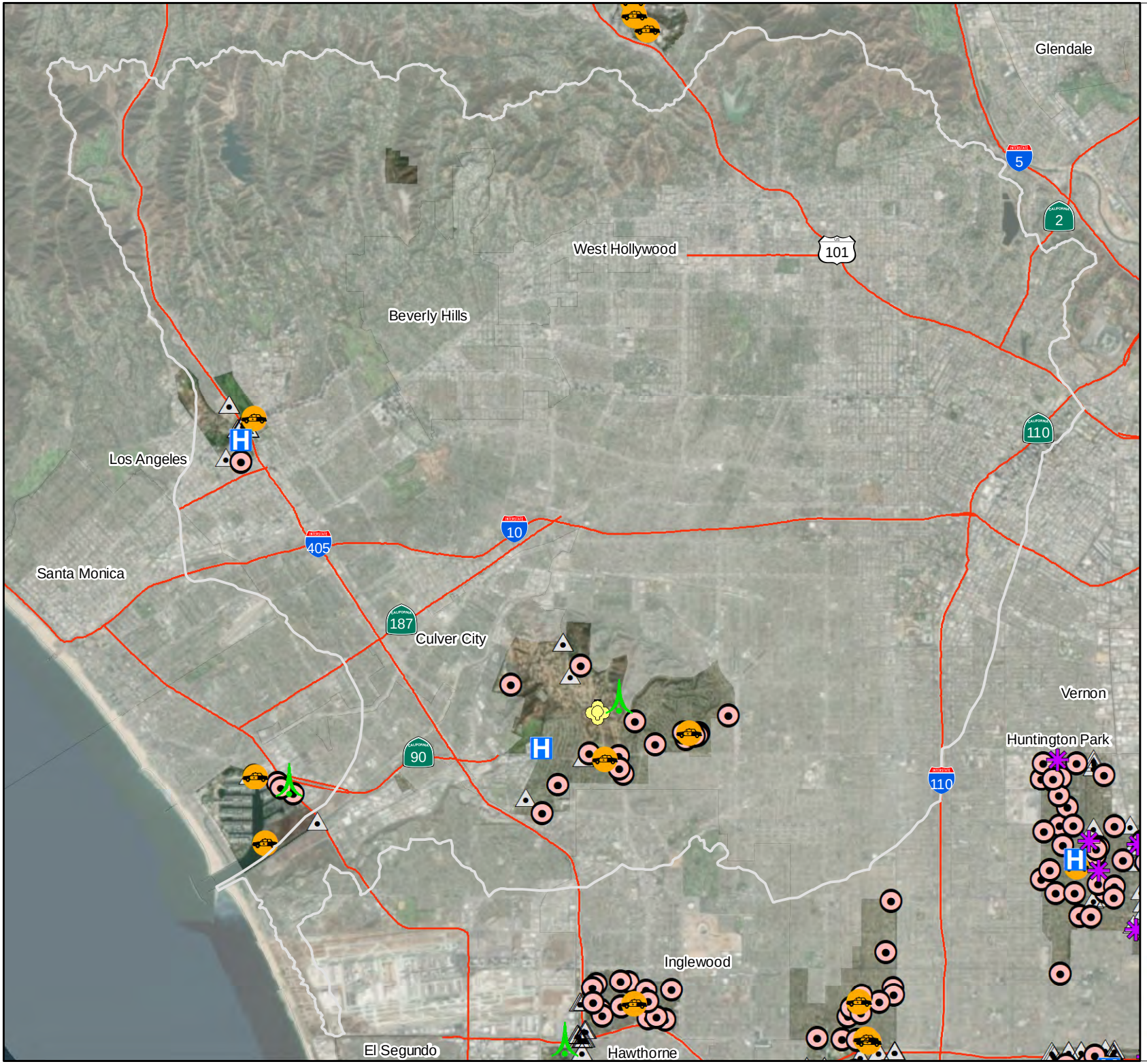
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 10,000 20,000

Meters
0 2,600 5,200

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Ballona Creek Watershed

## Critical Facilities

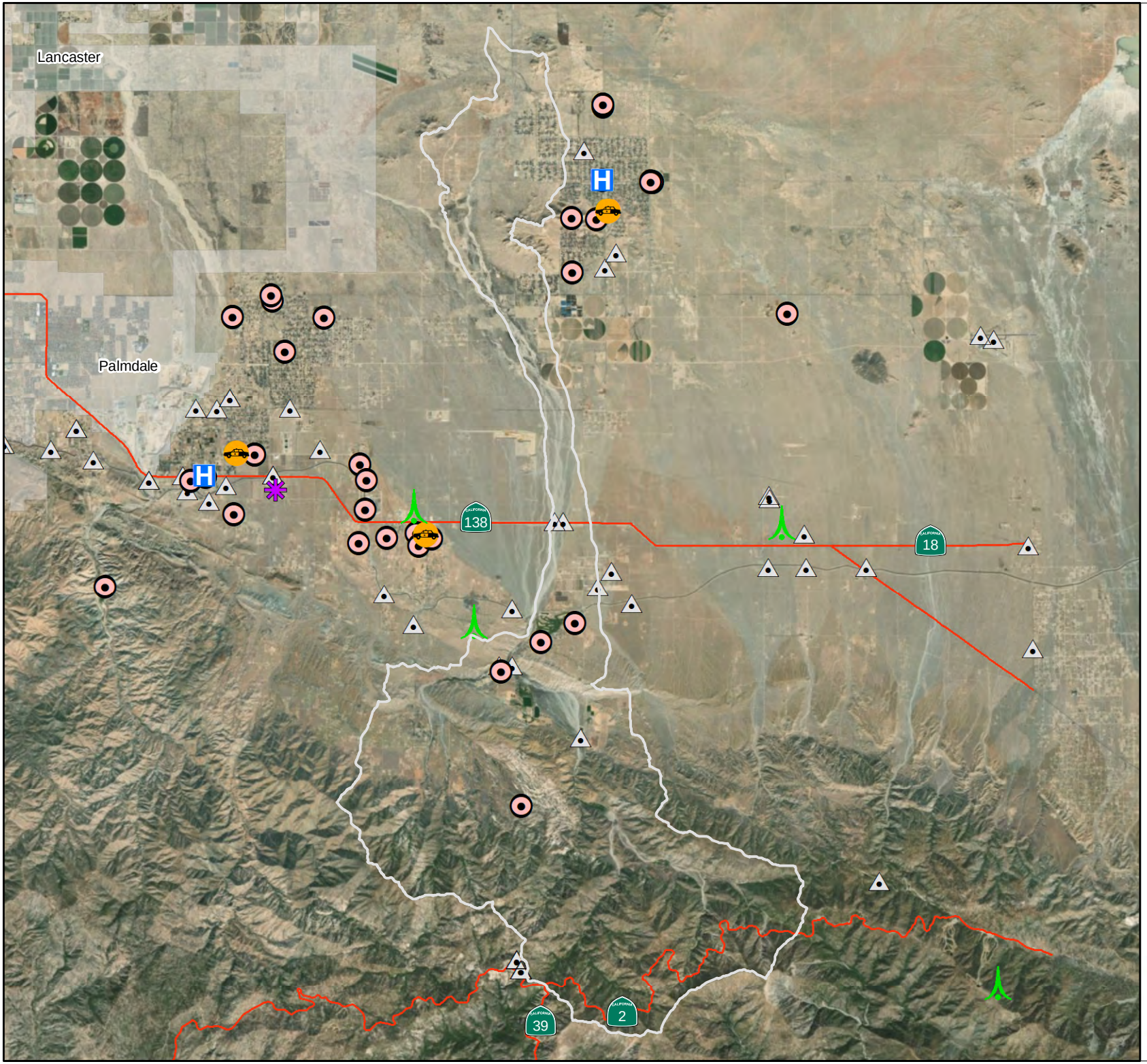
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 6,000 12,000

Meters
0 1,550 3,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Rock Creek-Big Rock Wash Watershed

## Critical Facilities

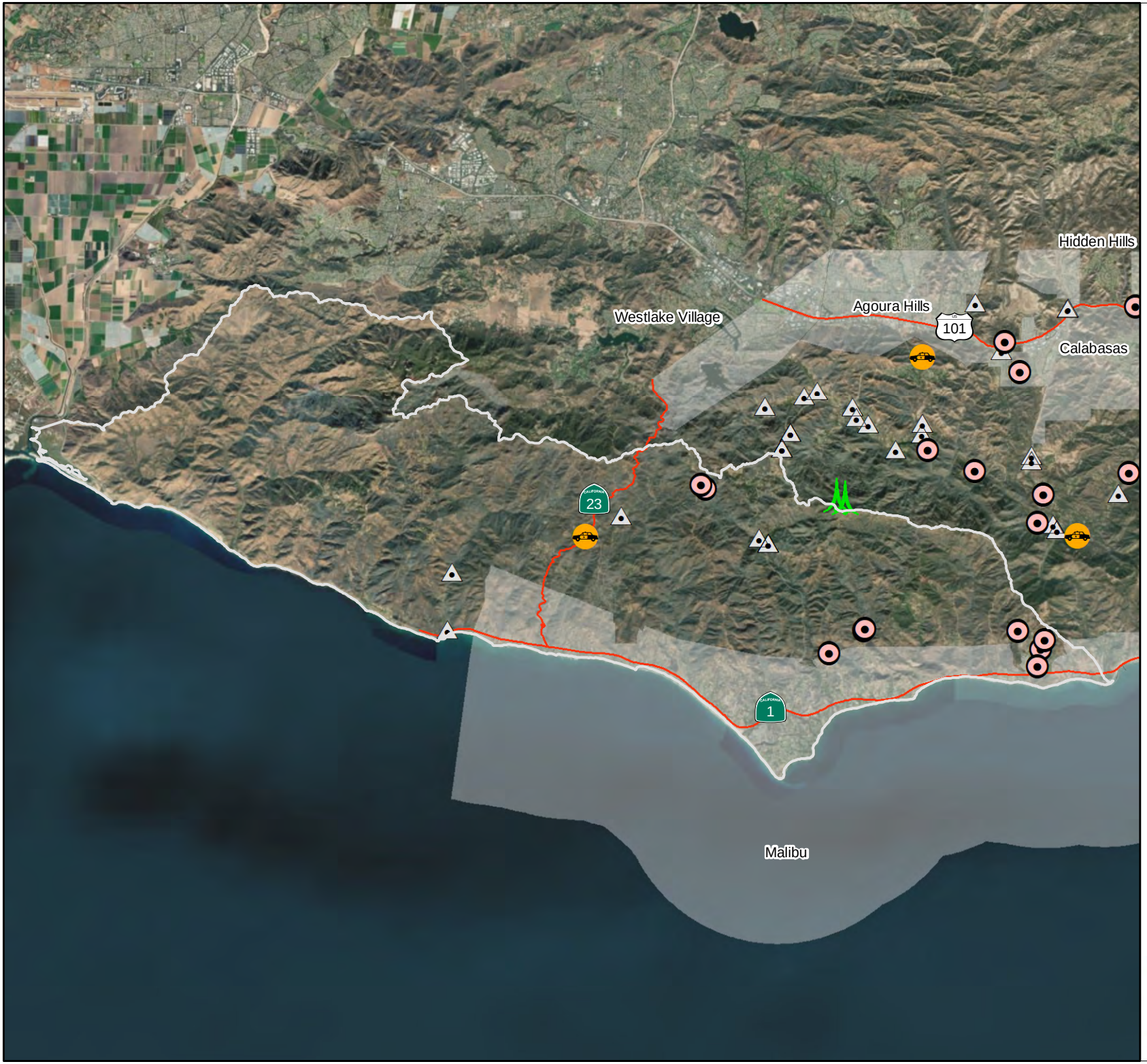
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Sycamore Canyon-Frontal Santa Monica Bay Watershed

## Critical Facilities

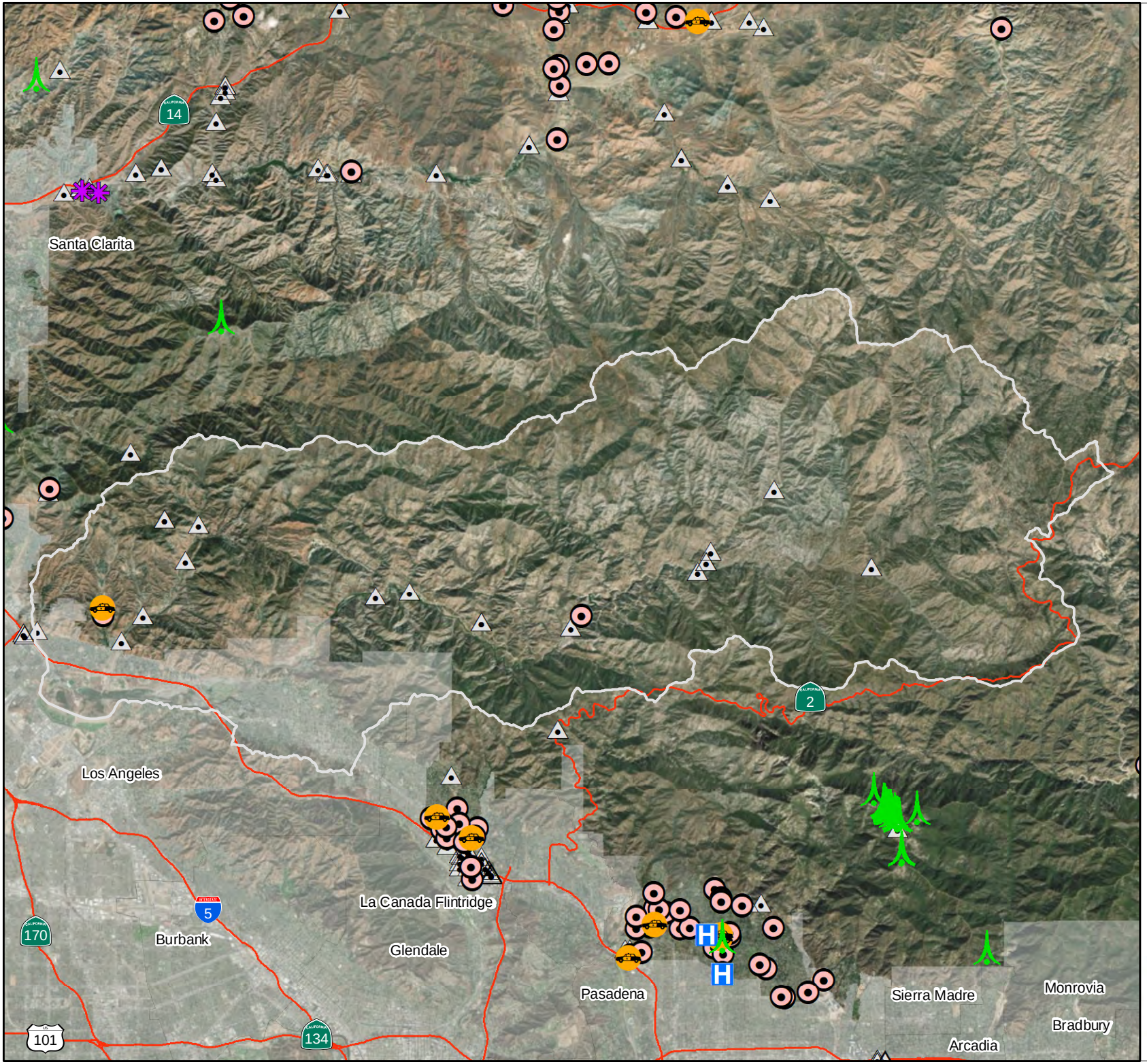
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Tujunga Creek Watershed

## Critical Facilities

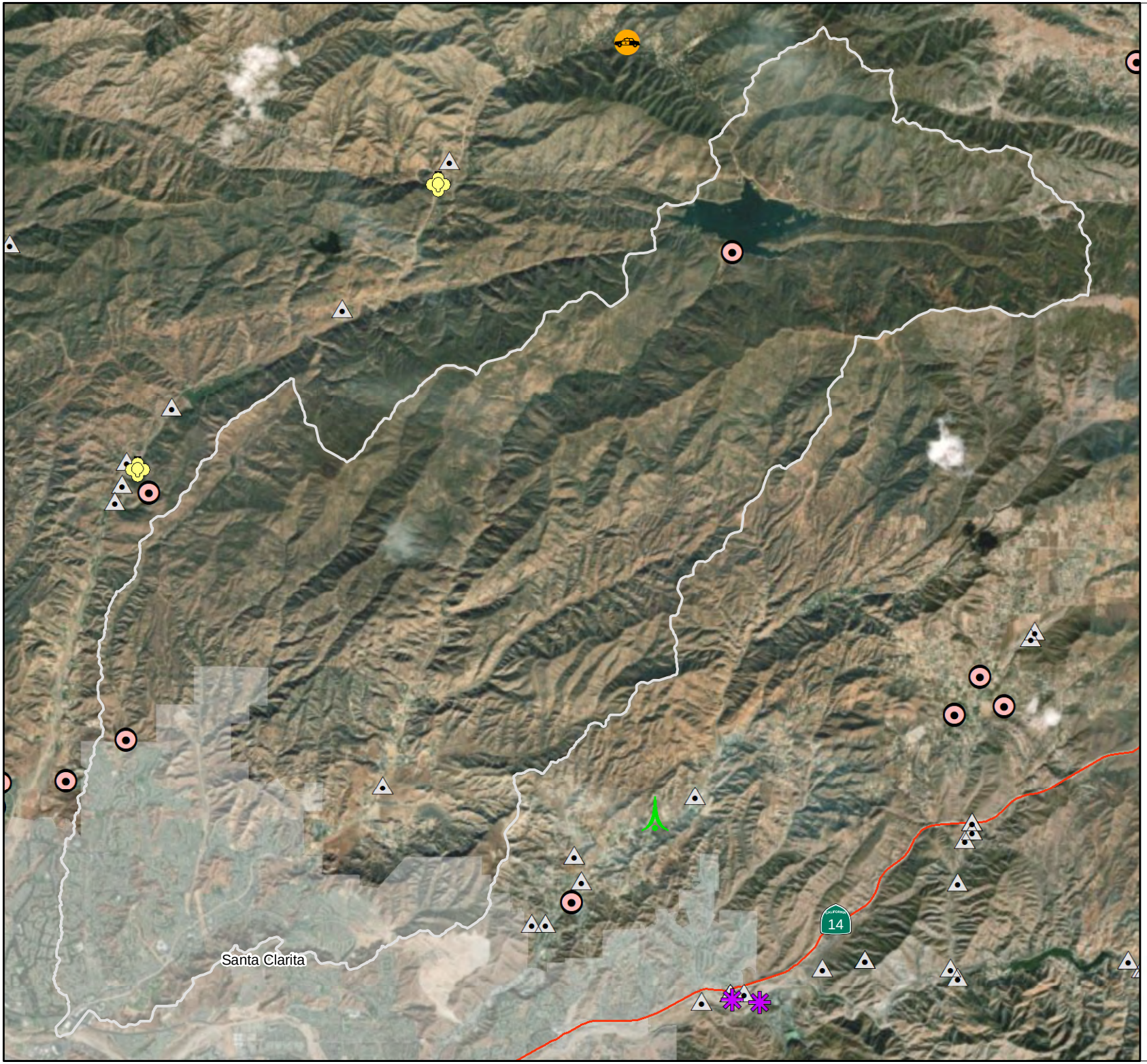
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Bouquet Canyon Watershed

## Critical Facilities

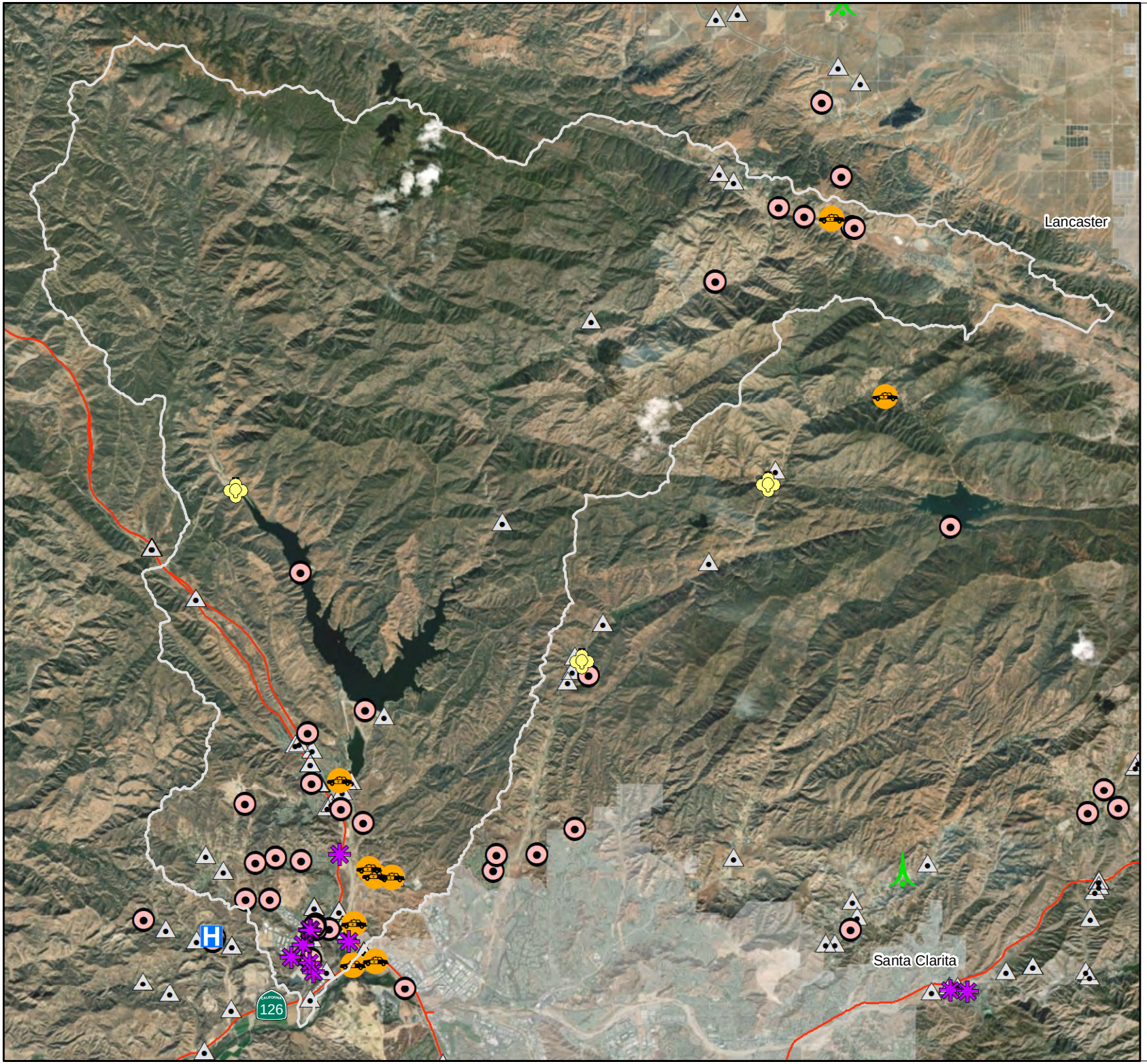
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Castaic Creek Watershed

## Critical Facilities

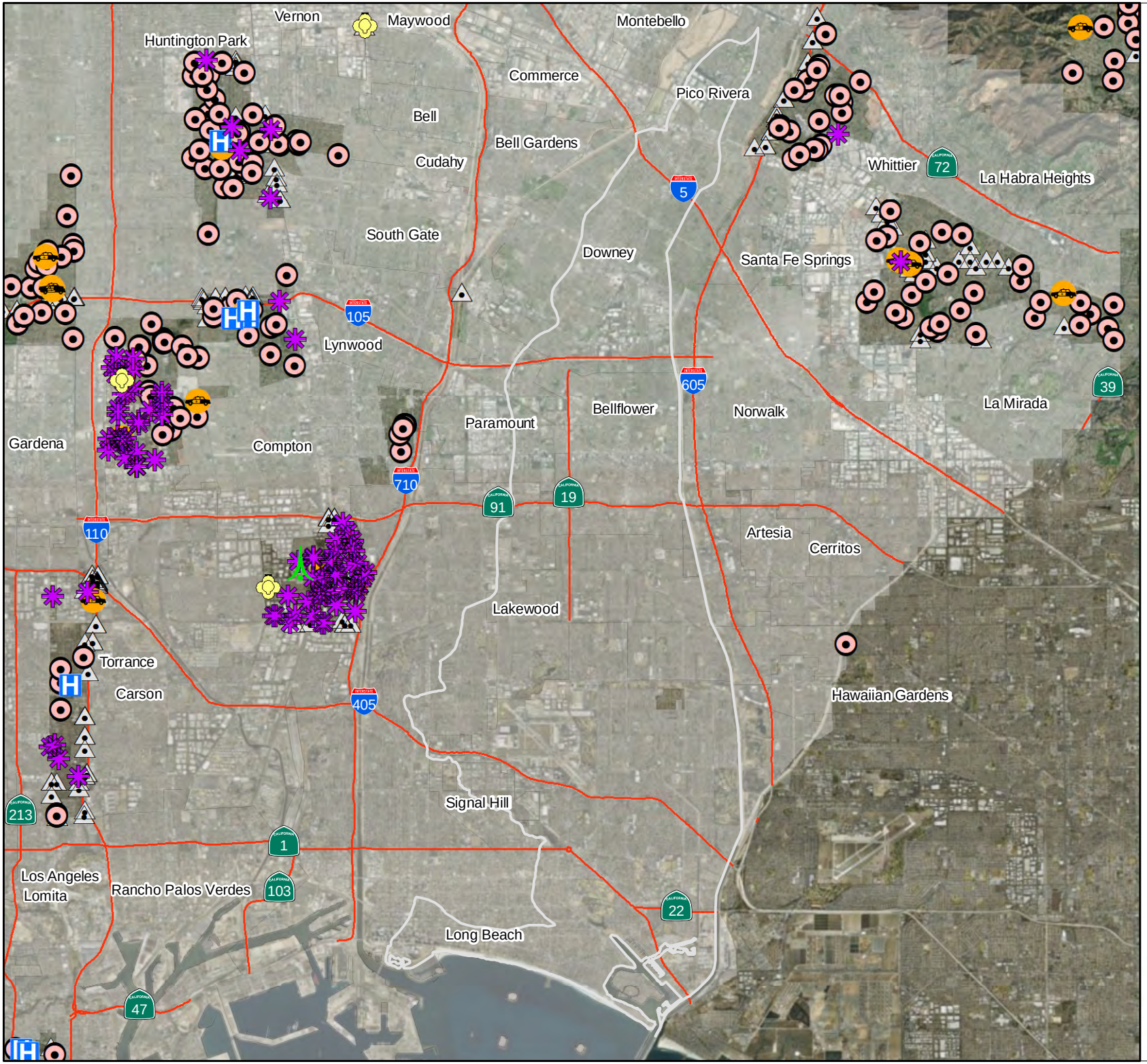
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,500 19,000

Meters
0 2,400 4,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Colorado Lagoon-Frontal Alamitos Bay Watershed

## Critical Facilities

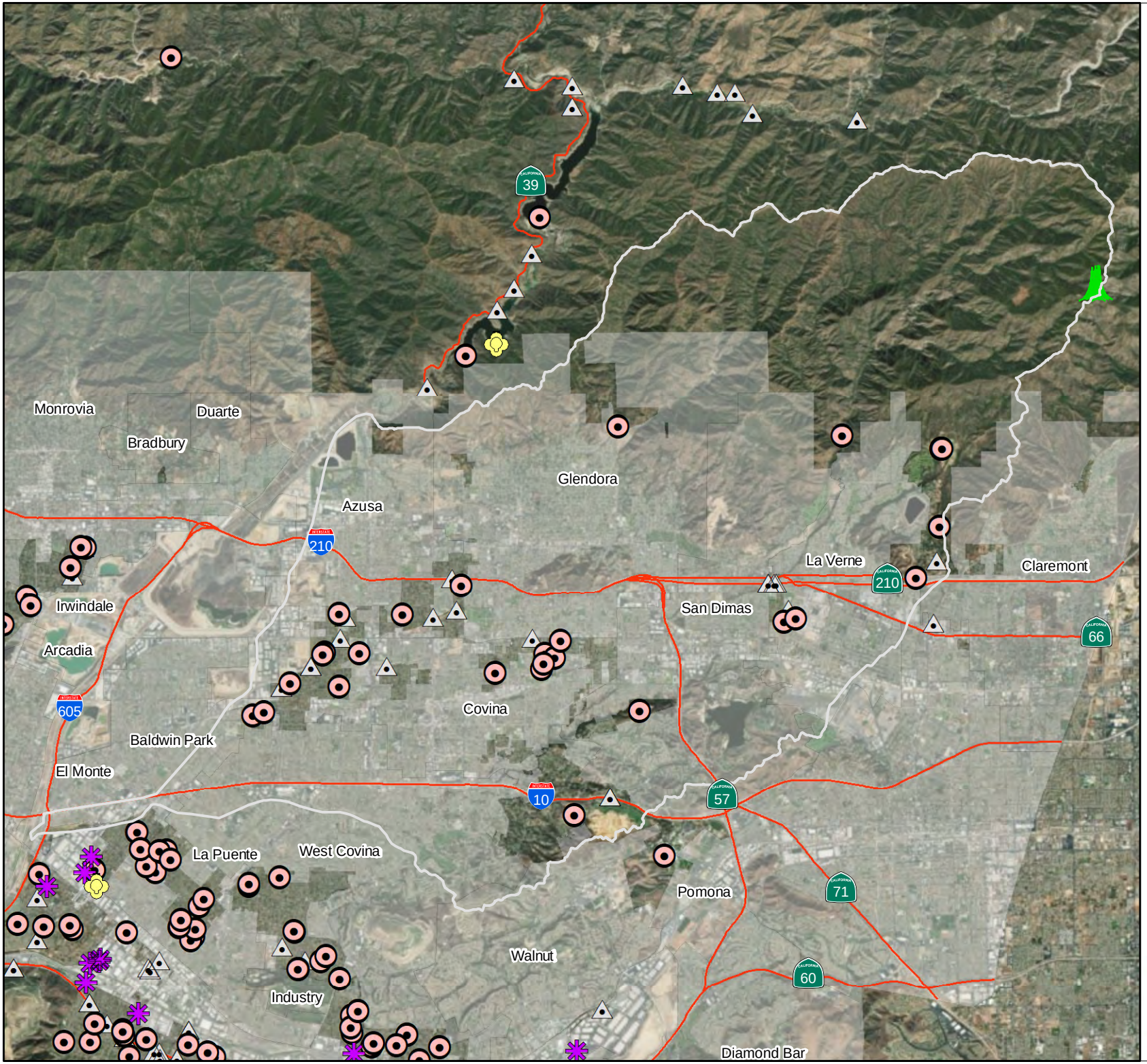
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,500 15,000

Meters
0 1,900 3,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dalton Wash Watershed

## Critical Facilities

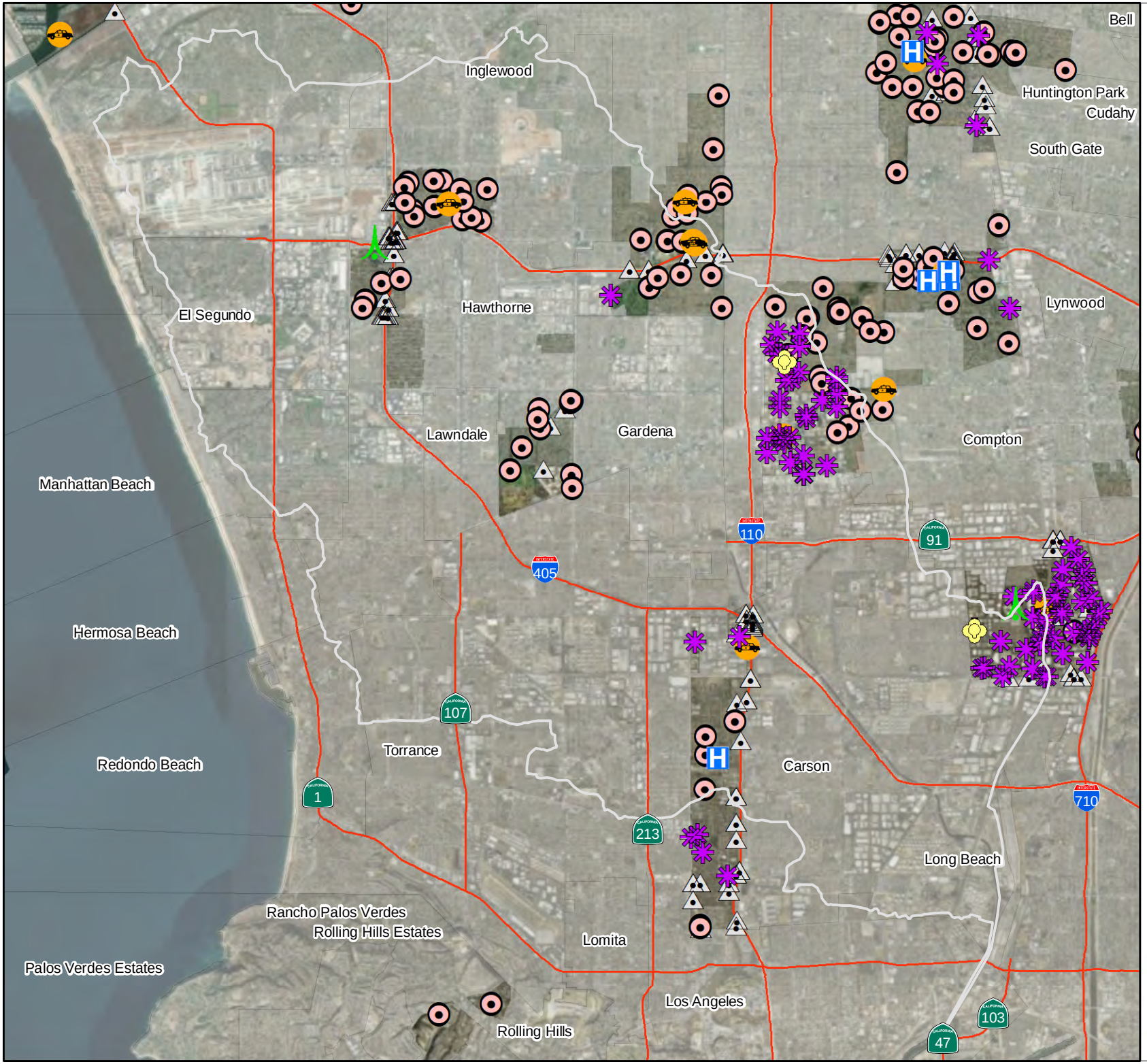
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,000 14,000

Meters
0 1,800 3,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dominguez Channel Watershed

## Critical Facilities

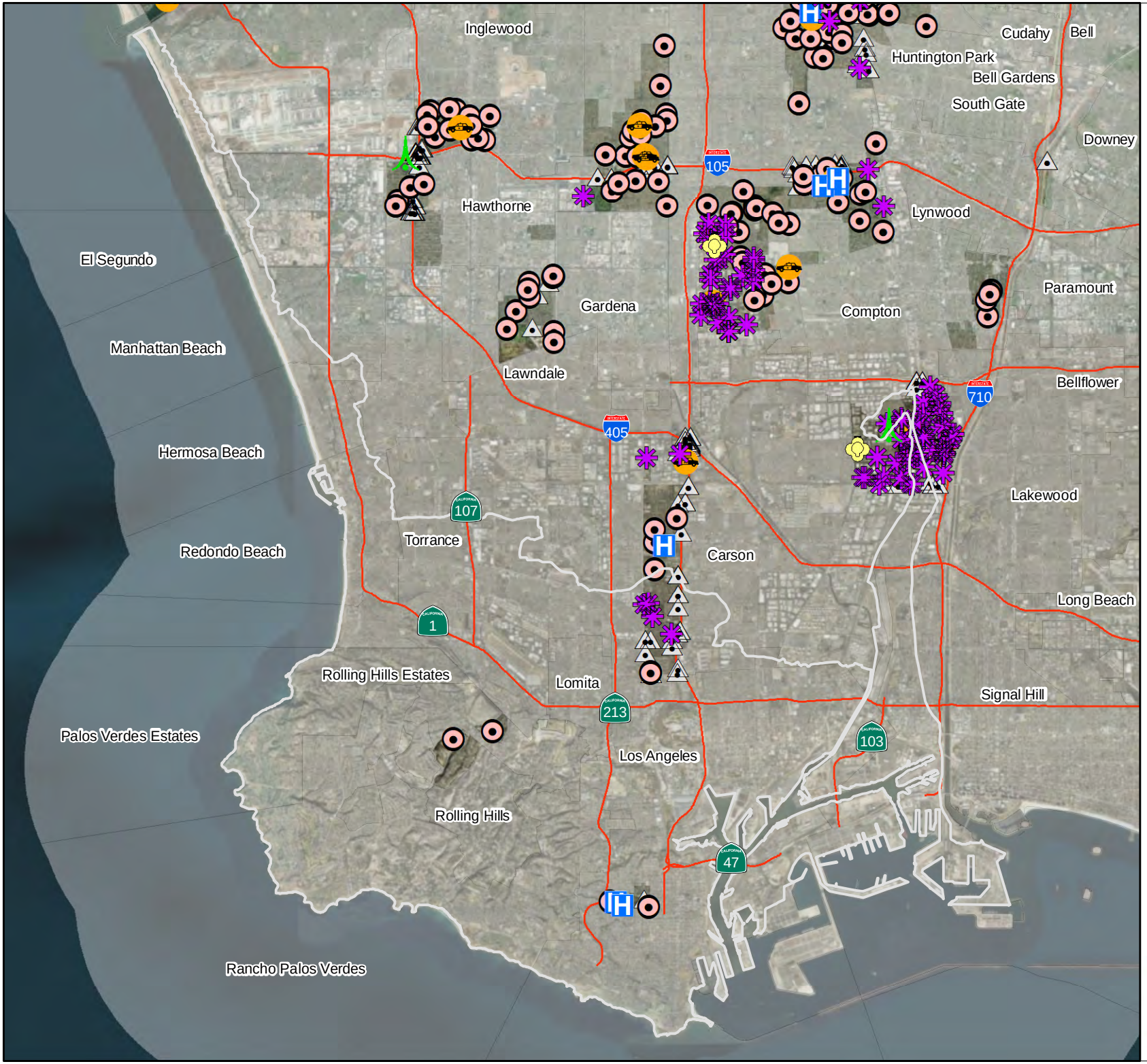
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Frontal Santa Monica Bay-San Pedro Bay Watershed

## Critical Facilities

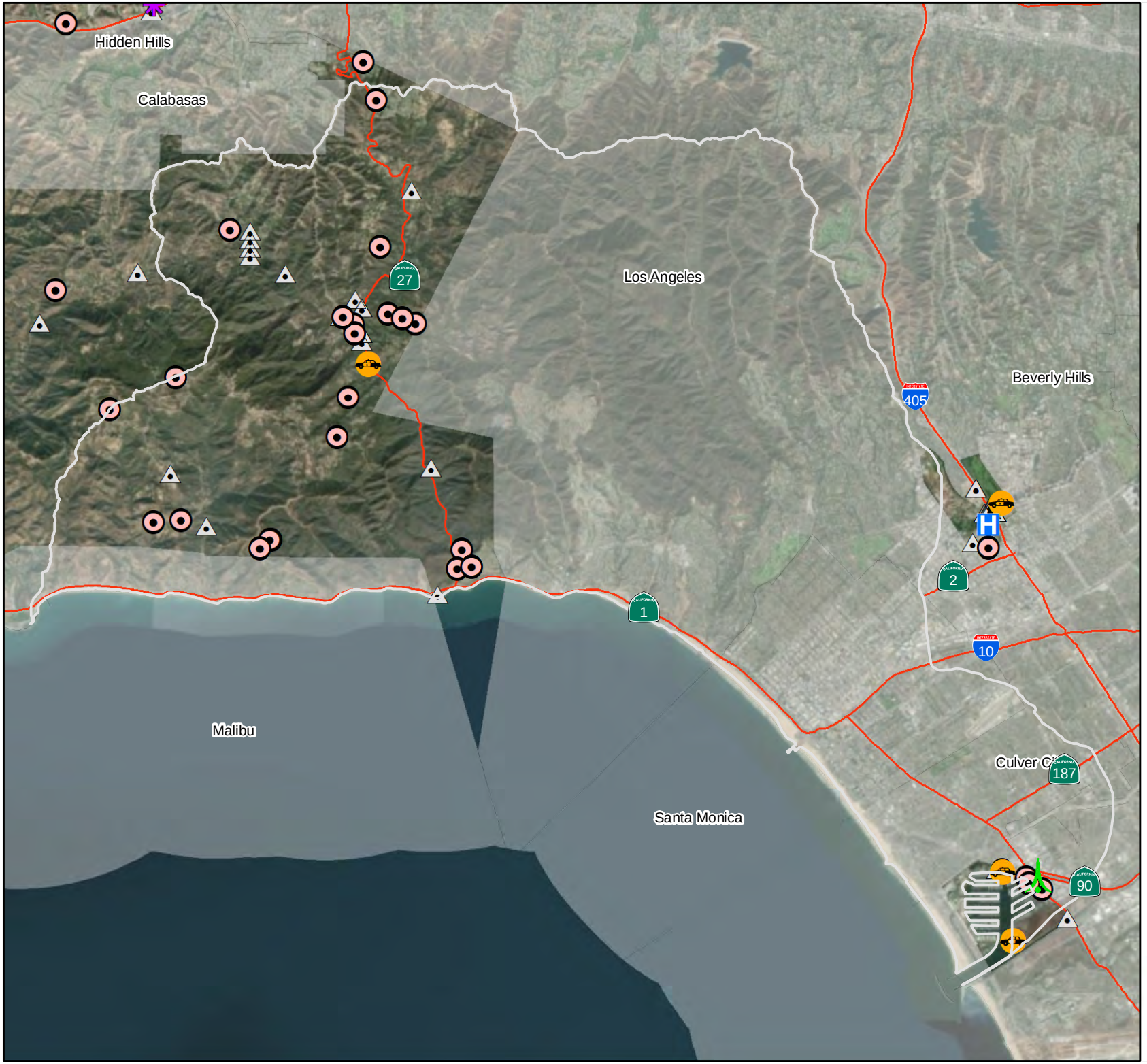
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,500 15,000

Meters
0 1,950 3,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Garapito Creek-Frontal Santa Monica Bay Watershed

## Critical Facilities

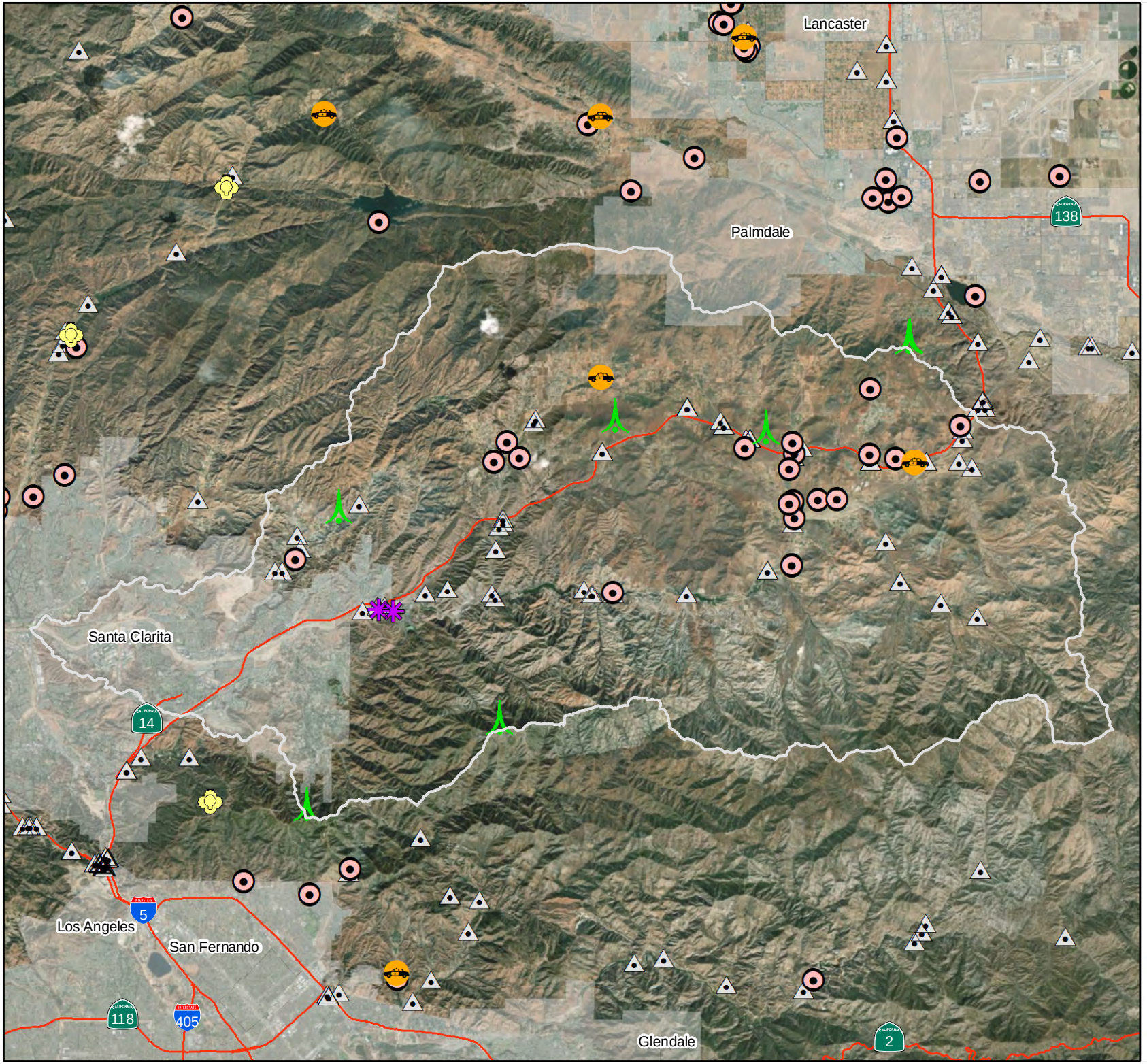
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 6,000 12,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Headwaters Santa Clara River Watershed

## Critical Facilities

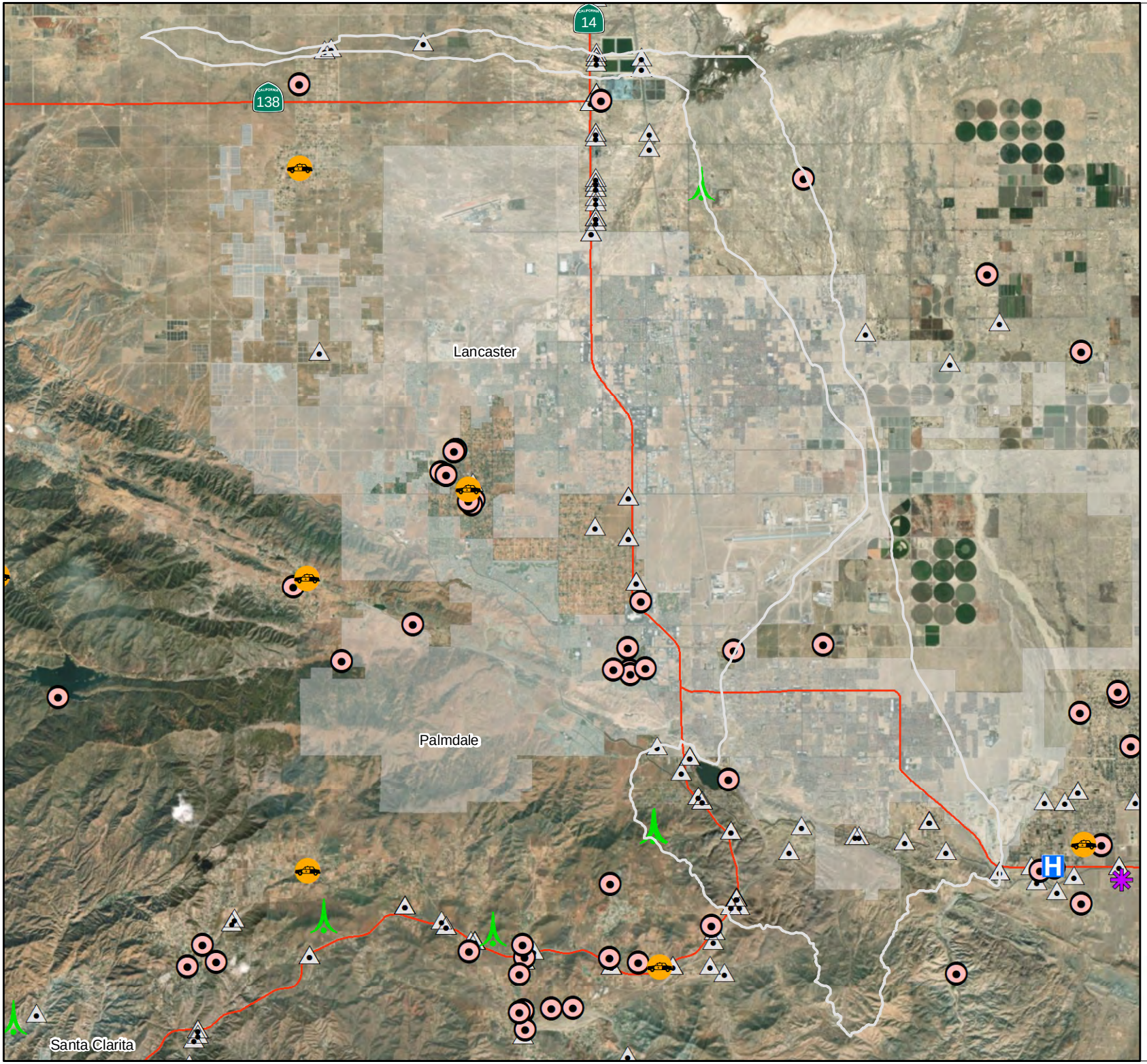
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 11,250 22,500

Meters
0 2,875 5,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lake Palmdale-Piute Ponds Watershed

## Critical Facilities

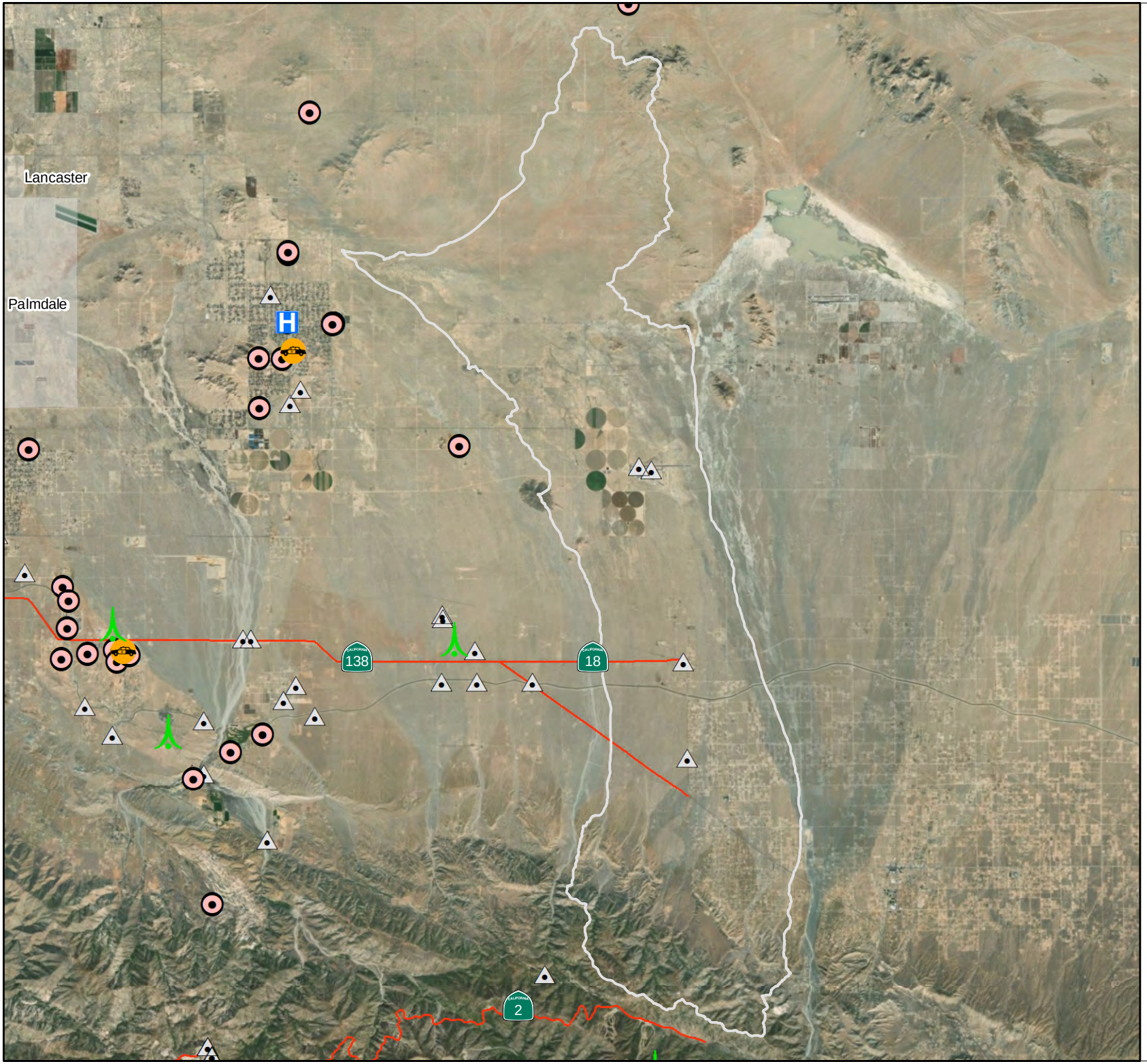
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 10,000 20,000

Meters
0 2,550 5,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Le Montaine Creek-Eller Slough Watershed

## Critical Facilities

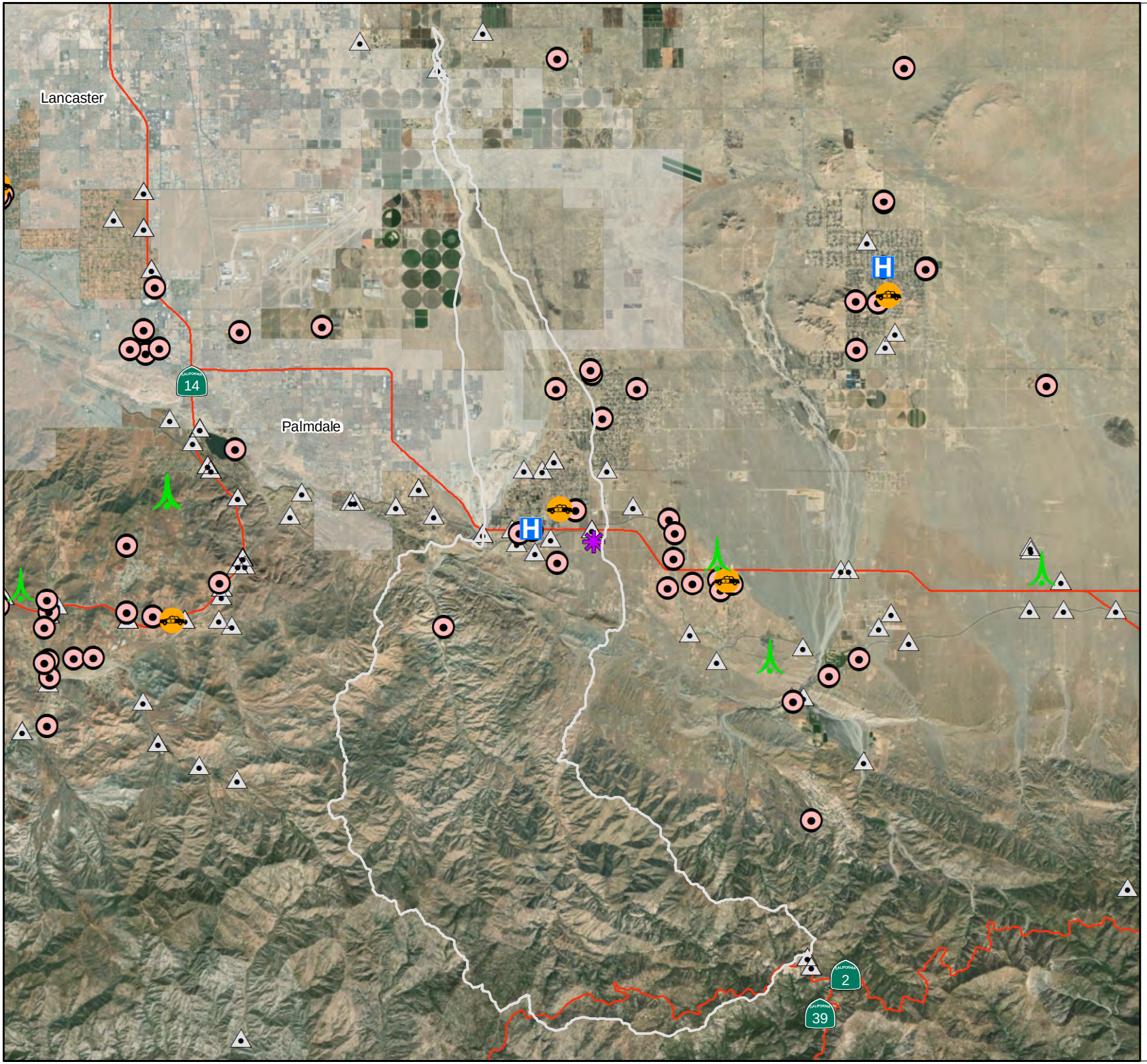
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 10,500 21,000

Meters
0 2,650 5,300

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Little Rock Wash Watershed

## Critical Facilities

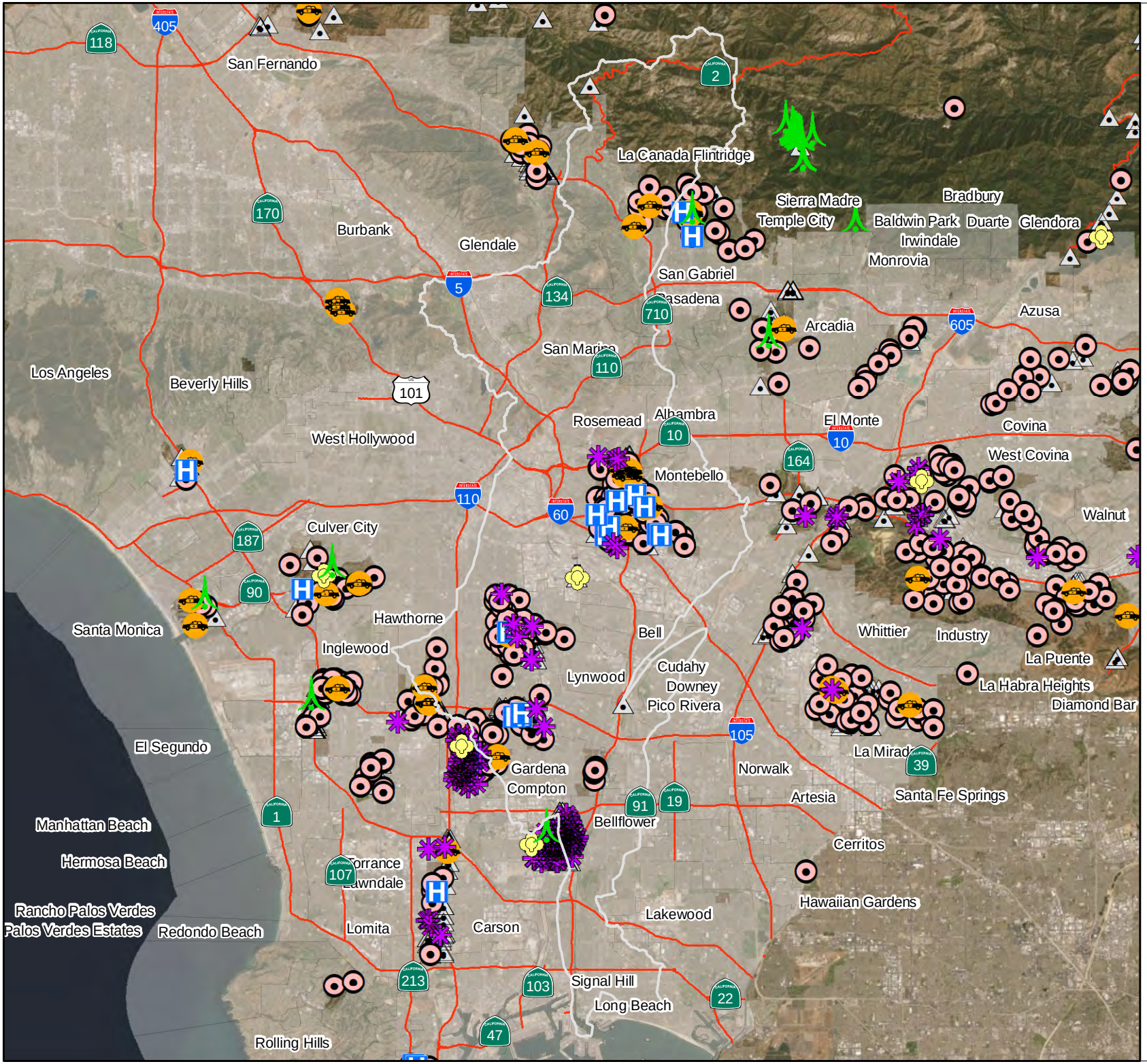
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 11,000 22,000

Meters
0 2,800 5,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower Los Angeles River Watershed

## Critical Facilities

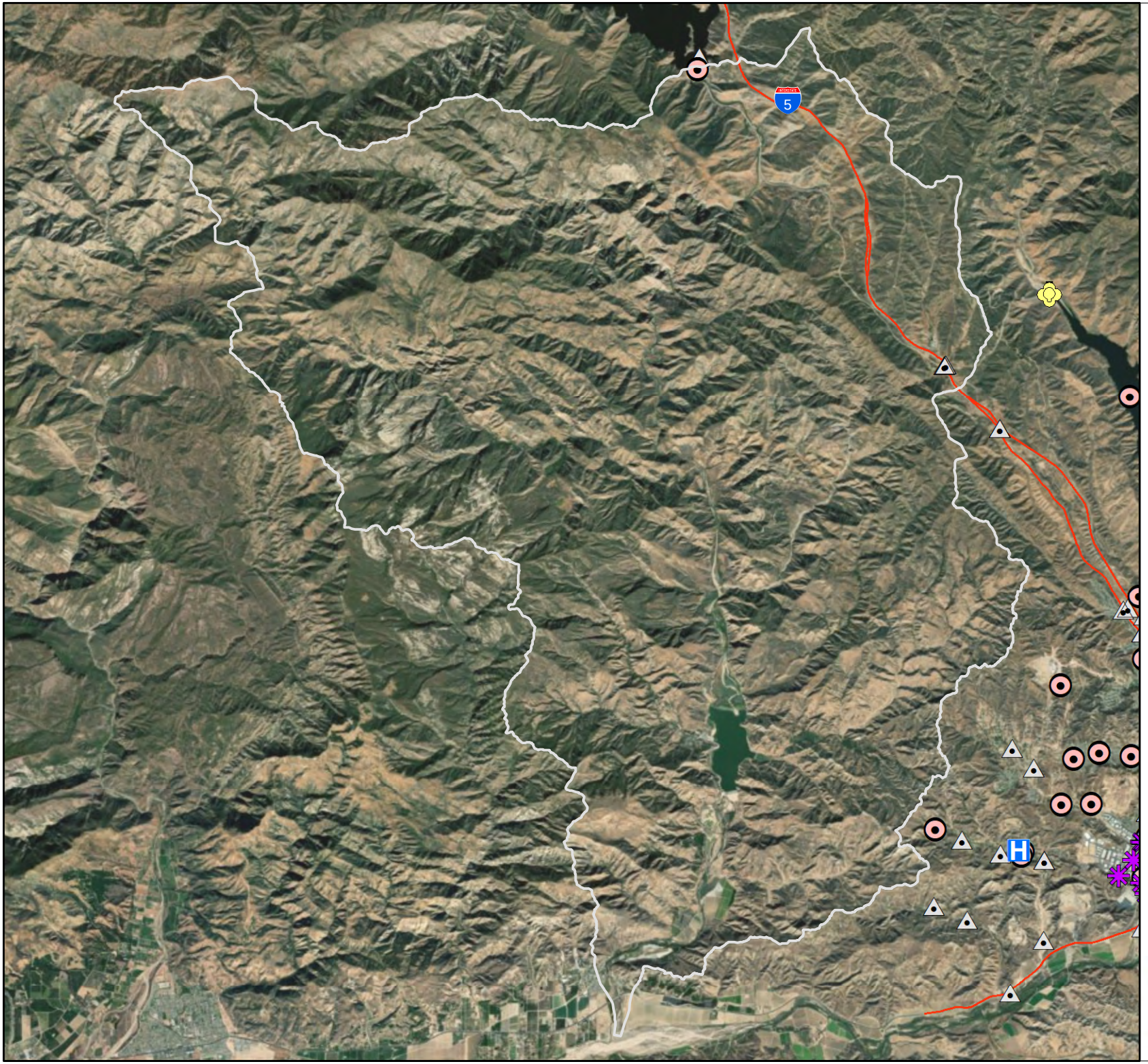
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 16,000 32,000

Meters
0 4,050 8,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower Piru Creek Watershed

## Critical Facilities

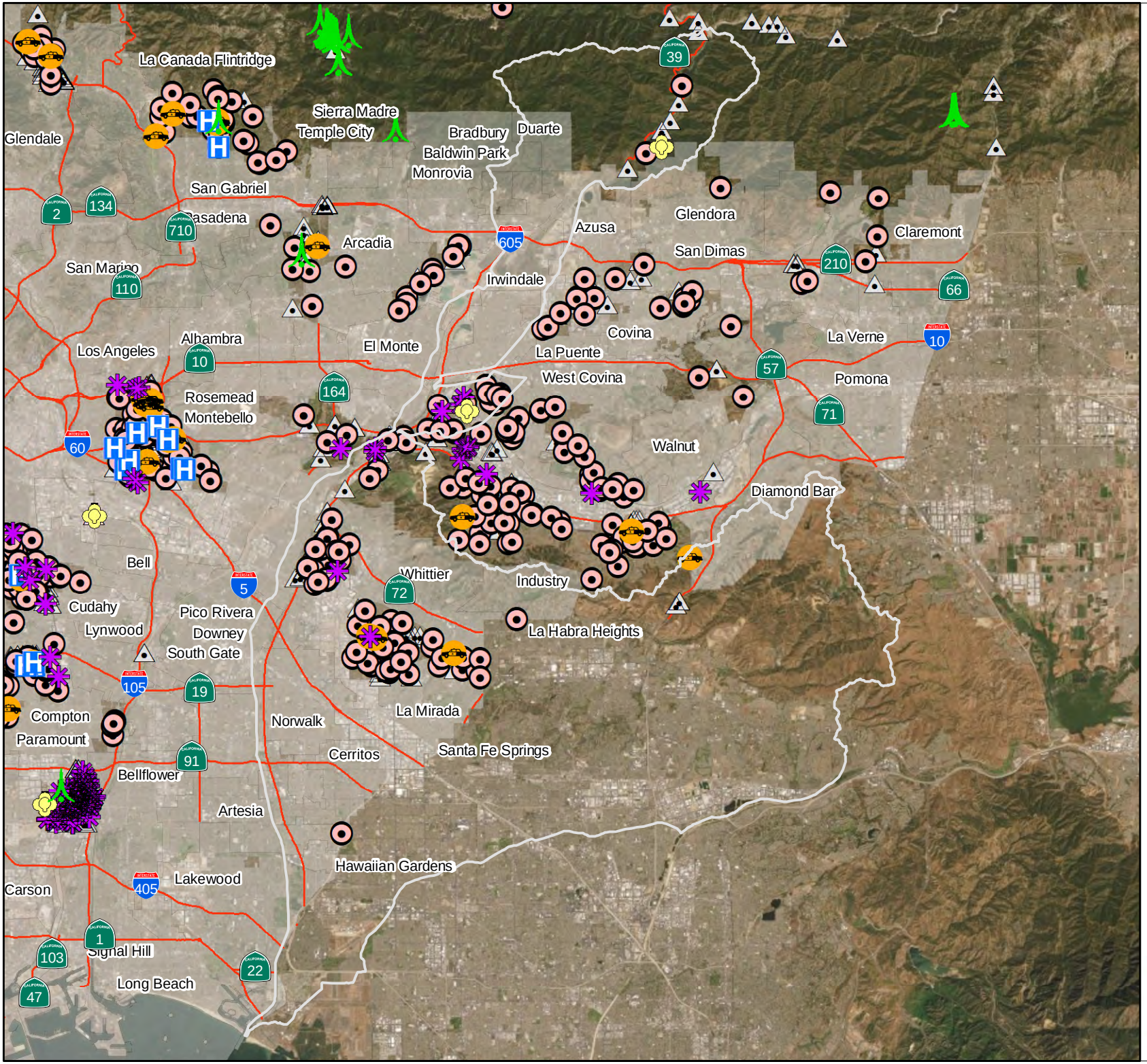
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,500 15,000

Meters
0 1,900 3,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower San Gabriel River Watershed

## Critical Facilities

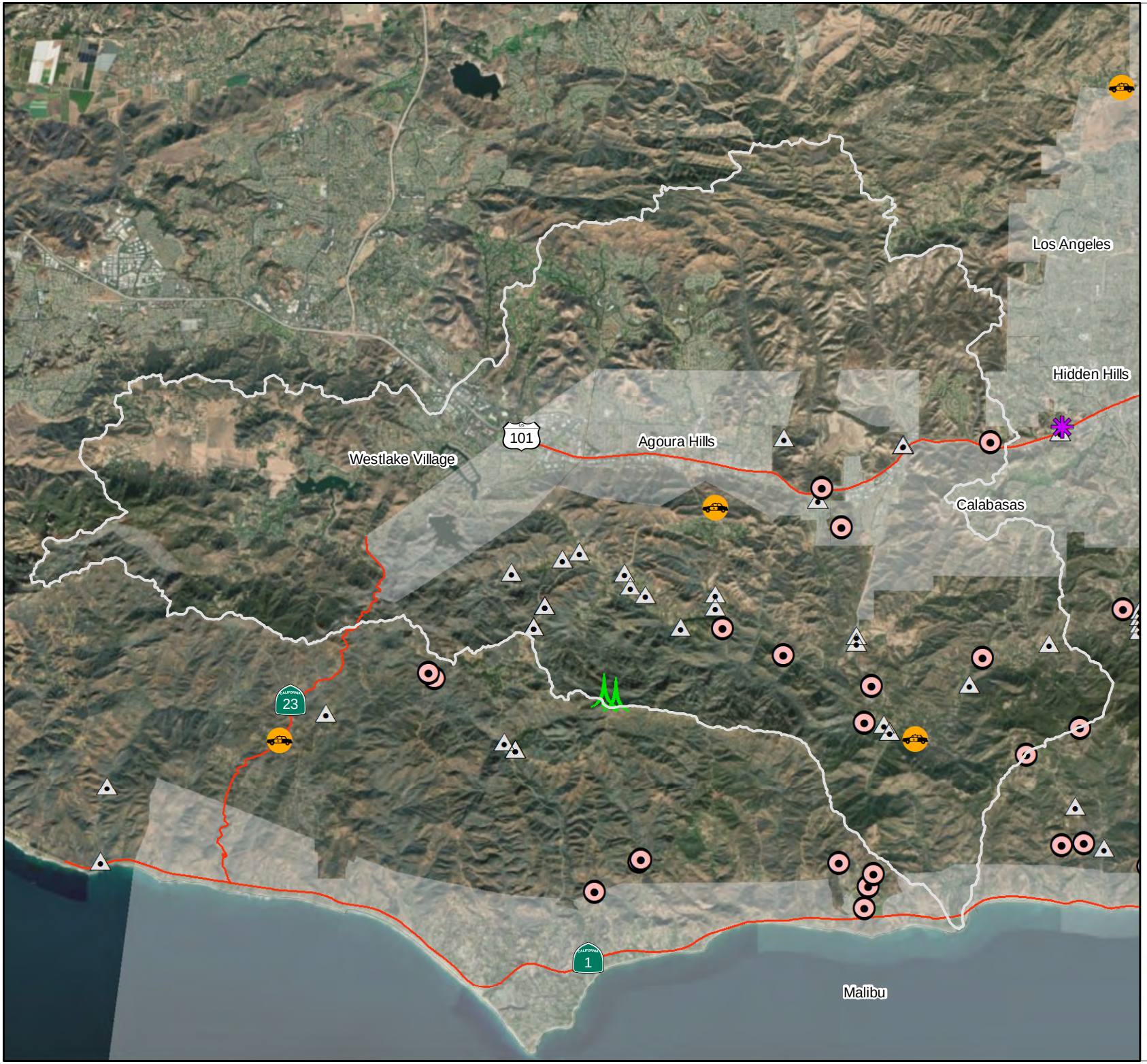
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

0 14,500 29,000 Feet

0 3,750 7,500 Meters

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Malibu Creek Watershed

## Critical Facilities

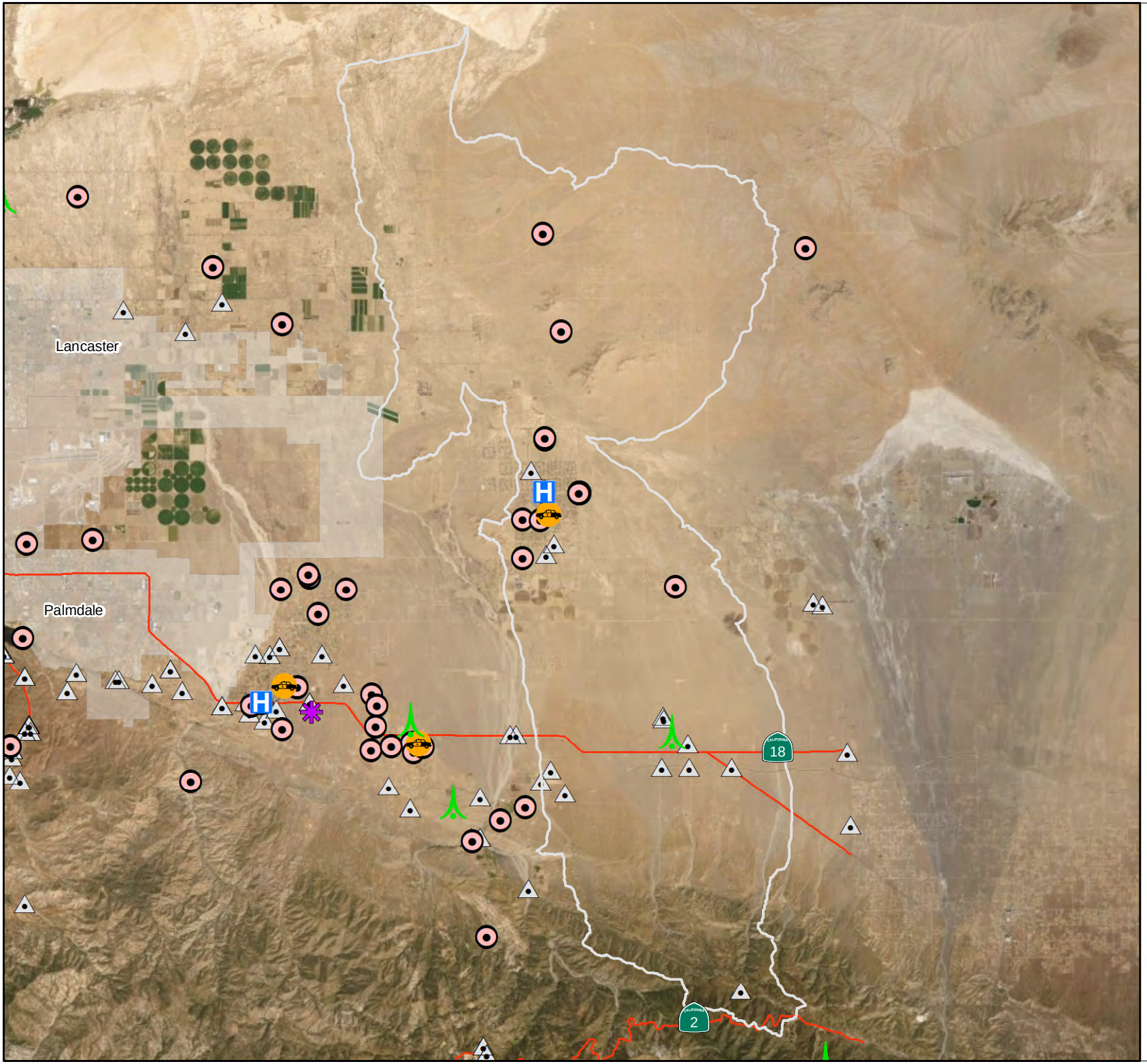
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,000 14,000

Meters
0 1,875 3,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Mescal Creek-Rocky Buttes Watershed

## Critical Facilities

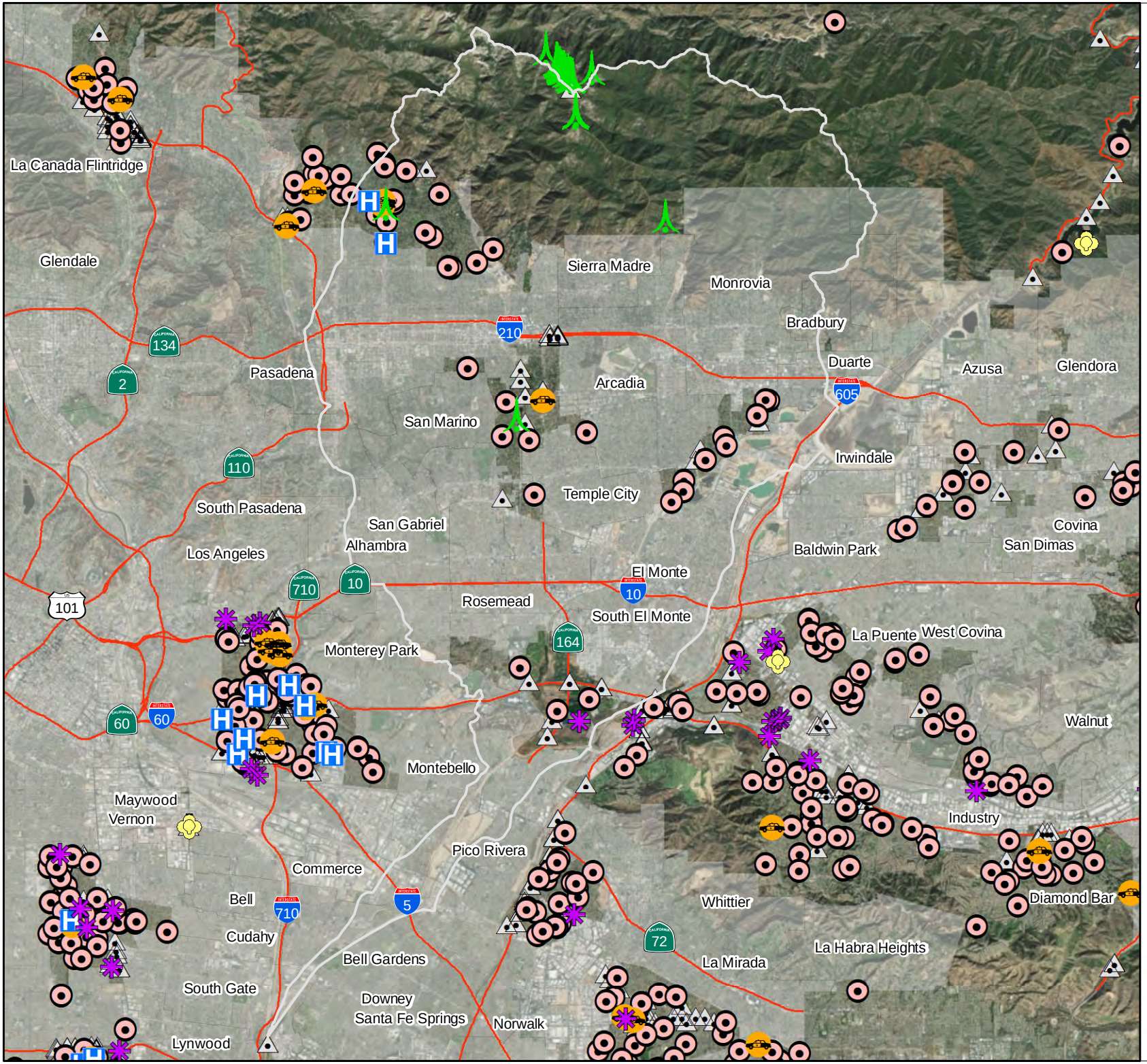
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 13,750 27,500

Meters
0 3,500 7,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rio Hondo Watershed

## Critical Facilities

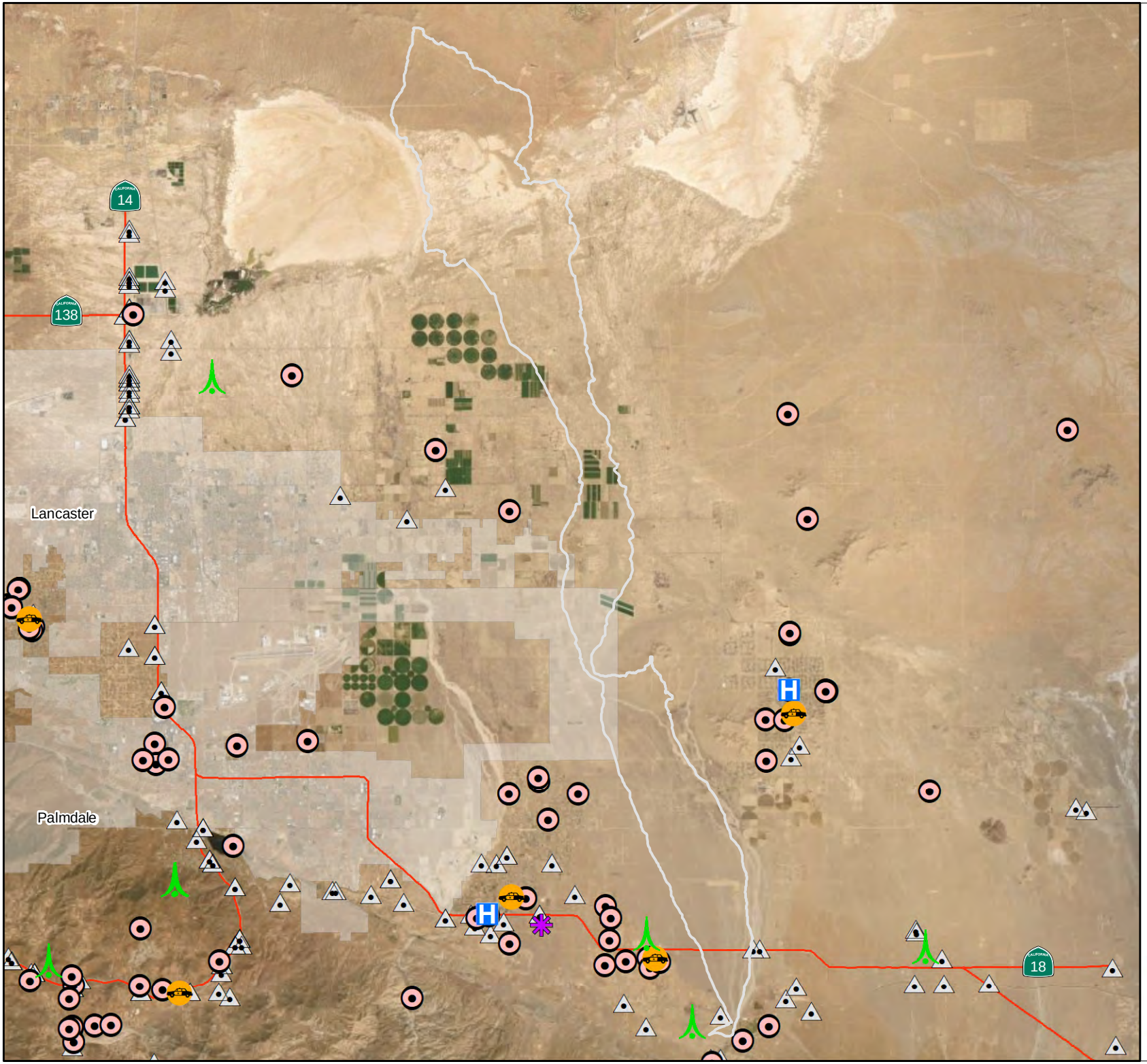
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,000 18,000

Meters
0 2,375 4,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rock Creek-Buckhorn Lake Watershed

## Critical Facilities

- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 13,000 26,000

Meters
0 3,250 6,500

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps



# Rogers Lake Watershed

## Critical Facilities

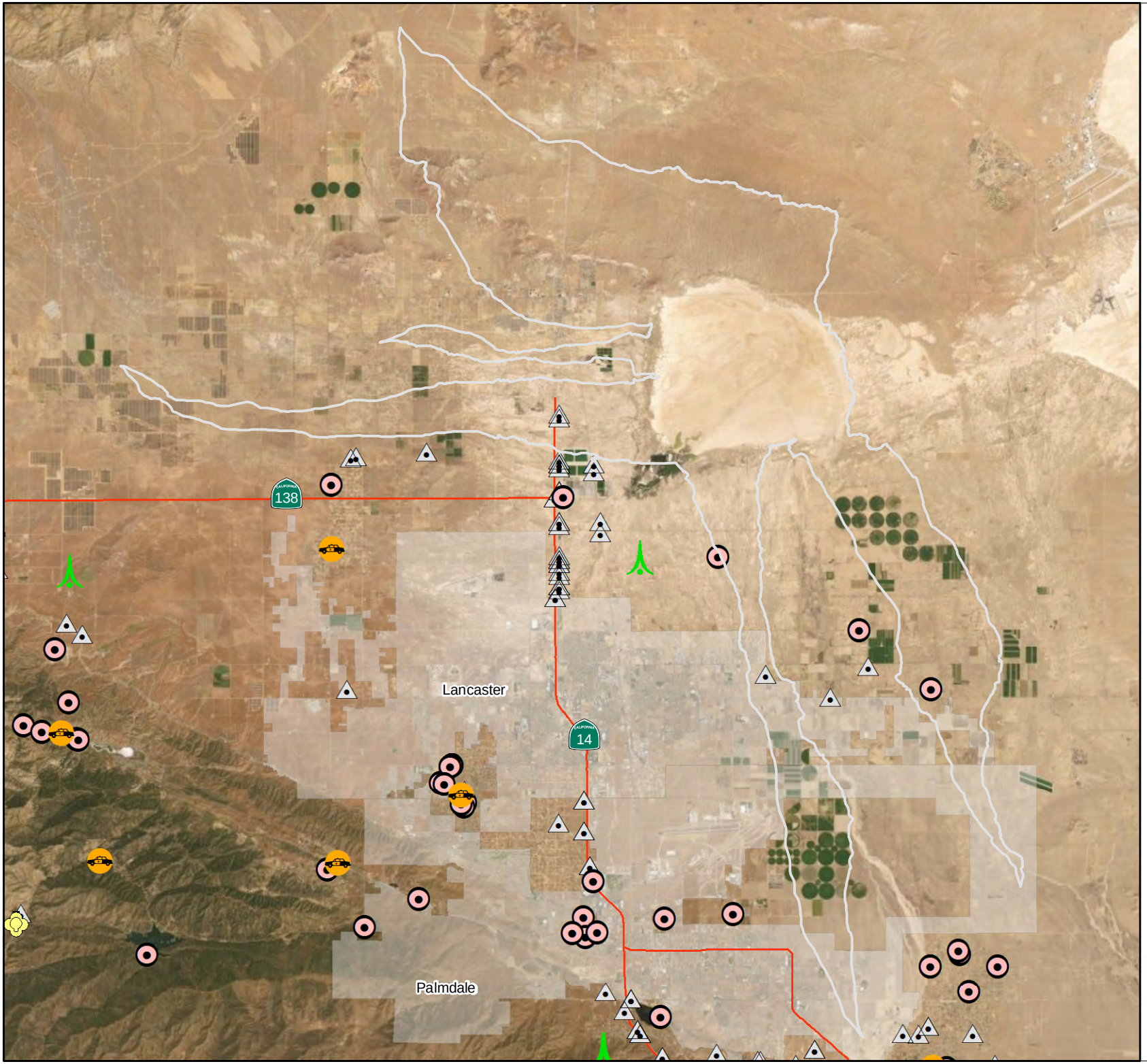
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rosamond Lake Watershed

## Critical Facilities

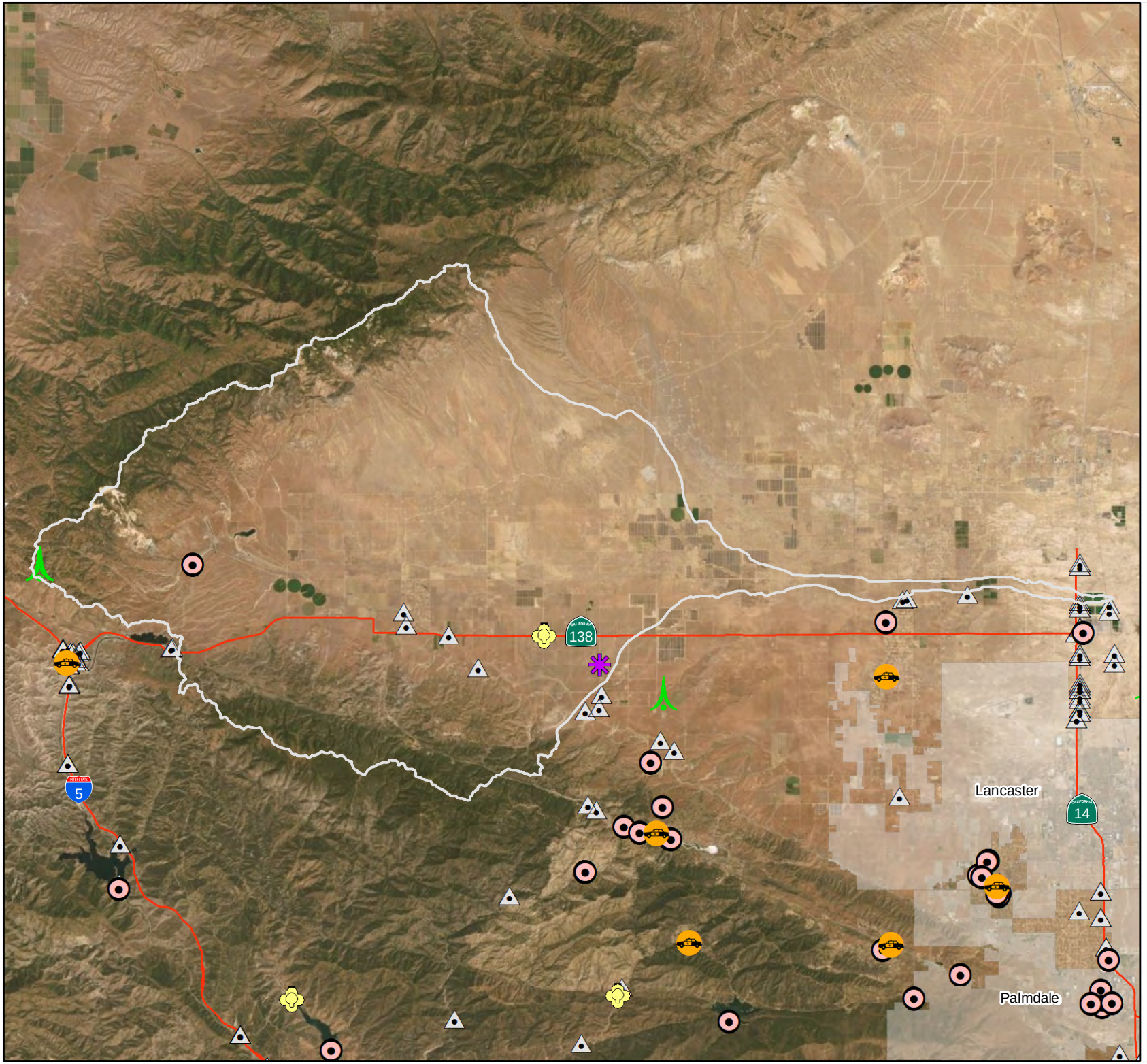
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 13,000 26,000

Meters
0 3,350 6,700

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Sacatara Creek-Kings Canyon Watershed

## Critical Facilities

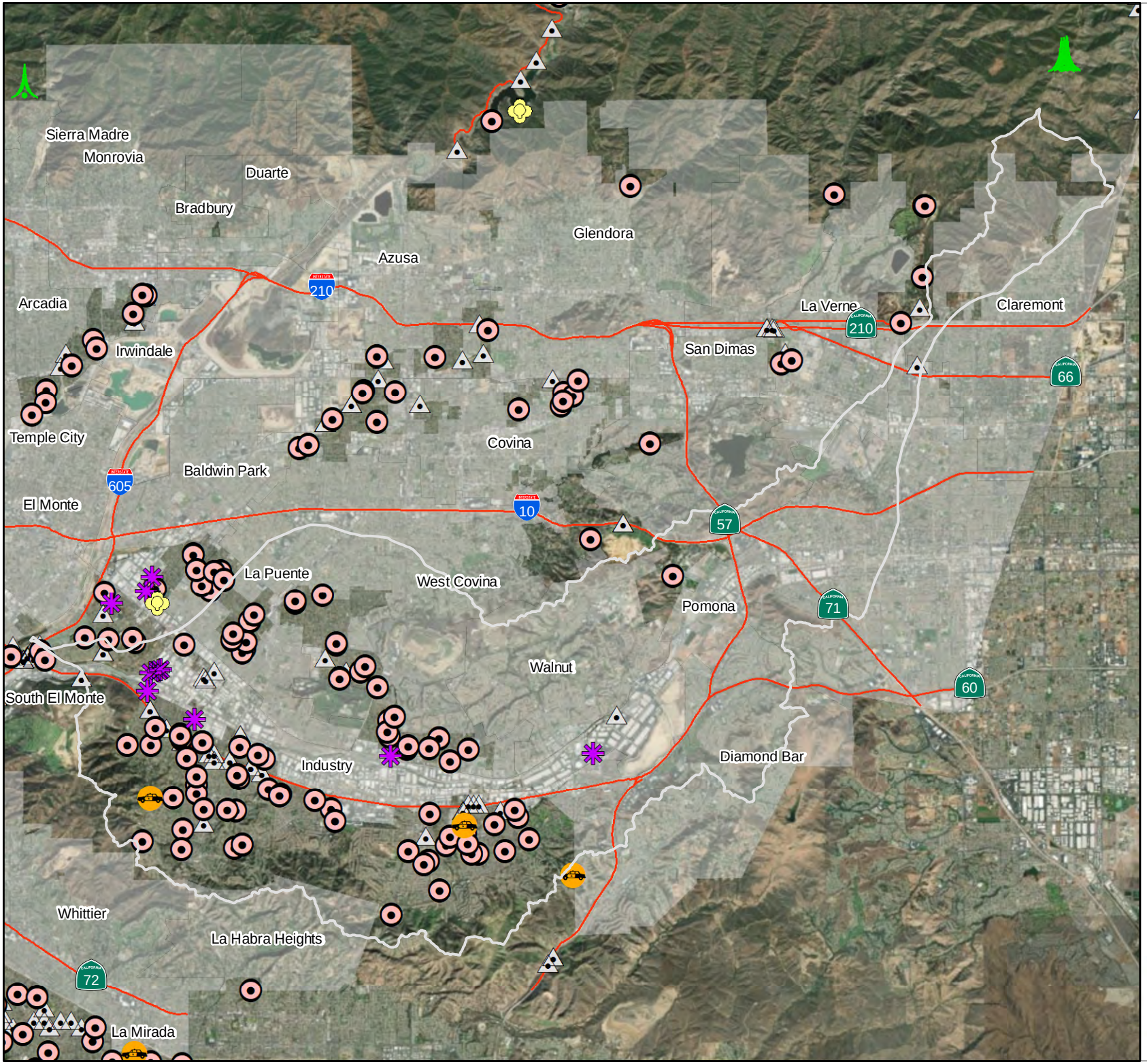
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 15,500 31,000

Meters
0 3,950 7,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# San Jose Creek Watershed

## Critical Facilities

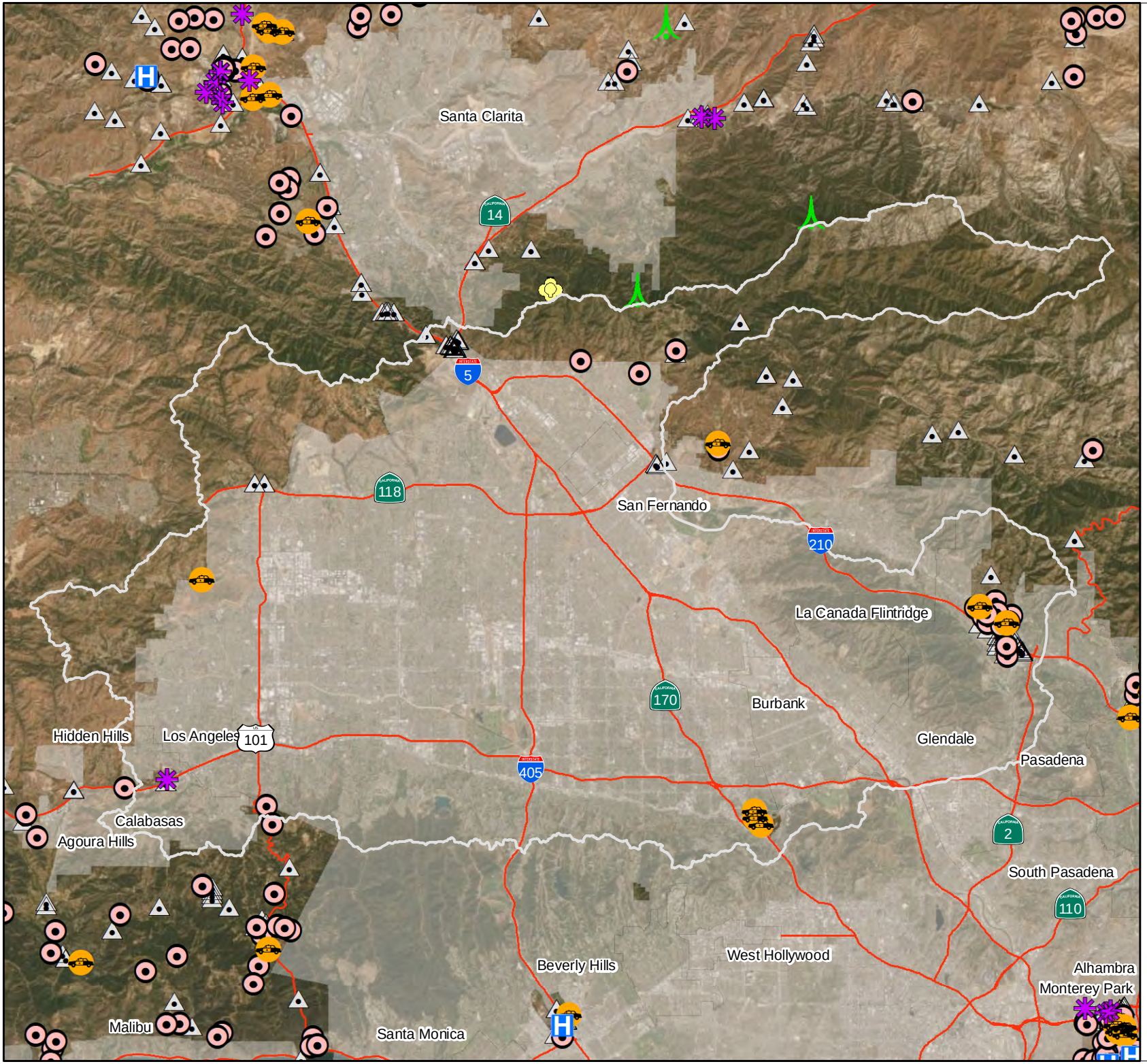
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 7,500 15,000

Meters
0 2,000 4,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Los Angeles River Watershed

## Critical Facilities

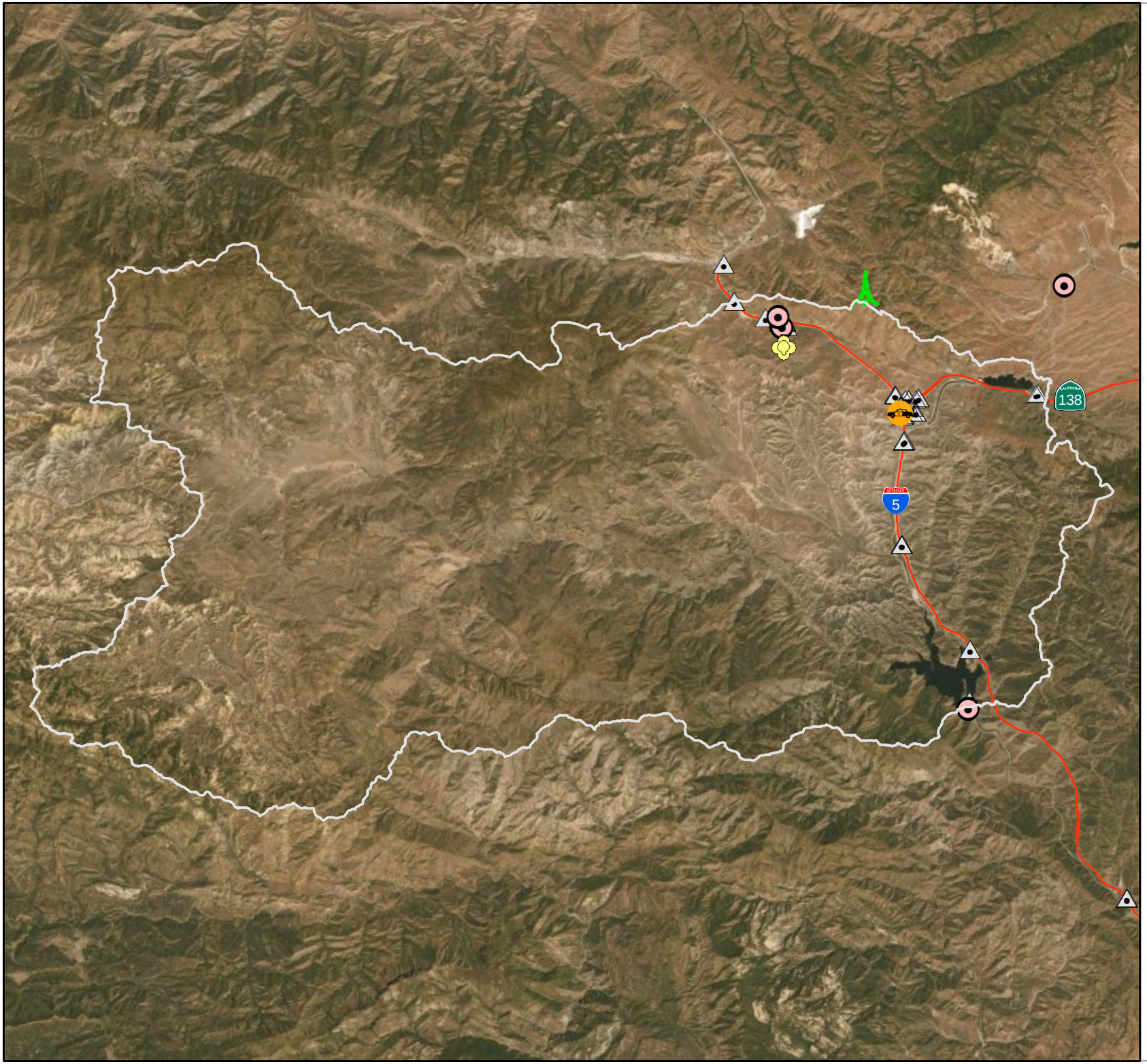
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 12,500 25,000

Meters
0 3,200 6,400

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Piru Creek Watershed

## Critical Facilities

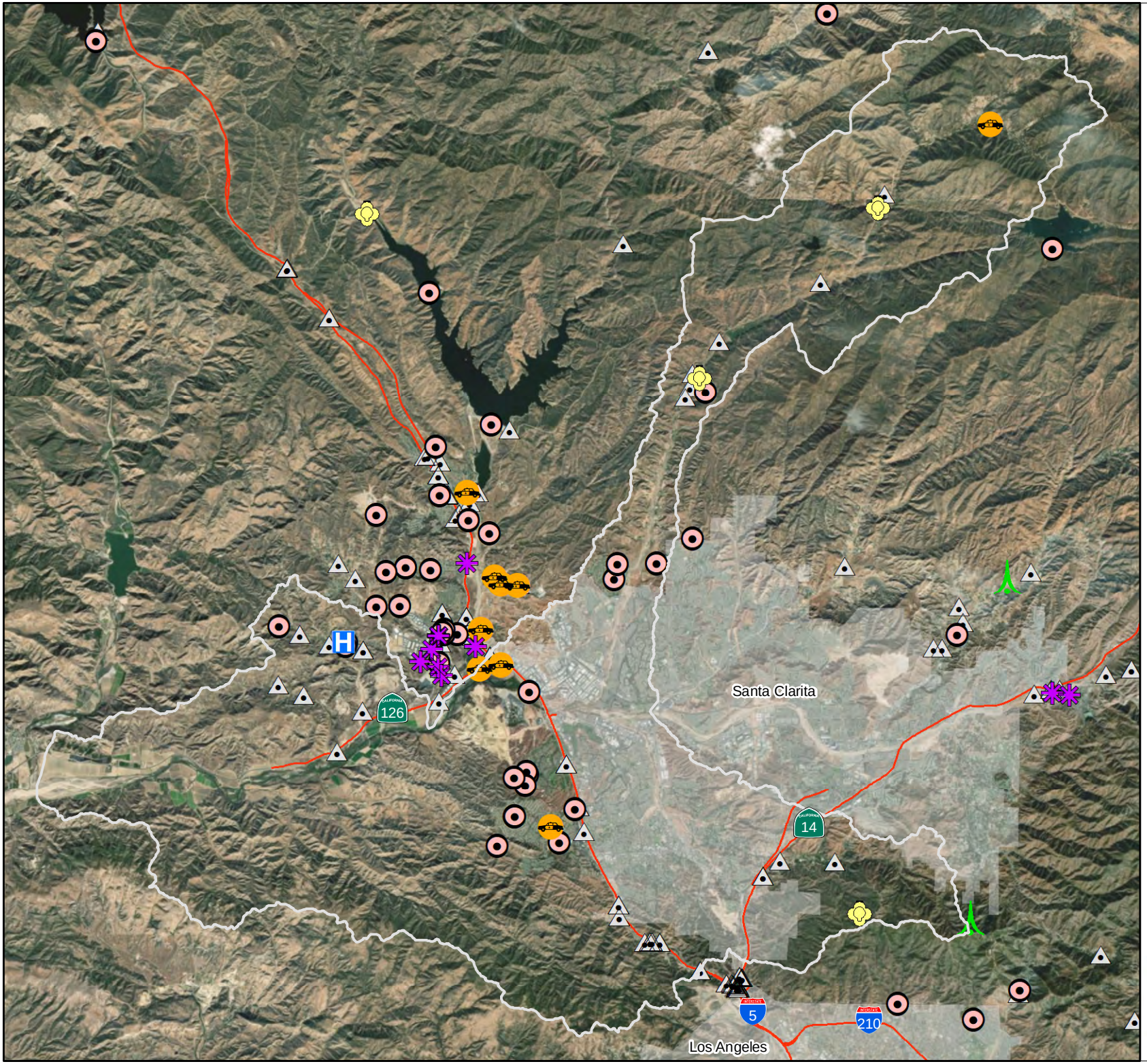
- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 12,000 24,000

Meters
0 3,000 6,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Santa Clara River Watershed

## Critical Facilities

- Watershed Boundary
- Incorporated Cities
- Communications
- Energy
- Food, Water, Sheltering
- Hazardous Materials
- Health and Medical
- Safety and Security
- Transportation

N

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Appendix E. Federal and State Agencies, Programs and Regulations

# E. Federal and State Agencies, Programs and Regulations

Existing laws, ordinances, plans and programs at the federal and state level can support or impact flood hazard mitigation actions identified in this plan. The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

## FEDERAL

### National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 100-year flood (or base flood) and the 500-year flood. Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a flood-prone area, participating jurisdictions must, at a minimum, ensure that the project meets the following criteria (44 CFR Part 60, Section 60.3):

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- Be constructed with materials resistant to flood damage
- Be constructed by methods and practices that minimize flood damage
- Be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Additional criteria apply depending on the availability of information about the flood hazard.

### Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 9 community would receive a 5 percent premium discount, a Class 8 community would receive a 10 percent premium discount, and so on, until reaching a 45 percent premium discount for a Class 1 community. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

## Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA replaced previous federal mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The DMA established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

## Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014

The Biggert-Waters Flood Insurance Reform Act of 2012 authorized and funded a national mapping program. It also authorized insurance premium rate increases to ensure the fiscal soundness of the NFIP by transitioning the program from subsidized rates, also known as artificially low rates, to offer full actuarial rates reflective of risk.

The Homeowner Flood Insurance Affordability Act of 2014 repealed parts of Biggert-Waters, restoring grandfathering, putting limits on certain rate increases and updating the approach to ensuring the fiscal soundness of the fund by applying an annual surcharge to all policyholders.

## Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

In some parts of the country, including the Pacific Northwest and the Sacramento-San Joaquin Delta area, court rulings have found that floodplain management measures can be in conflict with the goals of the endangered species act. Those rulings have required FEMA and local governments to engage in a consultation process with

federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects.

## Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

## National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving floods and other hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across this spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

## Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (Public Law 110-325). Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals.

The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

## Public Law 8499, Flood Control and Coastal Emergencies

Federal law that gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that have been damaged by floods. Under Public Law 8499, the Corps' Chief of Engineers is authorized to undertake activities including disaster preparedness, advance measures to prevent or reduce damage when there is an imminent threat of unusual flooding, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provision of emergency water in the event of drought or contaminated source.

# STATE

## California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. County actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

## California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

## Porter-Cologne Act

The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality. The act uses National Pollutant Discharge Elimination System permits for point source discharges and waste discharge to keep people from degrading the water quality of the state. The policy states:

- The quality of all waters of the state shall be protected
- All activities and factors affecting the quality of water will be regulated in order to attain the highest water quality within reason.
- The state must be prepared to exercise its fullest power and jurisdiction in order to protect the quality of water in the state from degradation.

## AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources. The conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including (California Legislature, 2015):

- Flood hazard zones
- Maps published by FEMA, California Department of Water Resources, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, the Governor's Office of Emergency Services, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or California Department of Water Resources has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

## AB 2140: General Plans—Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires the California Office of Emergency Services to give preference for federal mitigation funding to cities and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

## AB 747: General Plans—Safety Element

This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills the goals and objectives of this law may comply with this requirement by summarizing and incorporating by reference the other plan or document in the safety element.

In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur

upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years.

## AB 2800: Climate Change—Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

## SB 92 and New Standards for Submitting Dam Inundation Maps

On June 27, 2017, significant legislative changes related to dam safety were adopted by California through the passing of Senate Bill 92 (SB 92, part of the 2017-18 budget package). The bill requires the following changes which will affect dam owners:

- Inundation Maps
- Emergency Action Plans
- Fees and Enforcement

## SB 379: Land Use, General Plan, Safety Element

This California Senate Bill establishes provisions that require the safety element in local general plans to be reviewed and updated to address climate adaptation and resiliency strategies. The safety element must include a vulnerability assessment, adaptation goals, policies and objectives, and implementation measures. A safety element update to comply with the law is due at the time of a jurisdiction's first local hazard mitigation plan adoption after January 1, 2017, or if no such FEMA plan has been adopted, by January 1, 2022. The bill also references specific sources of useful climate information to consult, such as Cal-Adapt.

## California State Building Code

California Code of Regulations Title 24, also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

## Standardized Emergency Management System

California Code of Regulations Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The Standardized Emergency Management System is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system in order to be eligible for state funding of response-related personnel costs under California Code of Regulations Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

## California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Local hazard mitigation plans developed in response to the Disaster Mitigation Act in the State of California are to be consistent with the provisions of the approved State Hazard Mitigation Plan.

## Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

## California Civil Code 1102

Article 1102 of the California Civil Code establishes requirements for disclosure of information as part of real estate transactions. It applies to any transfer of real property or residential stock cooperative with one to four dwelling units, by sale, exchange, installment land sale contract, lease with an option to purchase, other option to

purchase, or ground lease coupled with improvements. The code imposes disclosure duties on the seller, the seller's agent, or both. Provisions of this code require disclosure of information regarding the proximity of the subject property to areas of natural hazards, including flood, wildfire and earthquake.

## Local Flood Protection Planning Act

This statute provides guidance on what a flood mitigation plan should include.

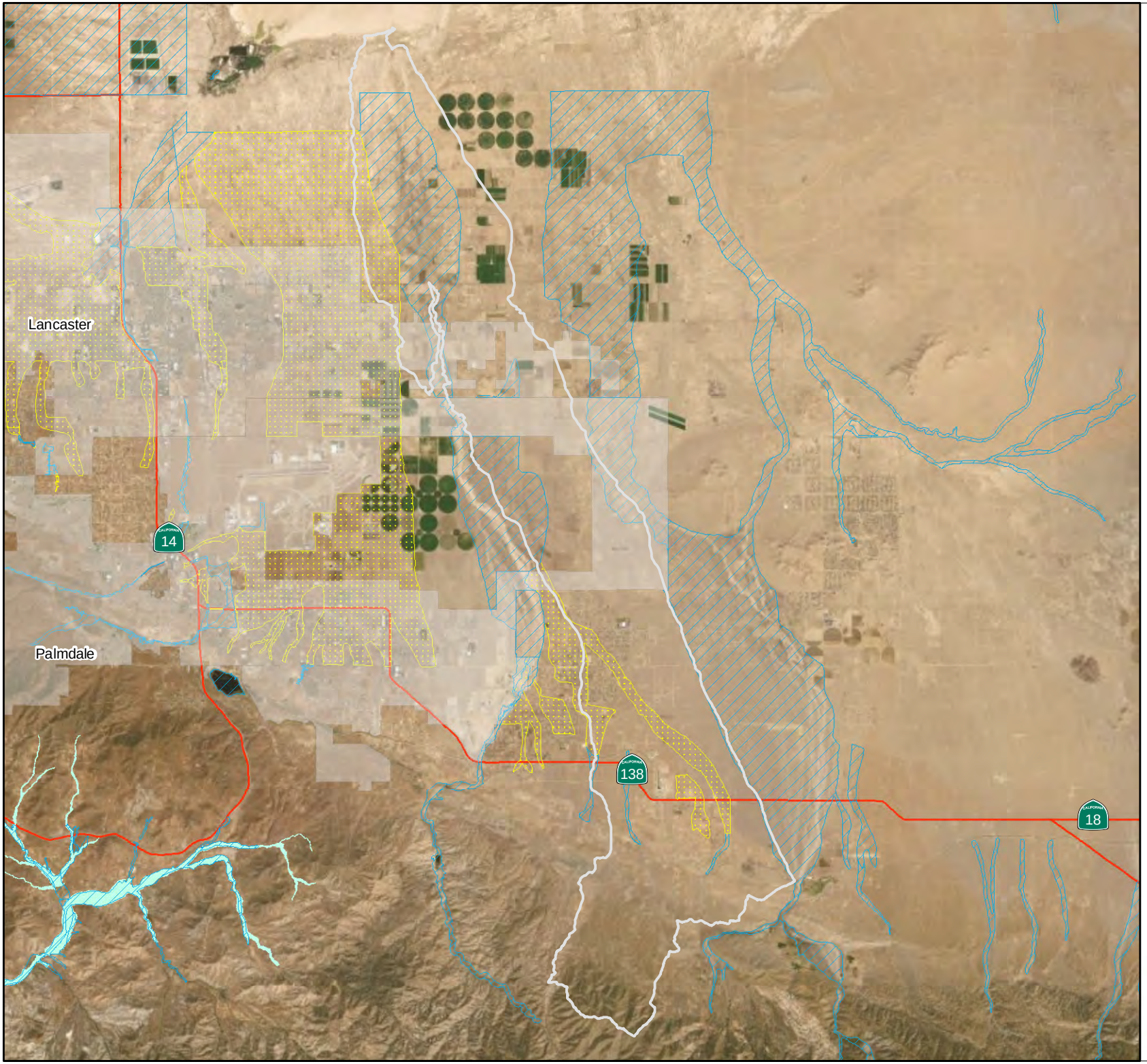
## Water Code Division 5, Part 2, Chapter 4, Article 4

This code provides flood plain regulations established for public agencies within flood plain or a flood plain management plan.

## California Coastal Management Program

This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.

# Appendix F. FEMA Flood Zone Maps




# 1809020616 (Pearblossom) Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

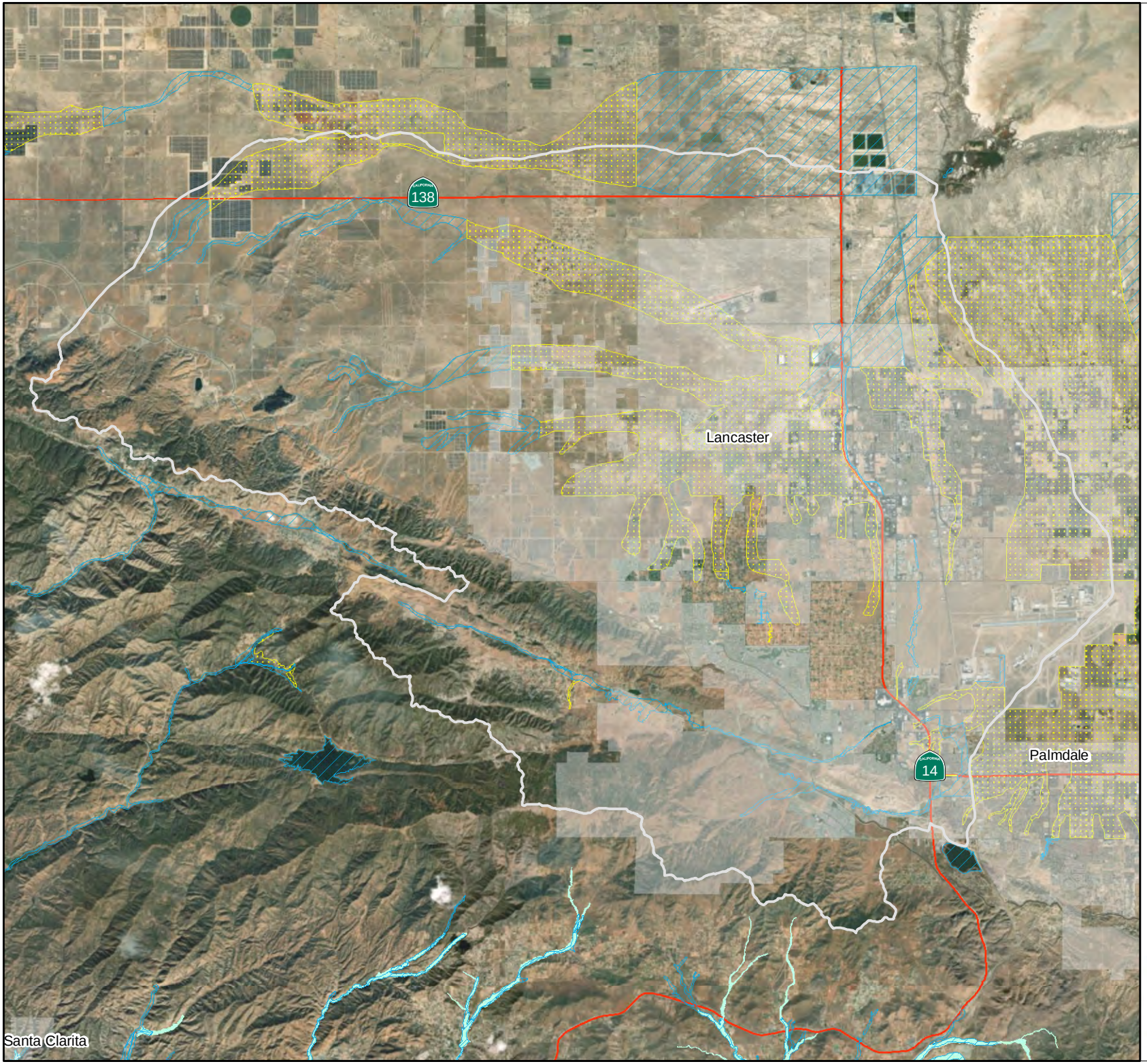
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 11,500 23,000

Meters
0 2,950 5,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Amargosa Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

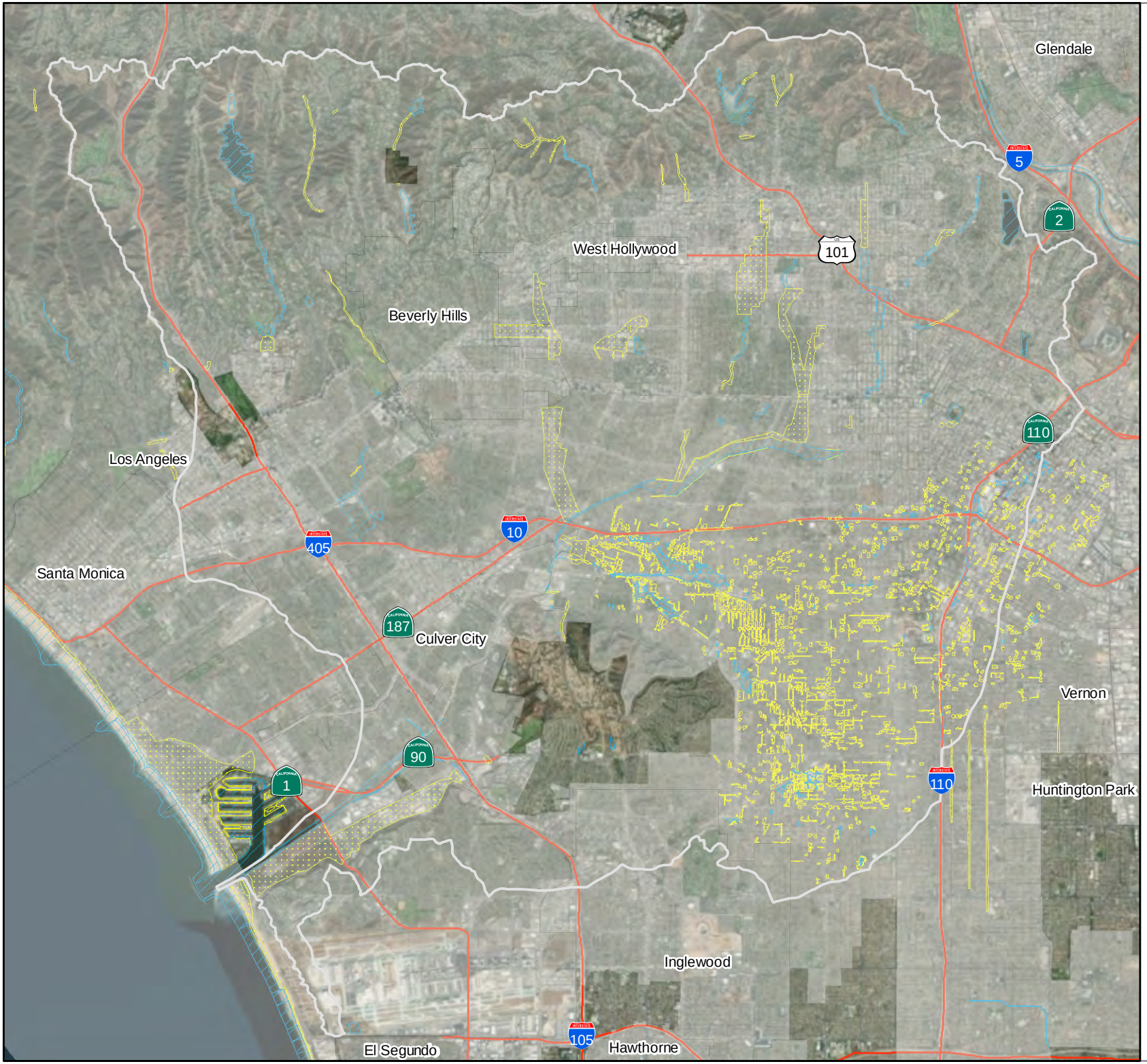
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,000 20,000

Meters
0 2,600 5,200

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Ballona Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

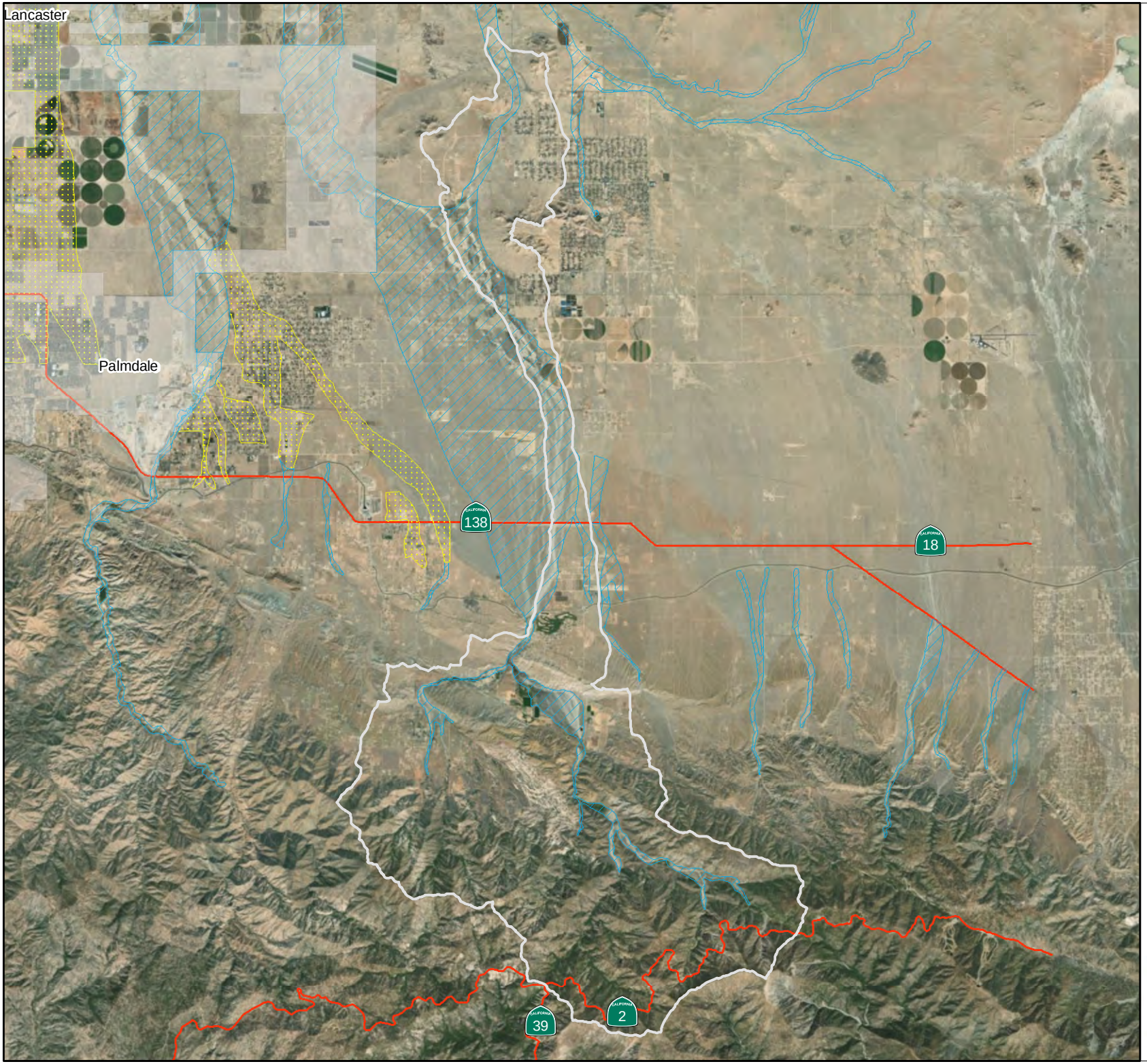
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 6,000 12,000

Meters
0 1,550 3,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Rock Creek-Big Rock Wash Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

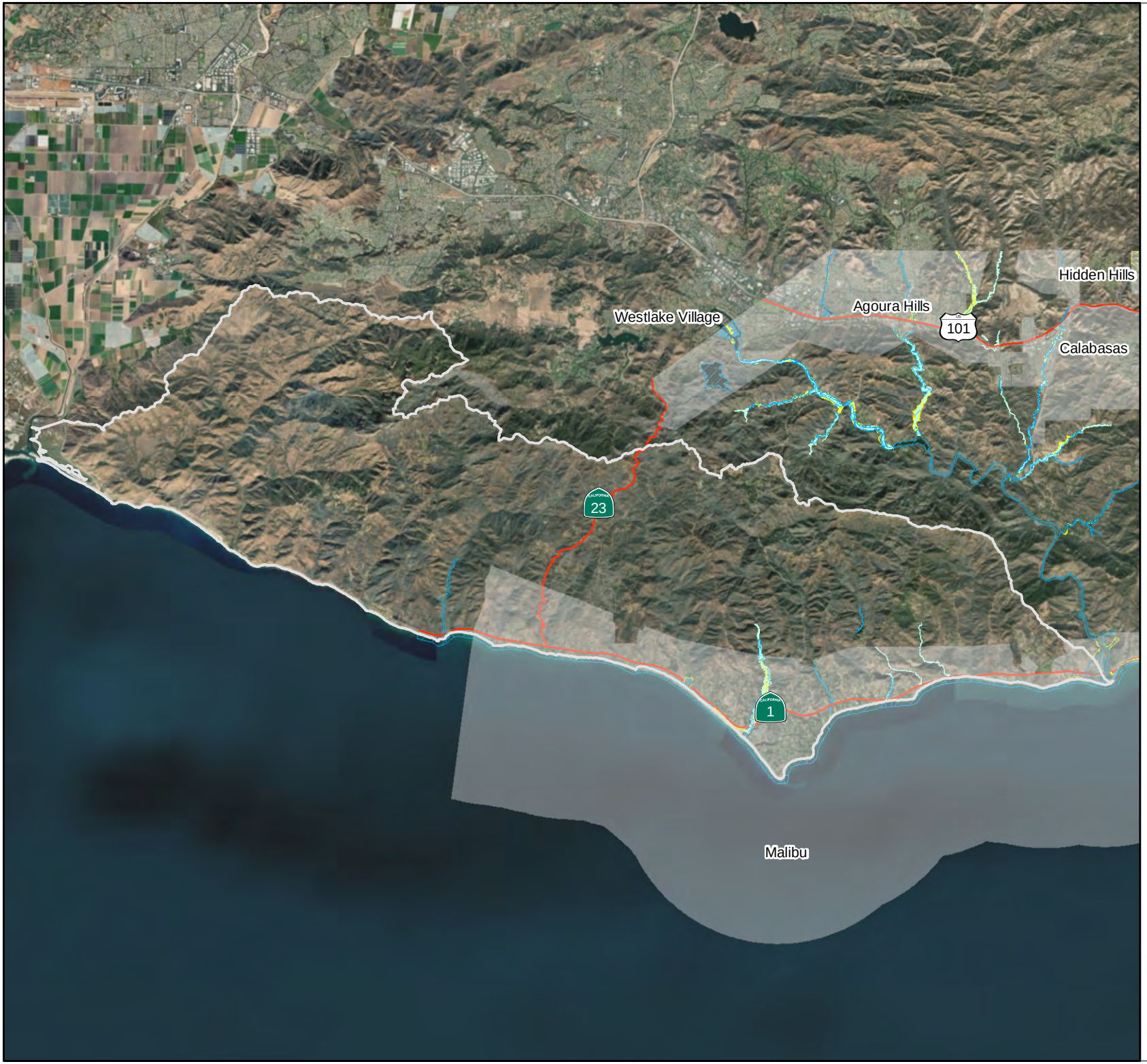
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Sycamore Canyon-Frontal Santa Monica Bay Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

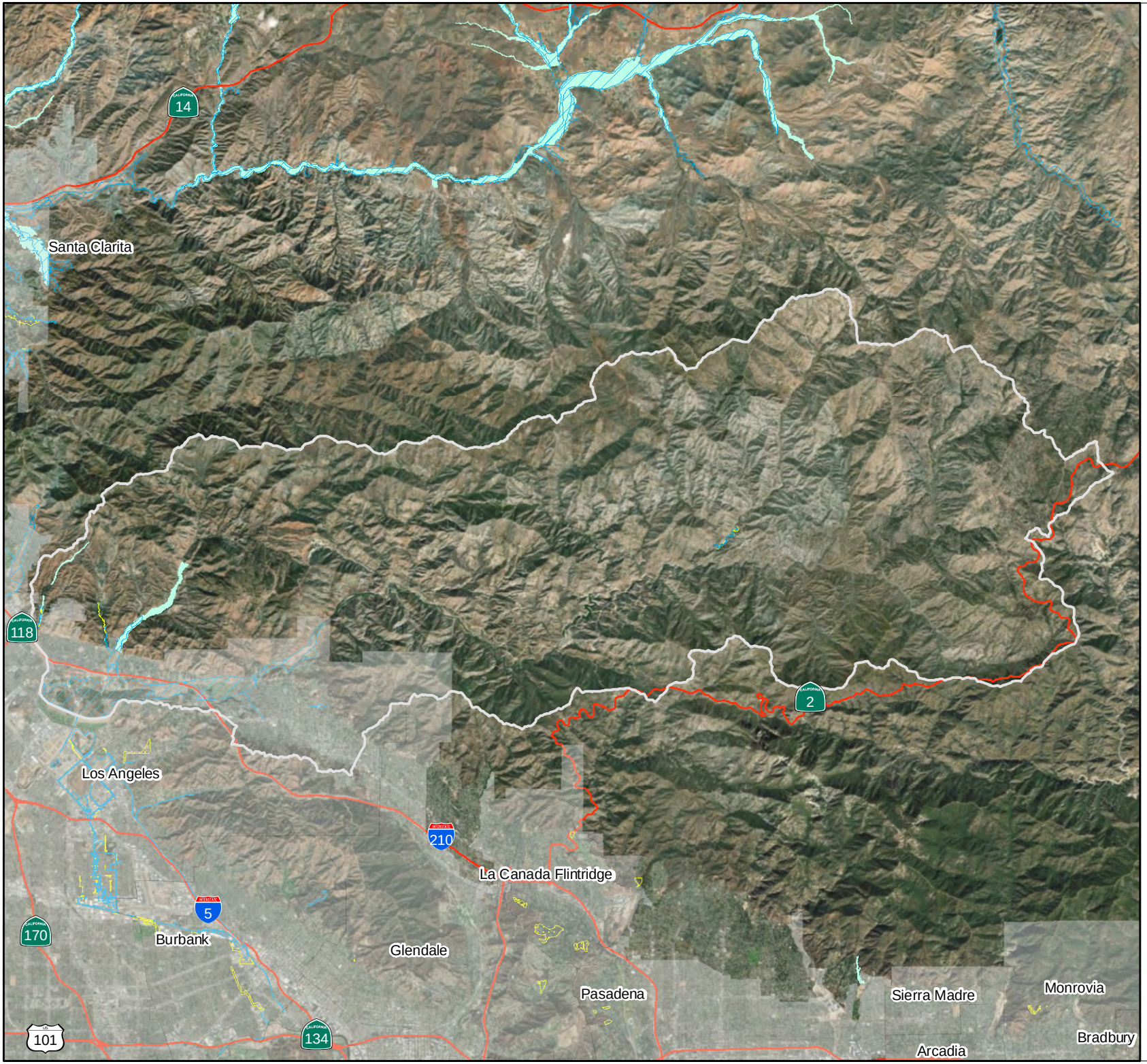
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Tujunga Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Bouquet Canyon Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Castaic Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

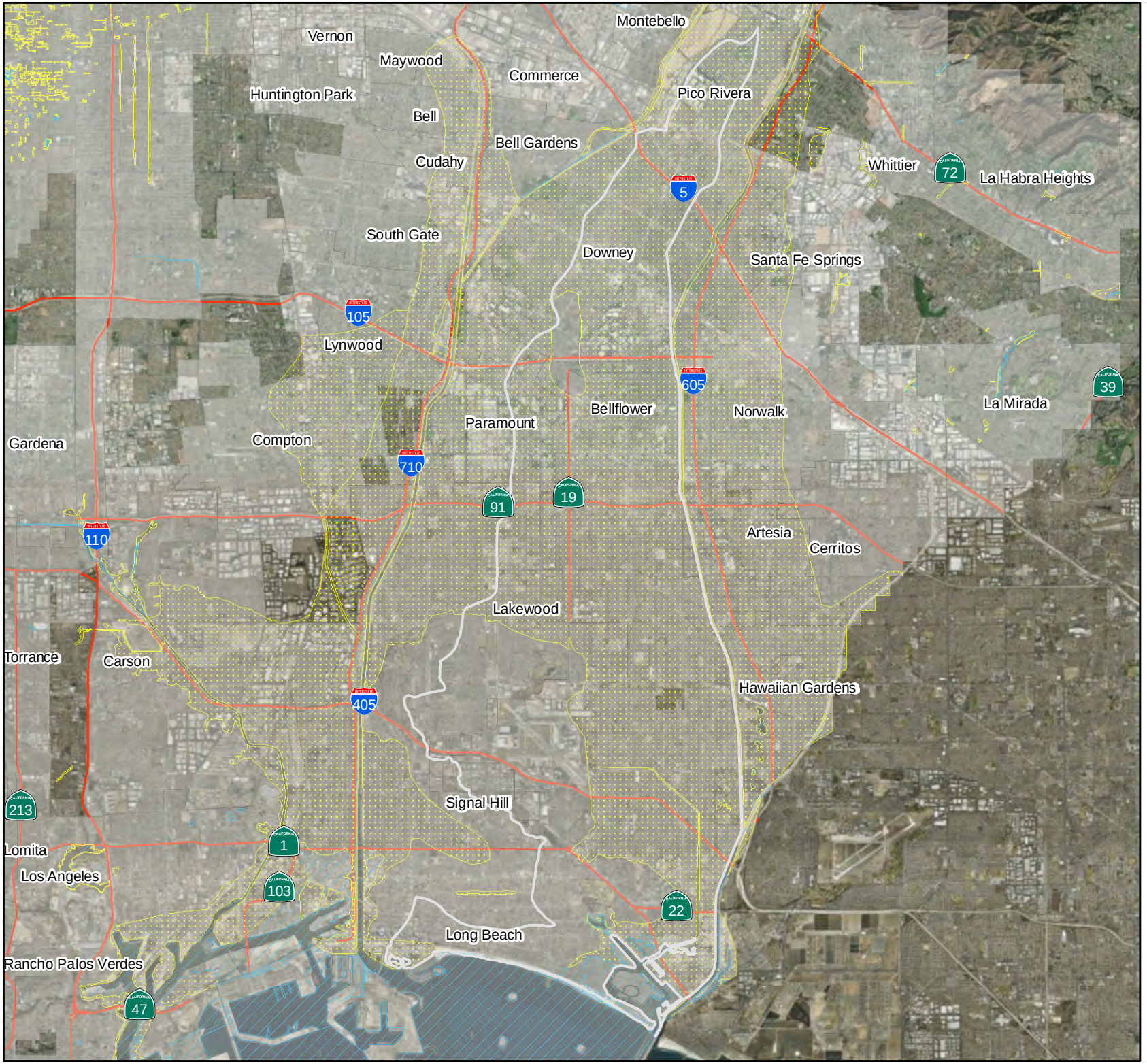
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,400 4,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Colorado Lagoon-Frontal Alamitos Bay Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

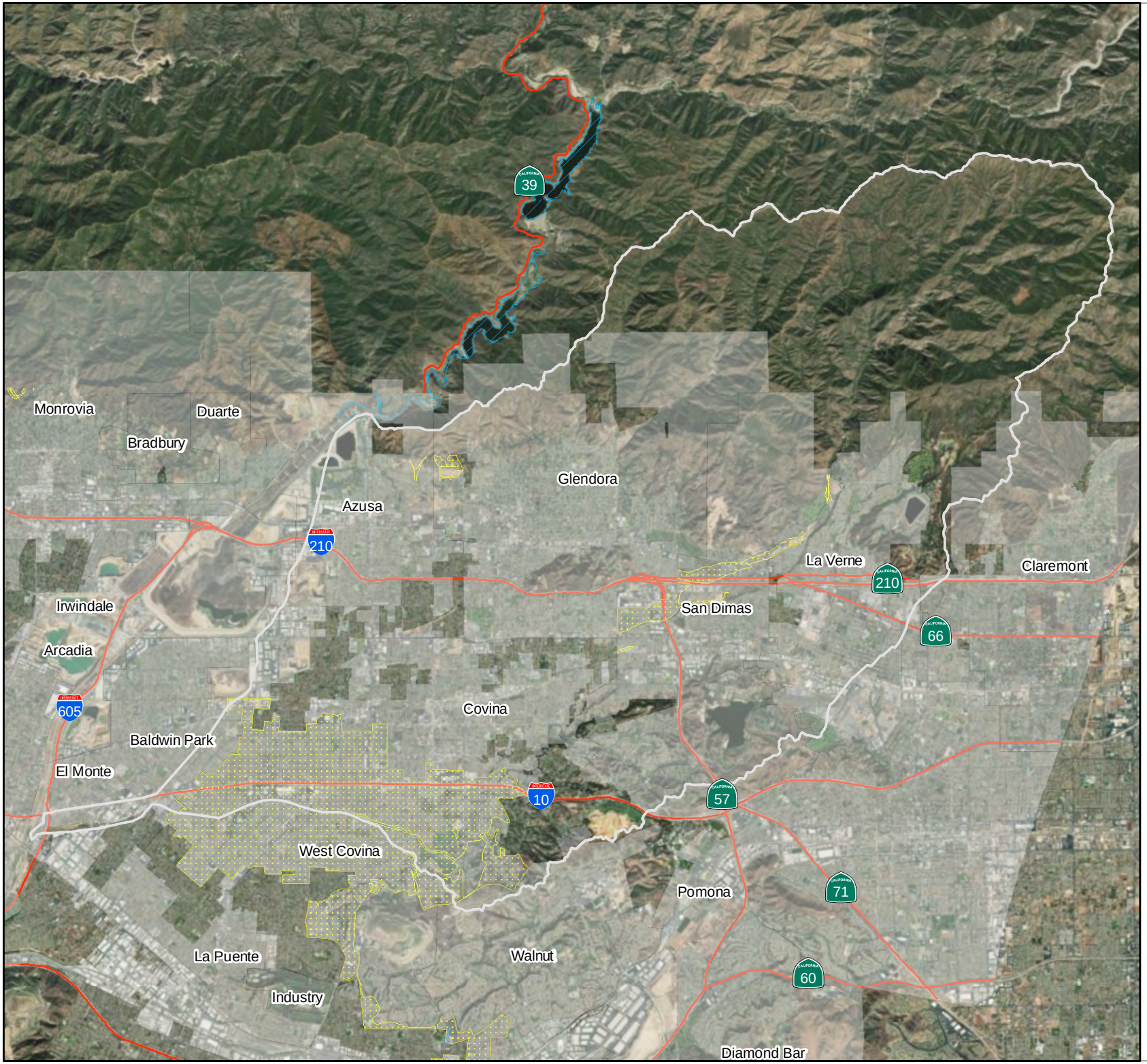
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,900 3,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dalton Wash Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

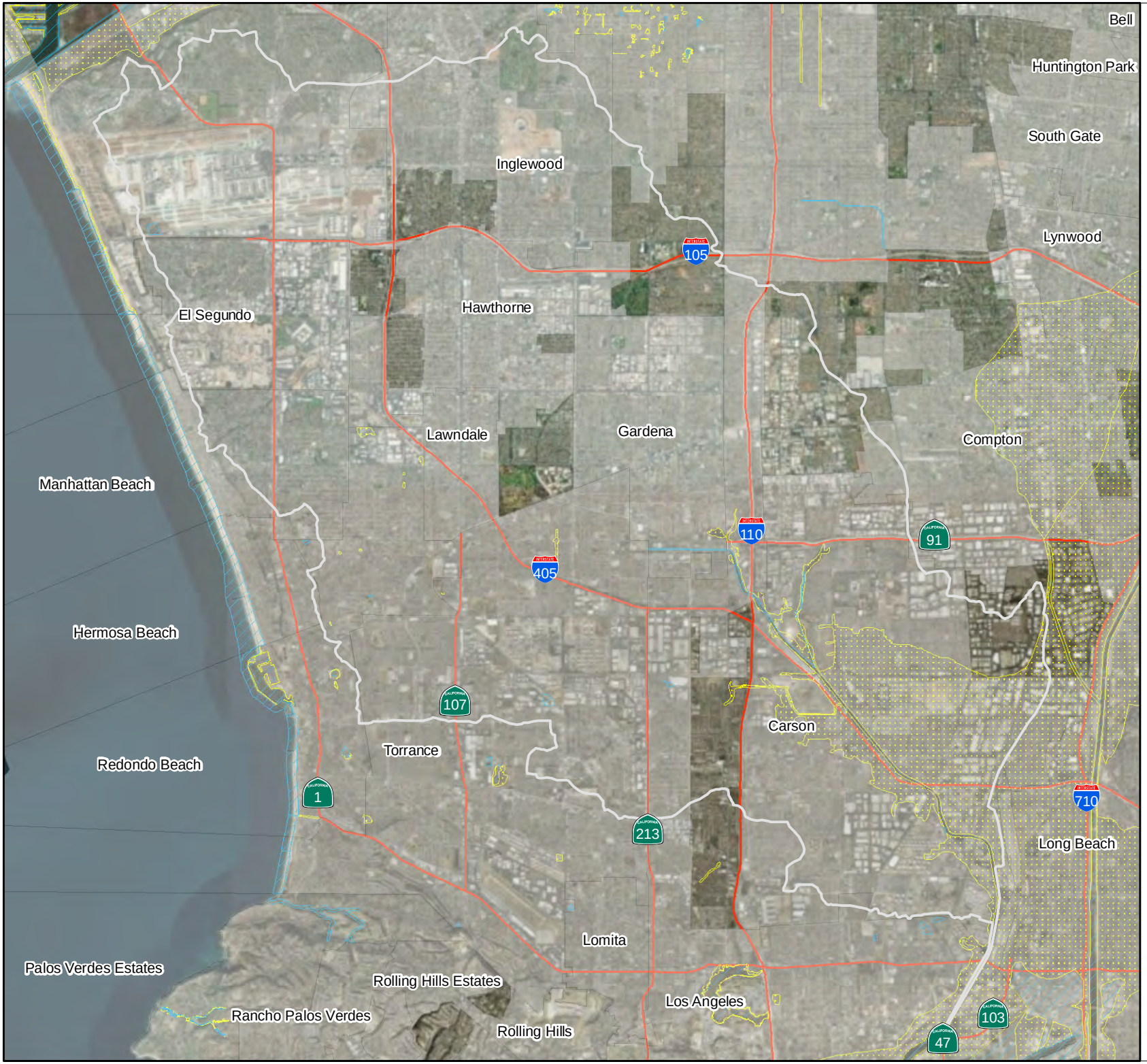
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,000 14,000

Meters
0 1,800 3,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dominguez Channel Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

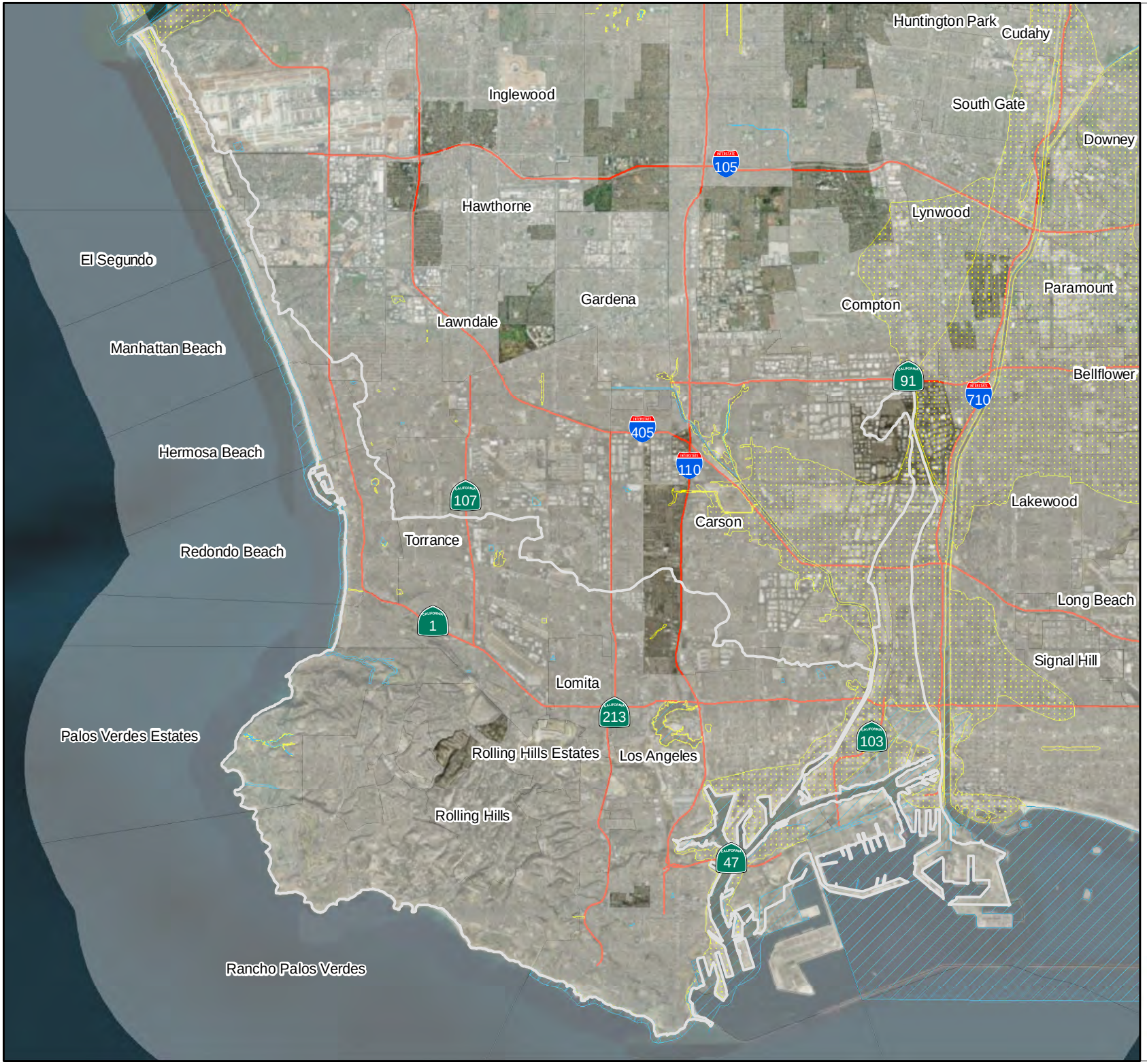
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Frontal Santa Monica Bay-San Pedro Bay Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

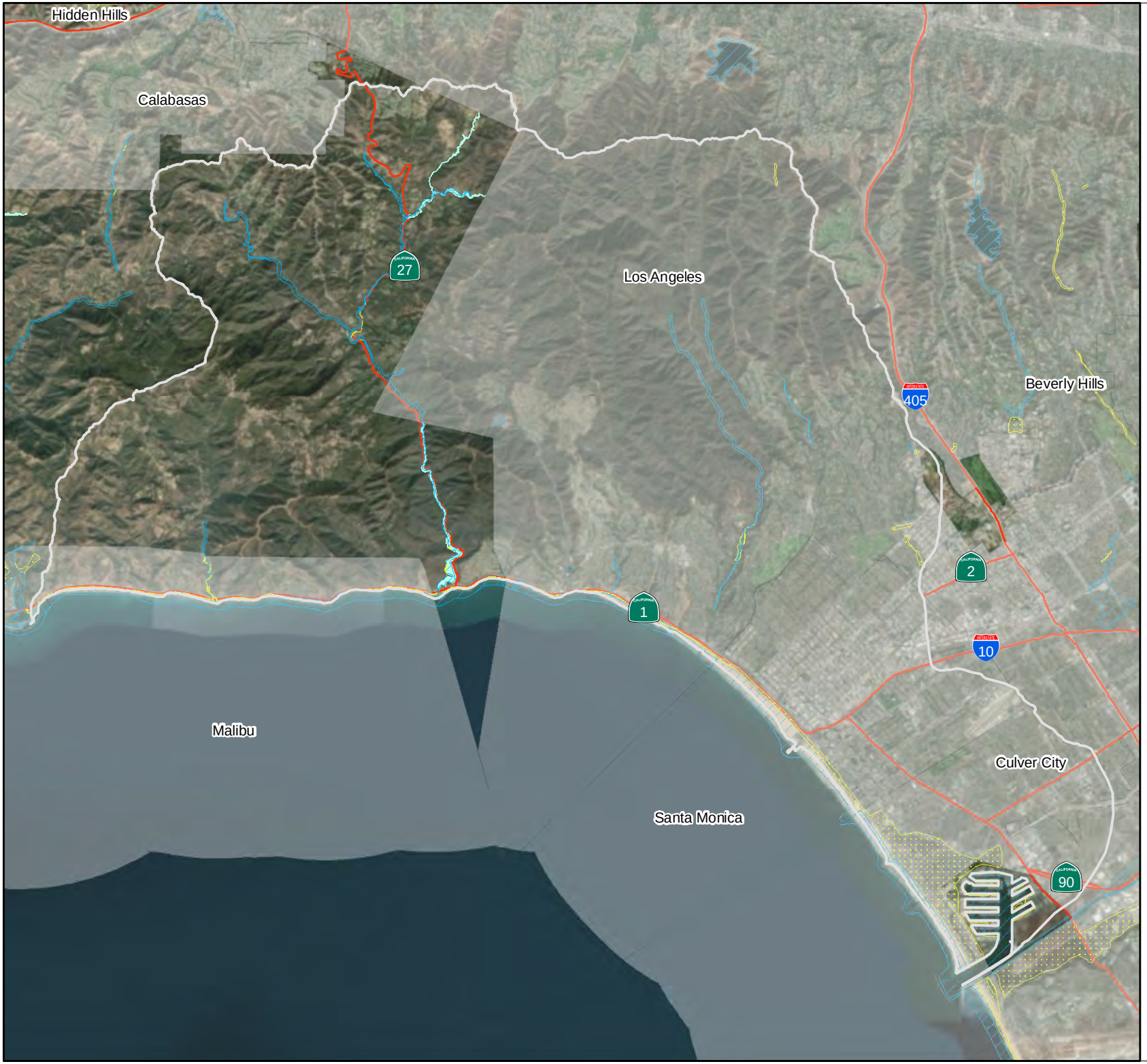
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,950 3,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Garapito Creek-Frontal Santa Monica Bay Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

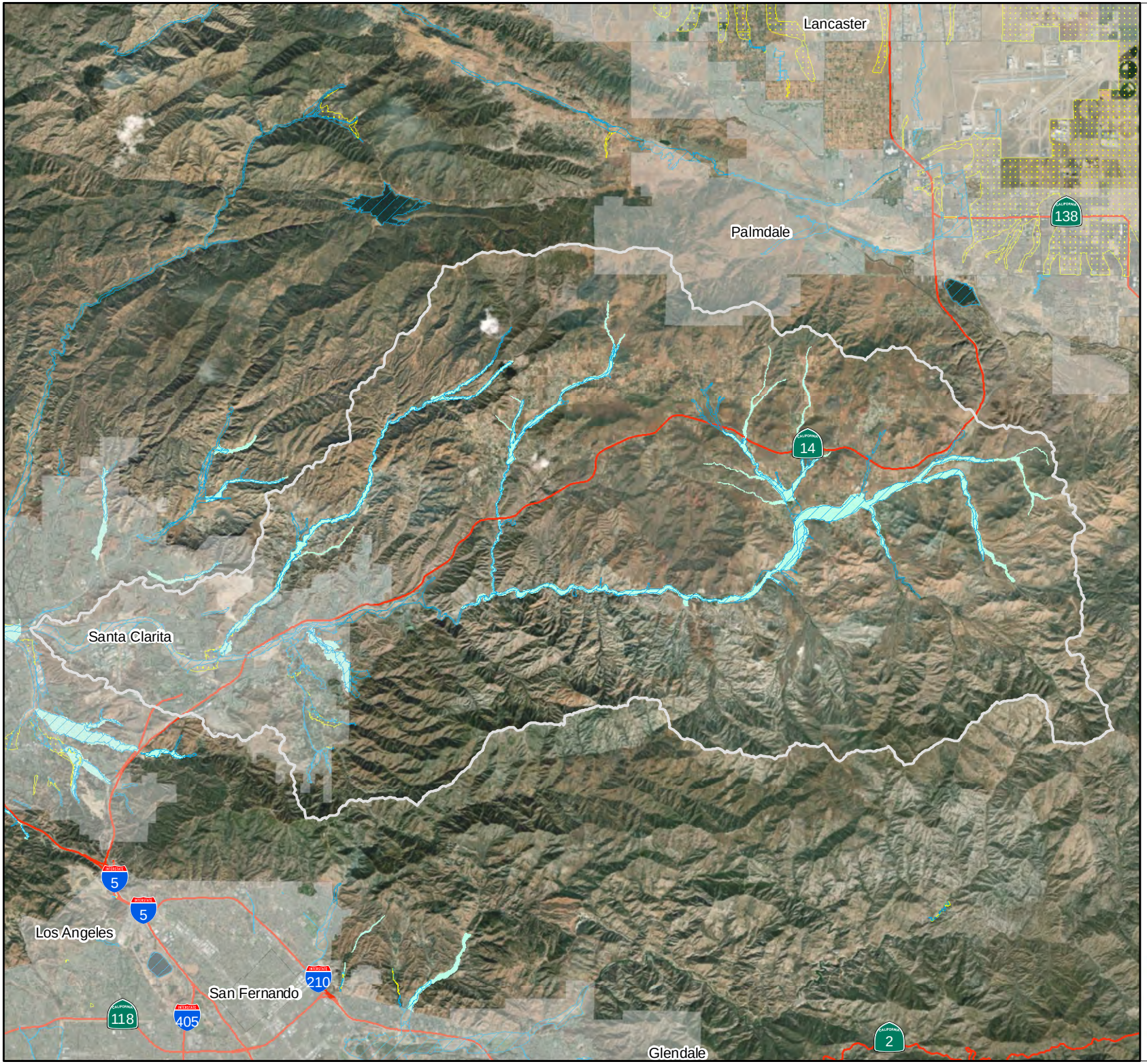
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 6,000 12,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Headwaters Santa Clara River Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

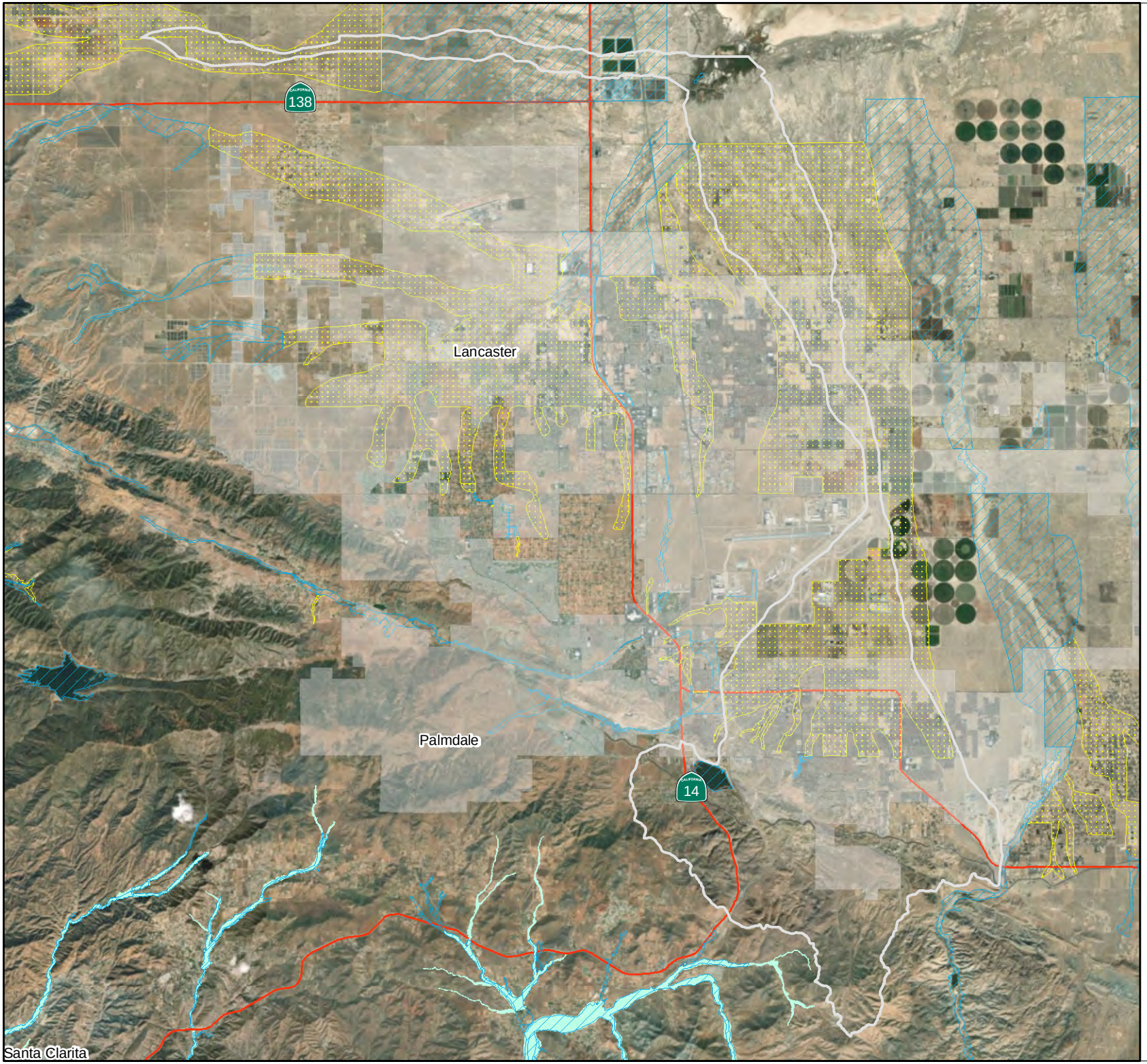
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 11,250 22,500

Meters
0 2,875 5,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lake Palmdale-Piute Ponds Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,000 20,000

Meters
0 2,550 5,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Le Montaine Creek-Eller Slough Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

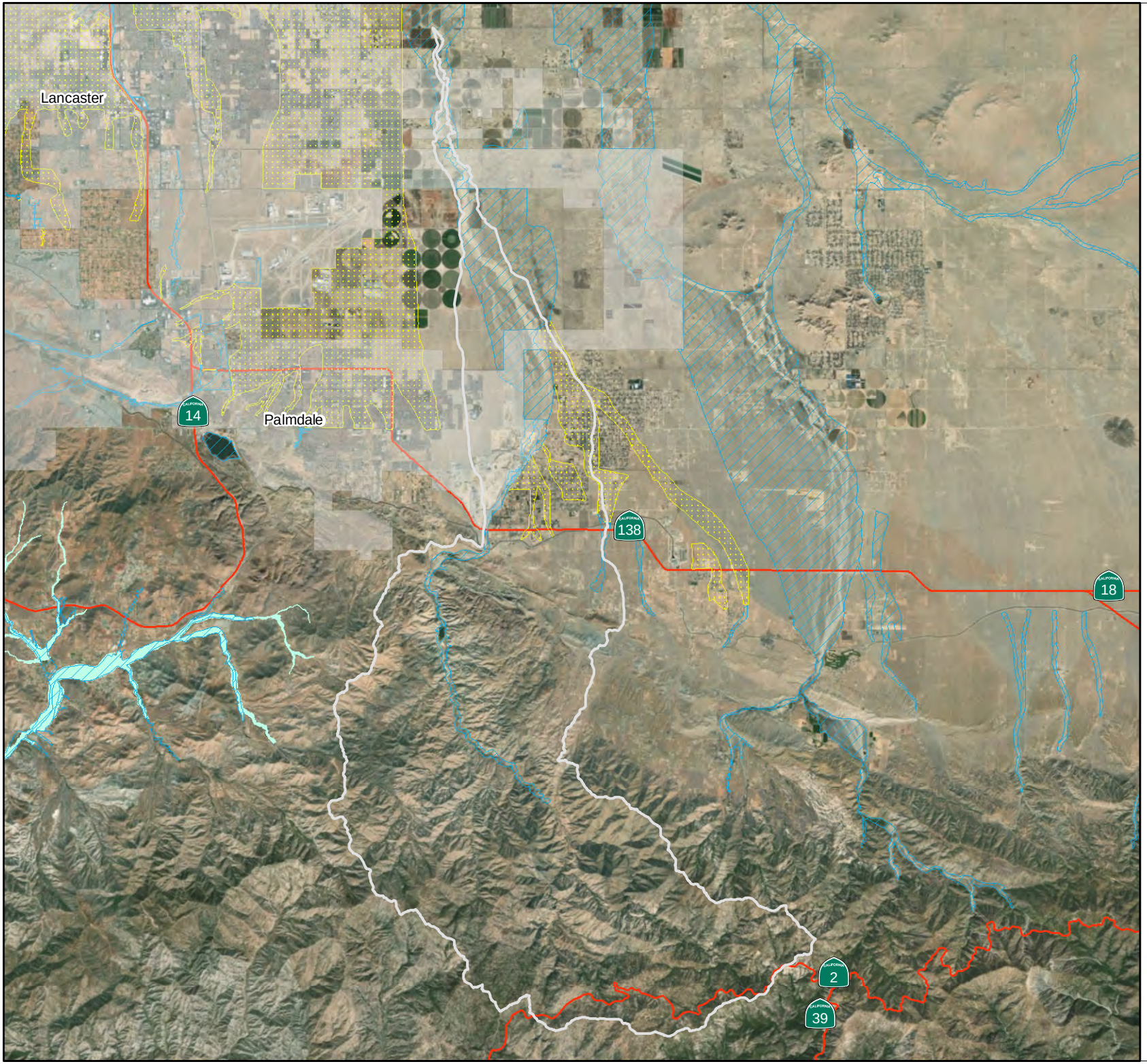
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,500 21,000

Meters
0 2,650 5,300

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Little Rock Wash Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

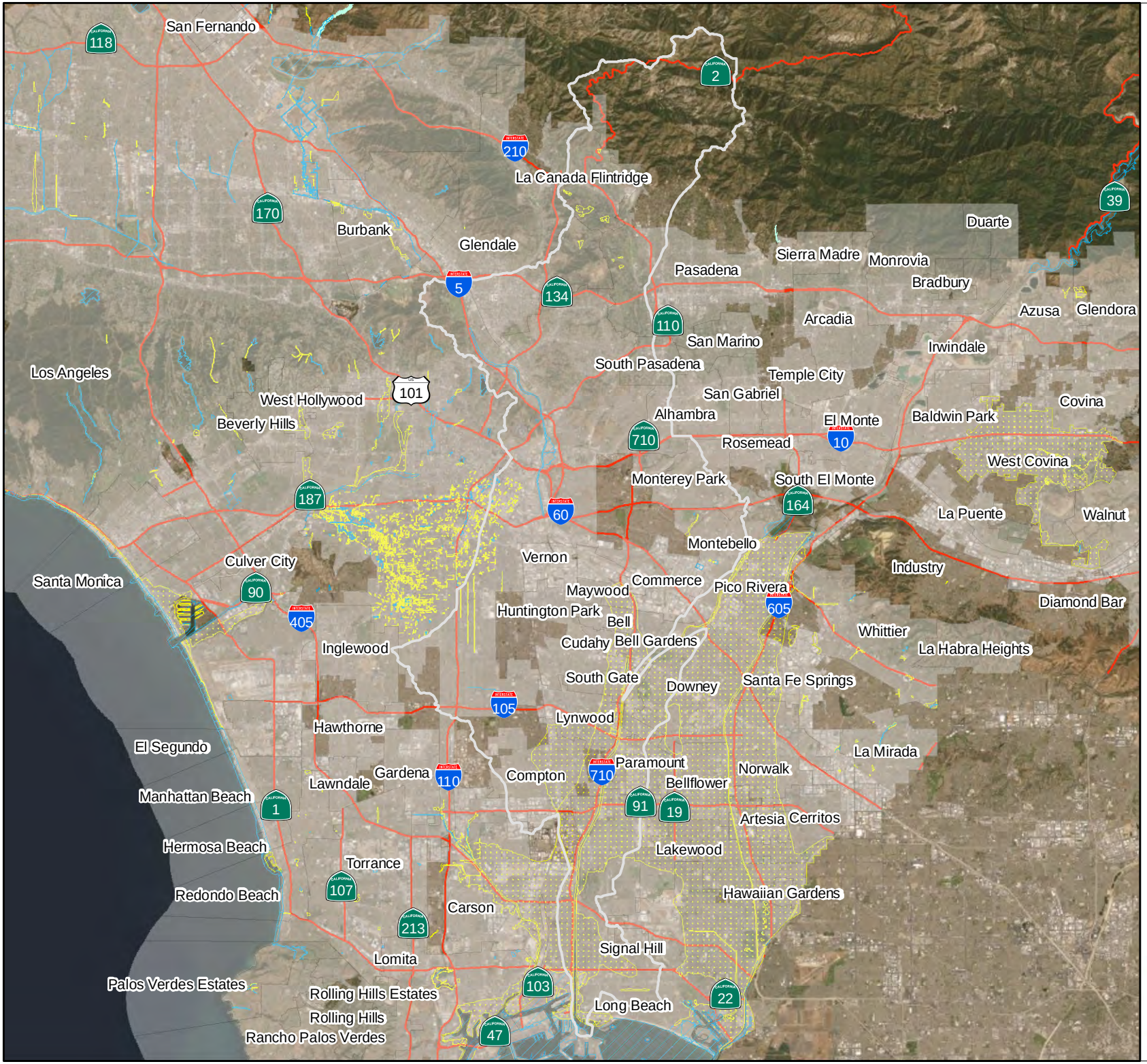
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 11,000 22,000

Meters
0 2,800 5,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower Los Angeles River Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

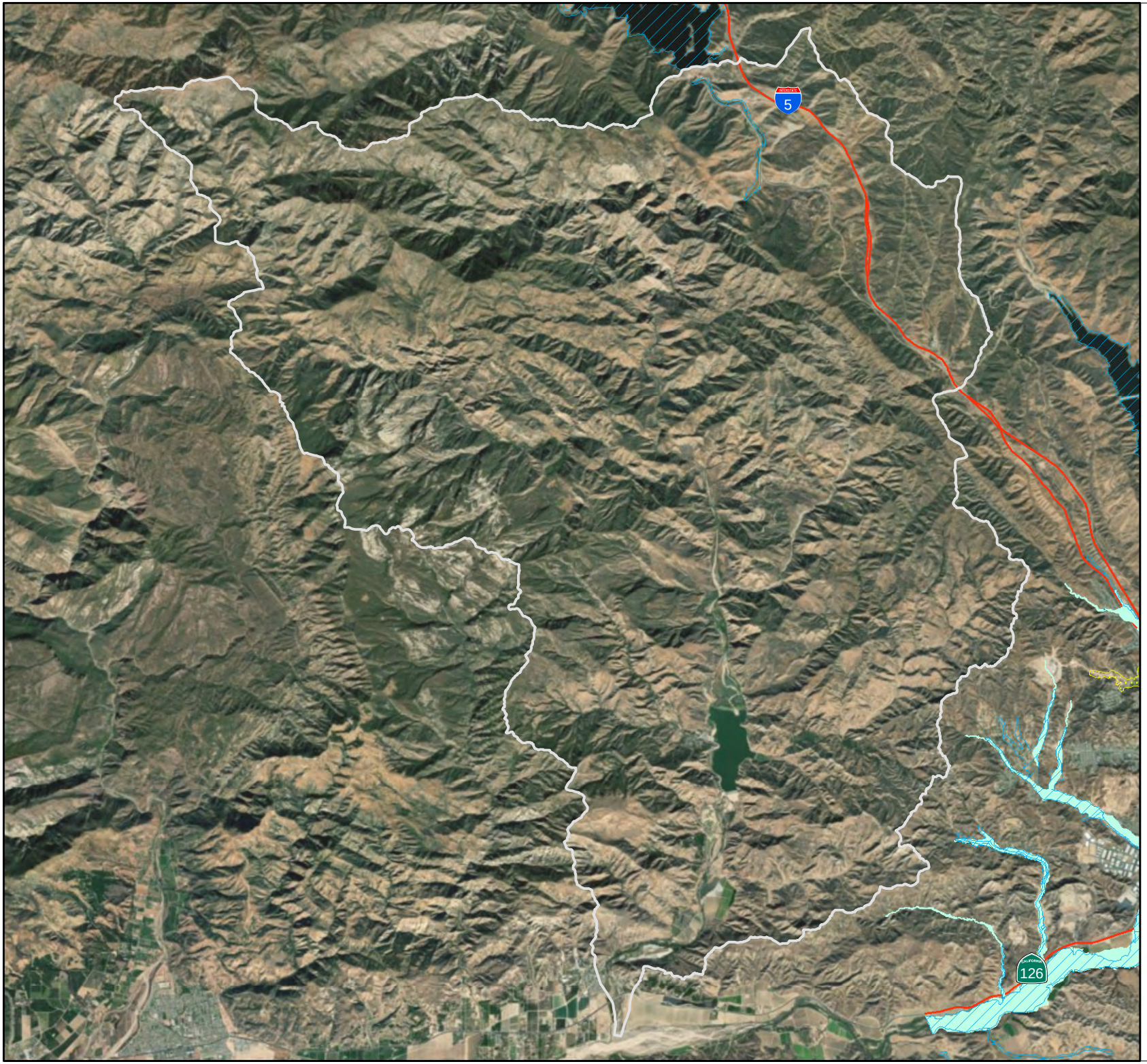
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 16,000 32,000

Meters
0 4,050 8,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower Piru Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Watershed Boundary

Incorporated Cities

**Flood Zone**

1% Annual Chance Flood

0.2% Annual Chance Flood

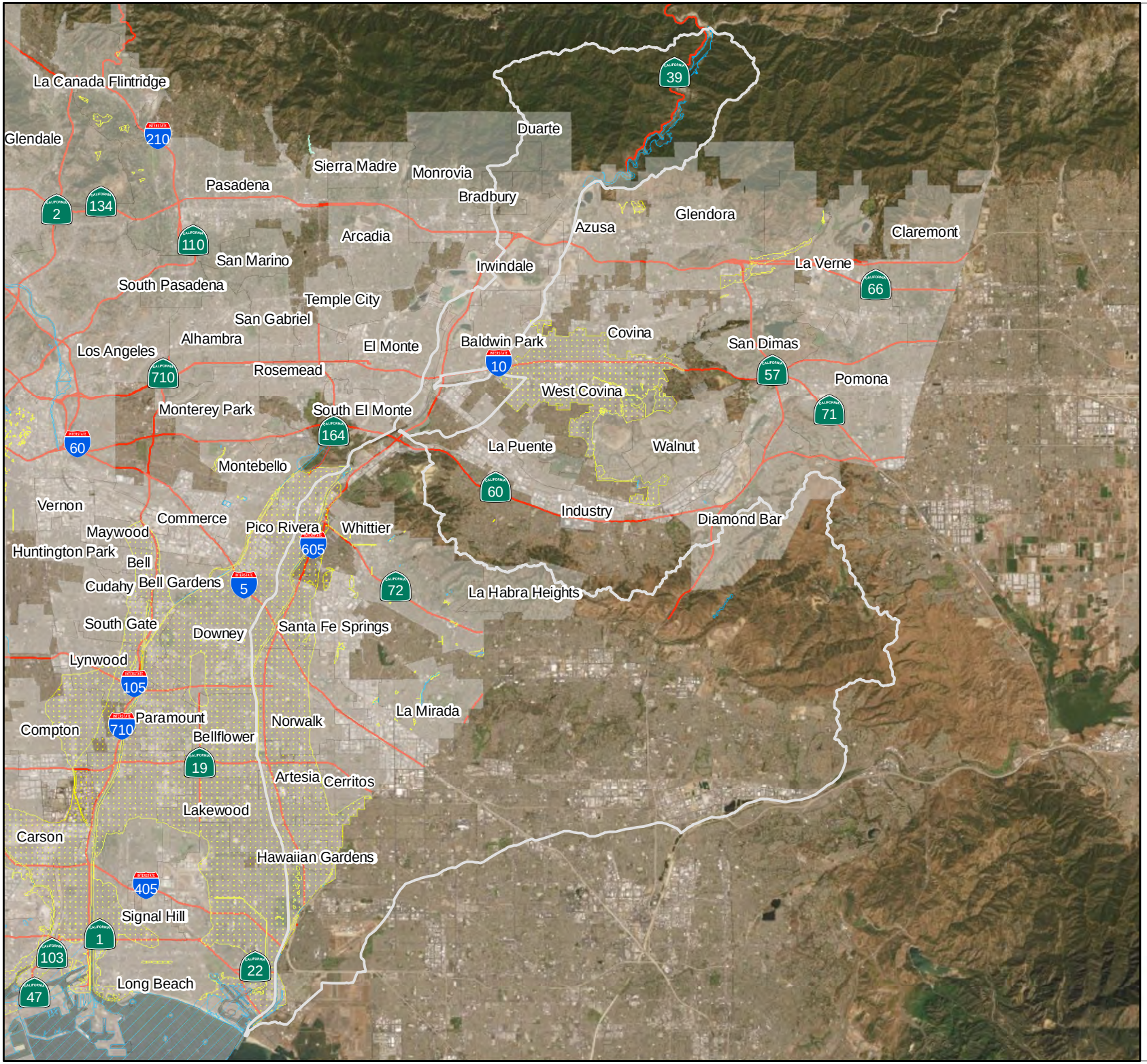
County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,900 3,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower San Gabriel River Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Watershed Boundary

Incorporated Cities

**Flood Zone**

1% Annual Chance Flood

0.2% Annual Chance Flood

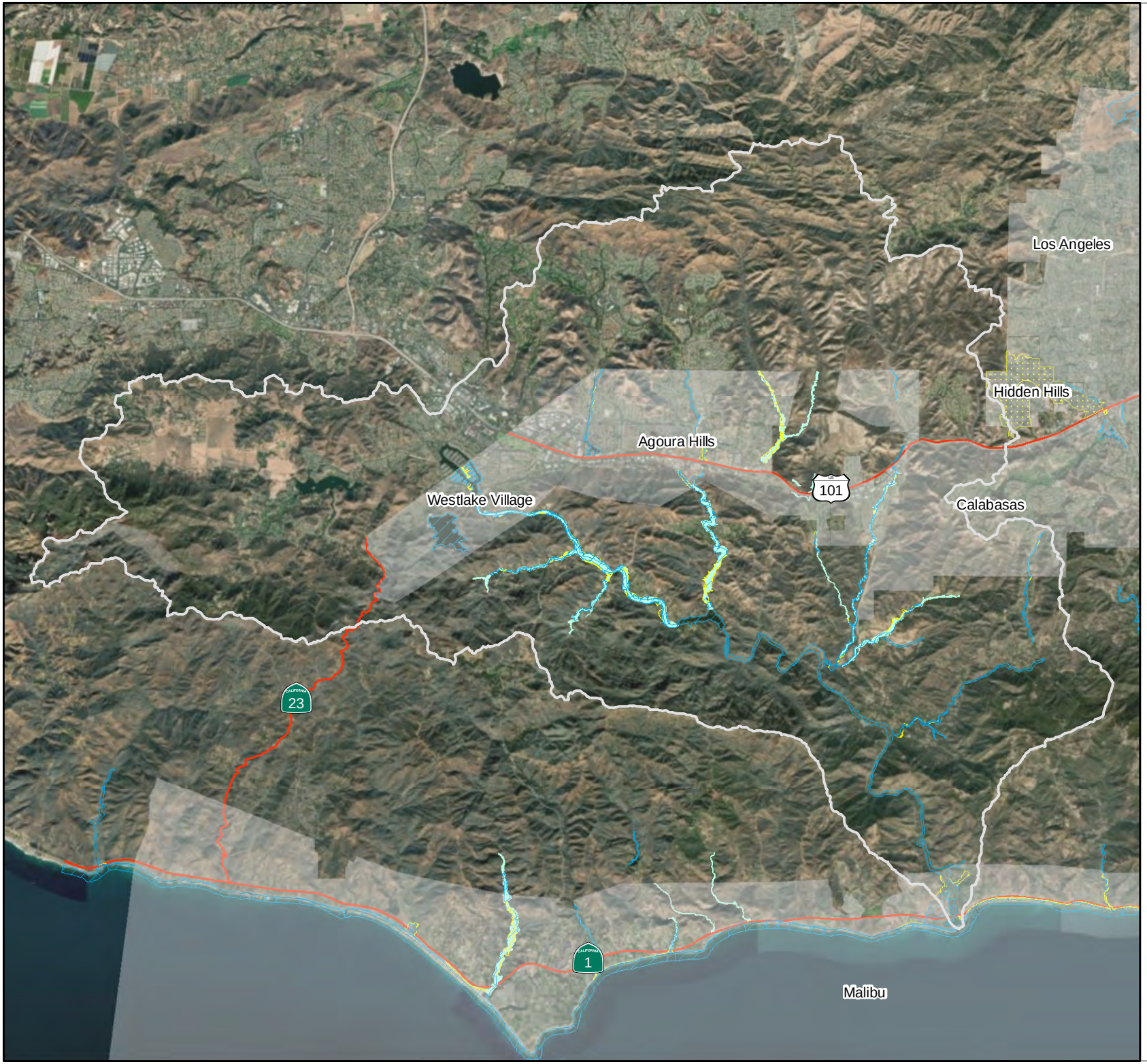
County Regulated Floodplain (Capital Storm)

N

Feet
0 14,500 29,000

Meters
0 3,750 7,500

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Malibu Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

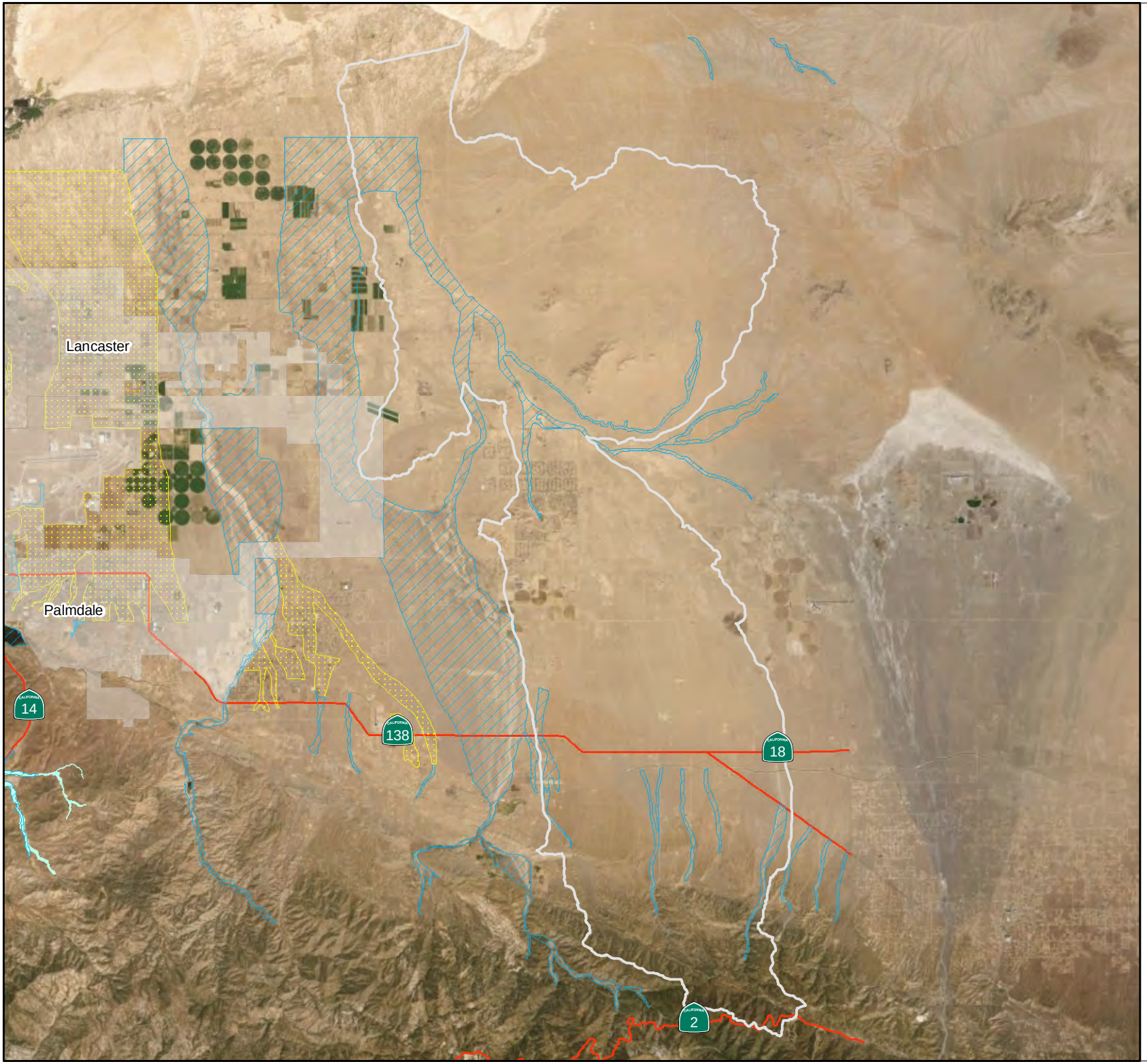
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,000 14,000

Meters
0 1,875 3,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Mescal Creek-Rocky Buttes Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

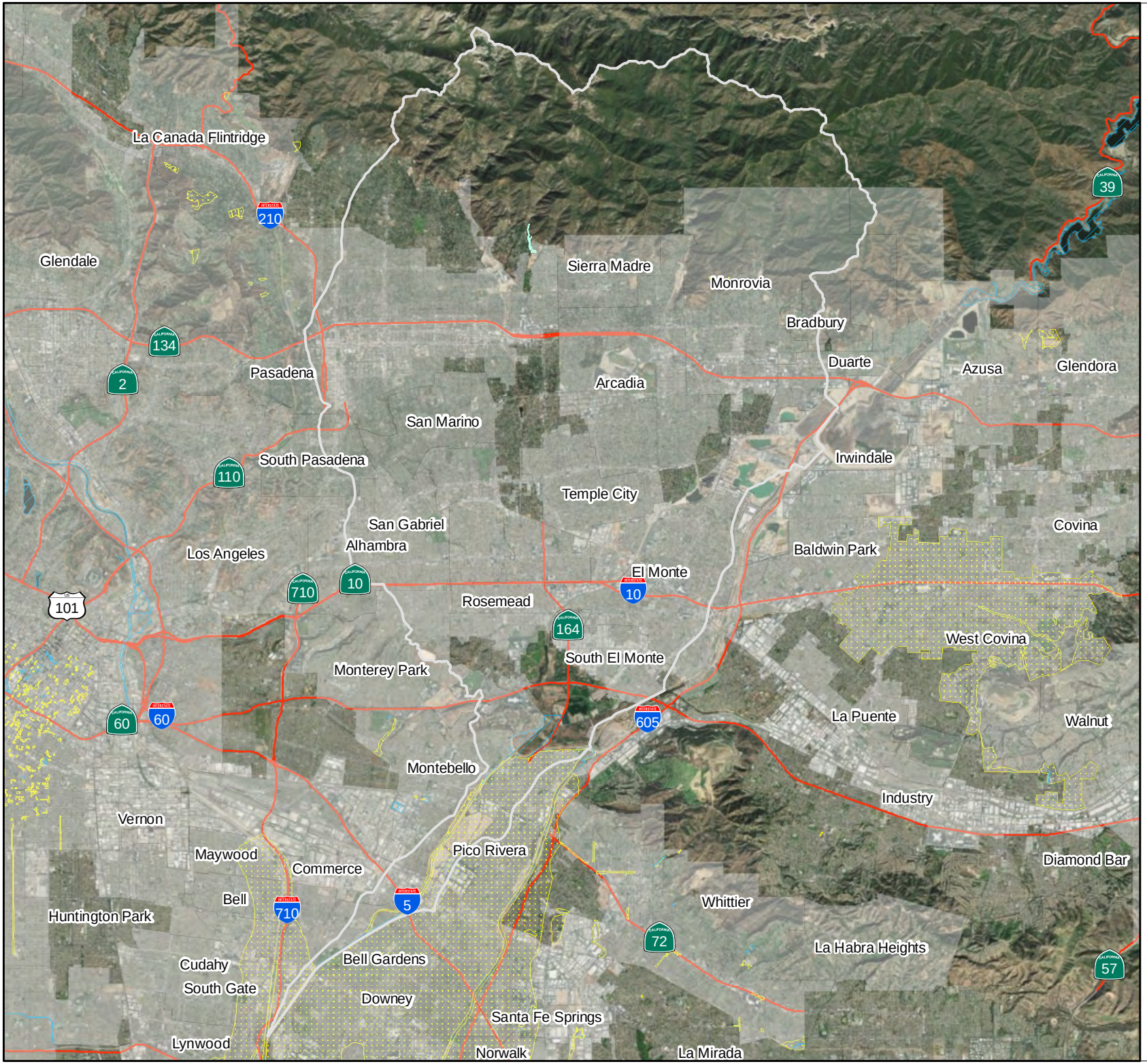
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,750 27,500

Meters
0 3,500 7,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rio Hondo Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

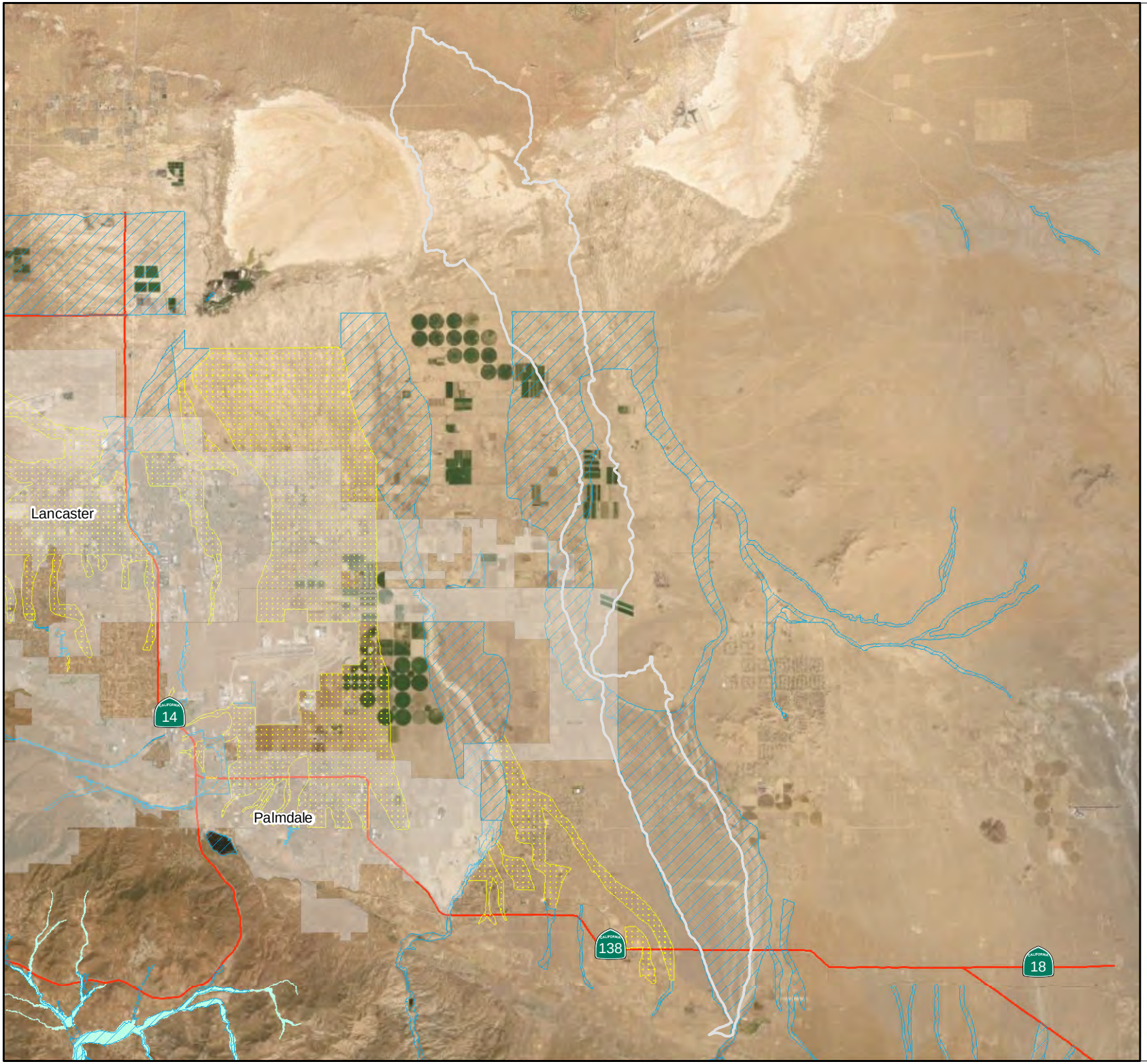
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,000 18,000

Meters
0 2,375 4,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rock Creek-Buckhorn Lake Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,000 26,000

Meters
0 3,250 6,500

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps



# Rogers Lake Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

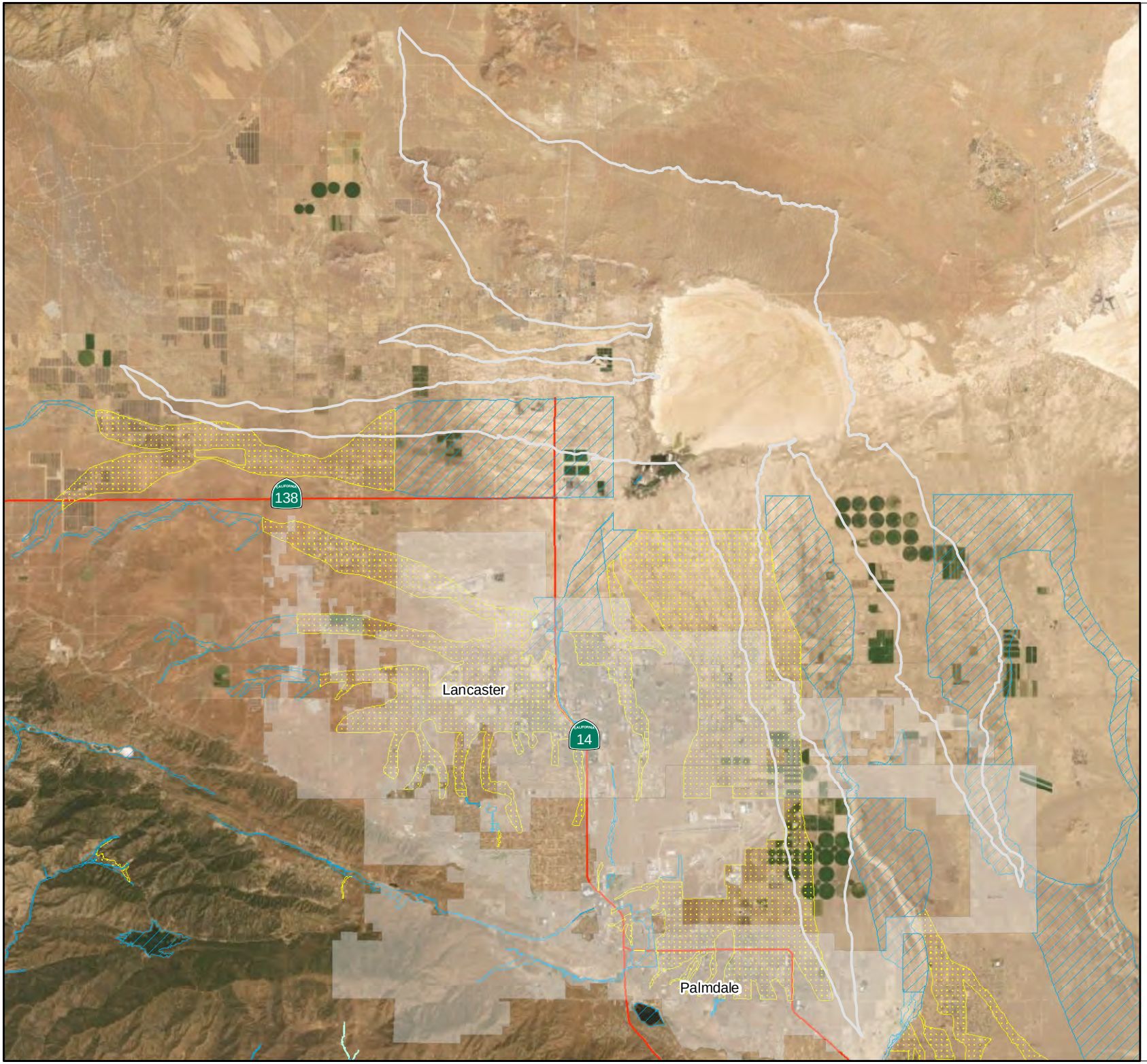
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rosamond Lake Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

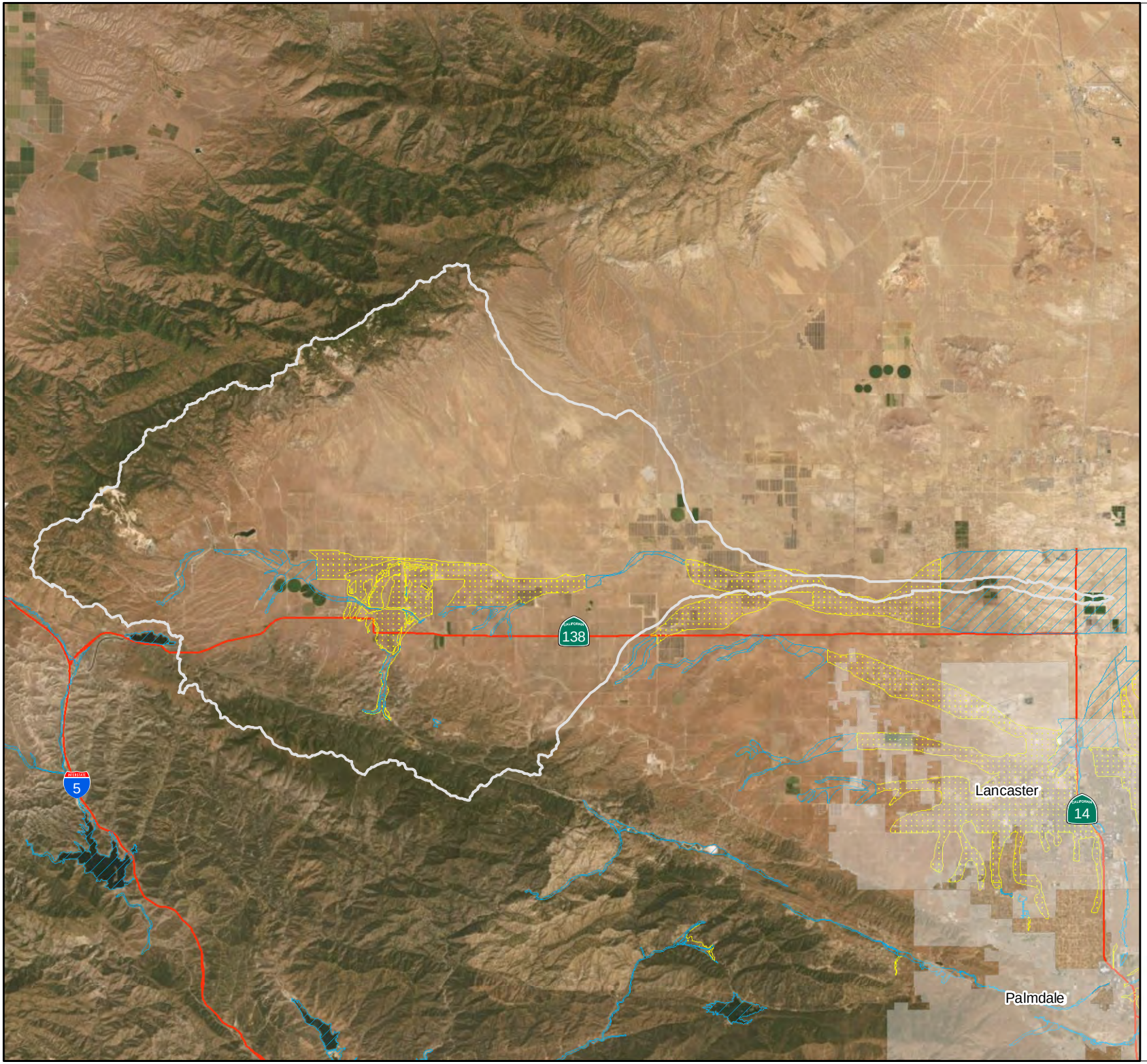
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,000 26,000

Meters
0 3,350 6,700

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Sacatara Creek-Kings Canyon Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Watershed Boundary

Incorporated Cities

**Flood Zone**

1% Annual Chance Flood

0.2% Annual Chance Flood

County Regulated Floodplain (Capital Storm)

N

Feet
0 15,500 31,000

Meters
0 3,950 7,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# San Jose Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

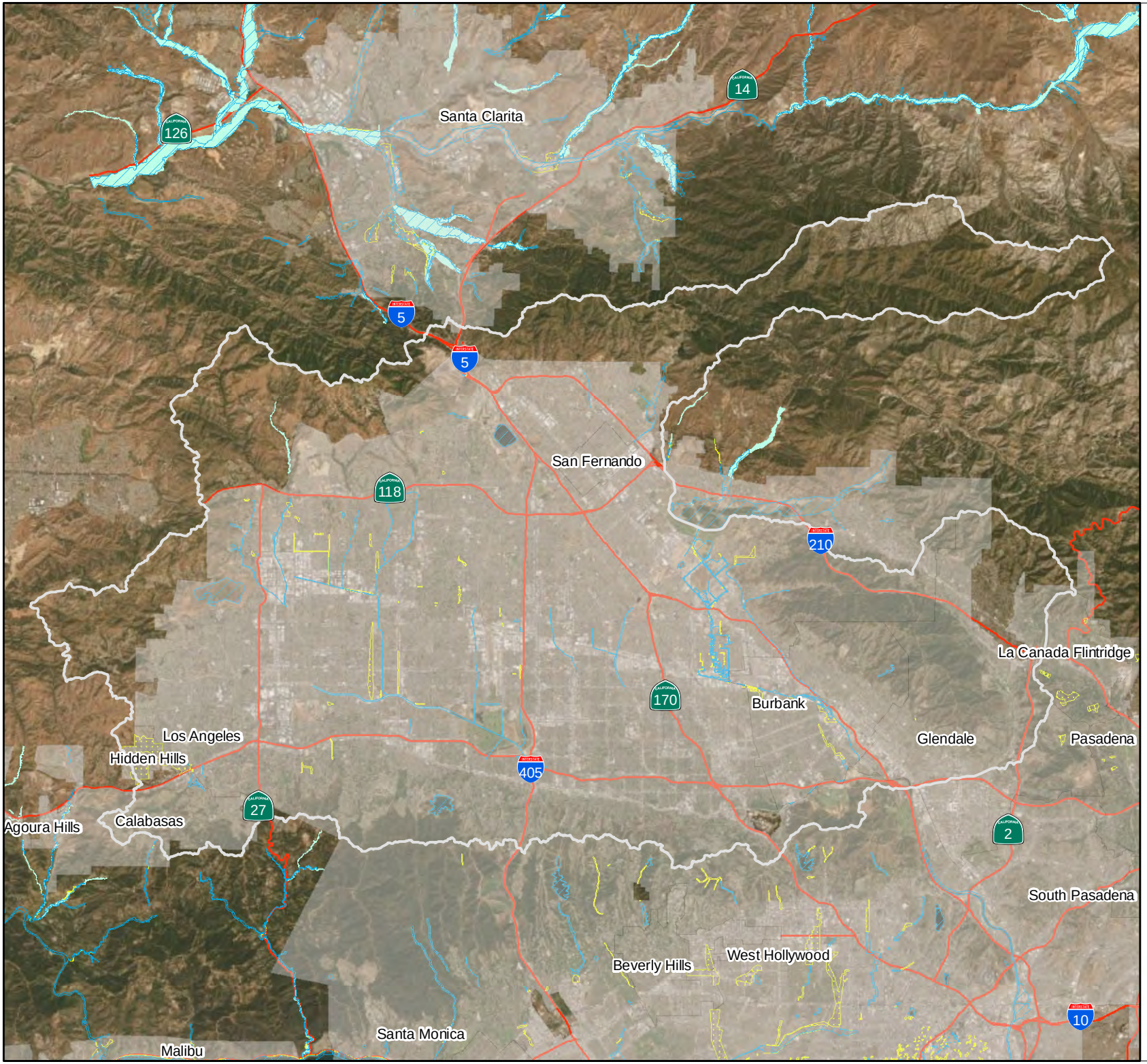
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 2,000 4,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Los Angeles River Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

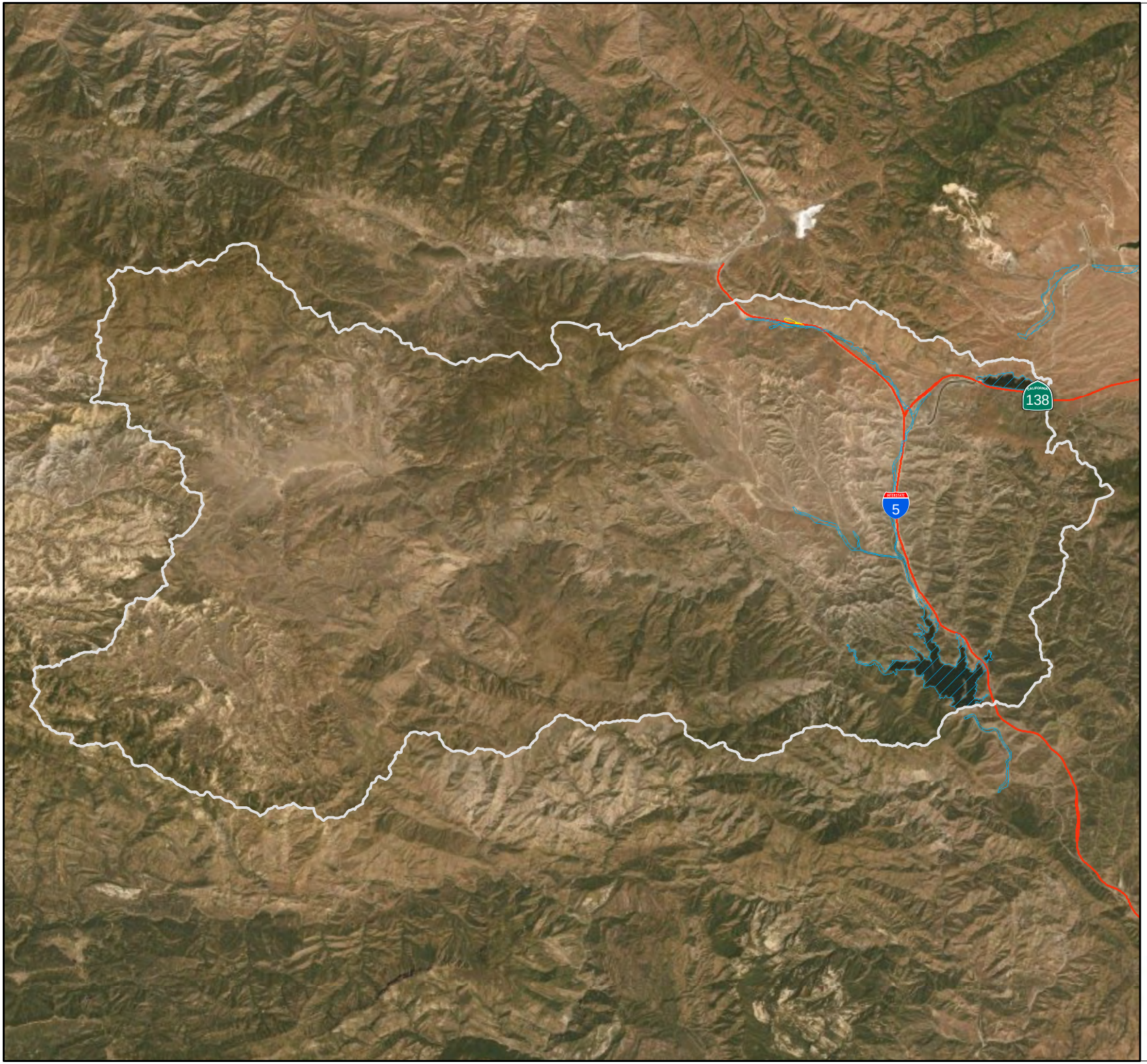
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 12,500 25,000

Meters
0 3,200 6,400

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Piru Creek Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

- Watershed Boundary
- Incorporated Cities

**Flood Zone**

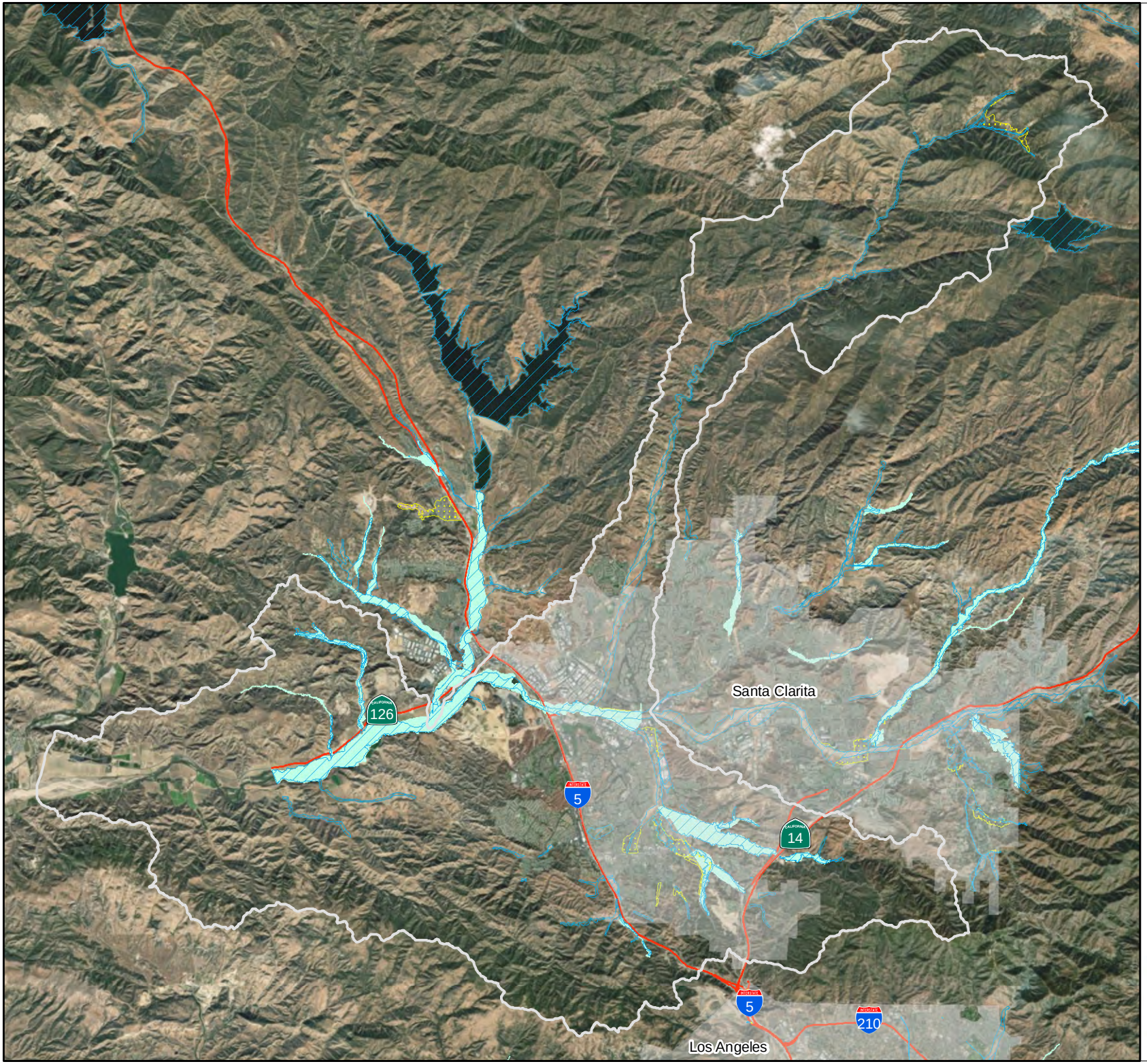
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- County Regulated Floodplain (Capital Storm)

N

Feet
0 12,000 24,000

Meters
0 3,000 6,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Santa Clara River Watershed

## FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Watershed Boundary

Incorporated Cities

**Flood Zone**

1% Annual Chance Flood

0.2% Annual Chance Flood

County Regulated Floodplain (Capital Storm)

N

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 2/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Appendix G. Example Progress Report

# G. Example Progress Report

## Los Angeles County, California
## Comprehensive Floodplain Management Plan and
## Program for Public Information
## Annual Progress Report

## OVERVIEW

### Reporting Period

*(Insert reporting period)*

### Background

Los Angeles County developed a floodplain management plan to reduce risk from flooding by identifying resources, information, and strategies for risk reduction. To prepare the plan, Los Angeles County organized resources, assessed risks from flooding, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from floods. The plan can be viewed on-line at:

https://www.dpw.lacounty.gov/WMD/NFIP/FMP2020/

During the floodplain management plan development, Los Angeles County also developed a program for public information to identify, prepare, implement, and monitor a range of flood-related public information activities that meet specific, local needs. The PPI framework is described in Chapter 14 of the floodplain management plan.

### Purpose

The purpose of this report is to provide an annual update on the implementation of the action plan identified in the *Los Angeles County Comprehensive Floodplain Management Plan* and on the implementation and evaluation of the outreach projects identified in the program for public information. The objective is to ensure that there is a continuing and responsive planning process that will keep the floodplain management plan and related outreach efforts dynamic and responsive to the needs and capabilities of Los Angeles County and stakeholders. This report discusses the following:

- Flood events that have occurred within the last year
- Changes in risk exposure within the planning area (unincorporated Los Angeles County)
- Mitigation success stories
- Changes in capabilities that could impact plan implementation
- Floodplain management plan implementation status

    - Review of the action plan

  - Recommendations for changes/enhancement

- Program for Public Information implementation and evaluation status
  - Review of the outreach projects
  - Review on progress toward desired outcomes
  - Recommendations for changes/enhancement.

## Flood Events within the Planning Area

During the reporting period, there were __ flood events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- _____
- _____
- _____
- _____
- _____

## Changes in Risk Exposure in the Planning Area

*(Insert brief overview of any flood event in the planning area that changed the probability of occurrence of flooding as presented in the floodplain management plan)*

## Mitigation Success Stories

*(Insert brief overview of mitigation accomplishments during the reporting period, including notably successful public outreach efforts)*

## Changes That May Impact Implementation of the Plan

*(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan or on public outreach efforts. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

# FLOODPLAIN MANAGEMENT PLAN PROGRESS

## Summary Overview of the Plan's Progress

The performance period for the floodplain management plan became effective on ____, 2020, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before _____, 2025. As of this reporting period, the performance period for this plan is considered to be __% complete. The floodplain management plan has targeted 37 flood hazard mitigation actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __ actions (__%) reported ongoing action toward completion.
- __ out of __ actions (__%) were reported as being complete.
- __ out of __ actions (___%) reported no action taken.

## The Floodplain Management Plan Steering Committee

The floodplain management plan steering committee, made up of stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 202_. It was determined through the plan's development process that a steering committee would remain in service to oversee maintenance of the plan. At a minimum, the Steering Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the Steering Committee membership is as indicated in Table 1.

**Table 1.** Steering Committee Members

| Name | Title | Jurisdiction/Agency |
|---|---|---|
| | | |
| | | |
| | | |
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## Review of the Action Plan

Table 2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the floodplain management plan for more detailed descriptions of each action and the prioritization process.

*Address the following in the "status" column of the following table:*

- *Was any element of the action carried out during the reporting period?*
- If no action was completed, why?
- Is the timeline for implementation for the action still appropriate?
- If the action was completed, does it need to be changed or removed from the action plan?

**Table 2.** Action Plan Matrix

| Action Taken? (Yes or No) | Timeline | Priority | Status | Status (X, O,✓) |
|---|---|---|---|---|
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |

| Action Taken? (Yes or No) | Timeline | Priority | Status | Status (X, O,✓) |
|---|---|---|---|---|
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |
| Action #__—_____[description] | | | | |

Completion status legend:
✓= Project Completed
O = Action ongoing toward completion
X = No progress at this time

## Recommendations for Changes or Enhancements

Based on the review of this report by the floodplain management plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

# PROGRAM FOR PUBLIC INFORMATION IMPLEMENTATION

## Summary Overview of Implementation

The annual performance period for the program for public information is from September 1 to September 30 of each year. In the 20___ reporting period, ___ (__ percent) of the ___ identified outreach projects were implemented. Of the projects that were implemented ___ (__ percent) have resulted in progress toward desired outcomes.

## The Program for Public Information Committee

The Program for Public Information Committee, made up of stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 202_. It is expected that turnover will occur in Program for Public Information Committee membership from year to year. For this reporting period, the Committee membership is as indicated in Table 3.

**Table 3.** Program For Public Information Committee

| Name | Title | Jurisdiction/Agency |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

## Review of the Outreach Projects

Table 4 reviews the identified outreach projects, reporting on the following items:

- The target audiences, the messages, and the desired outcomes.
- The projects in the PPI used to convey the messages.
- Which projects were implemented.
- Why some projects were not implemented.
- What progress was made toward the desired outcomes.
- What should be changed.

## Recommendations for Changes or Enhancements

Based on the review of this report by the program for public information Committee, the following changes will be incorporated during the next performance period:

- _____
- _____
- _____
- _____

**Table 4.** Program For Public Information Committee

| Message | Target Audiences | Desired Outcomes | Progress toward Outcomes | Projects | Assignment | Schedule | Stakeholder | Implemented (yes or why not?) |
|---|---|---|---|---|---|---|---|---|
| **Topic 1: Know Your Flood Hazard** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| **Topic 2: Insure Your Property Against Your Flood Hazard** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| **Topic 3: Protect People from the Hazard** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| **Topic 4: Protect Your Property from the Hazard** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| **Topic 5: Build Responsibly** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| **Topic 6: Protect Natural Floodplain Functions** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |

| Message | Target Audiences | Desired Outcomes | Progress toward Outcomes | Projects | Assignment | Schedule | Stakeholder | Implemented (yes or why not?) |
|---|---|---|---|---|---|---|---|---|
| **Topic 7: General Preparedness** | | | | | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |
| | | | | | | | | |
| | | | | Recommended changes: | | | | |

## PUBLIC REVIEW NOTICE

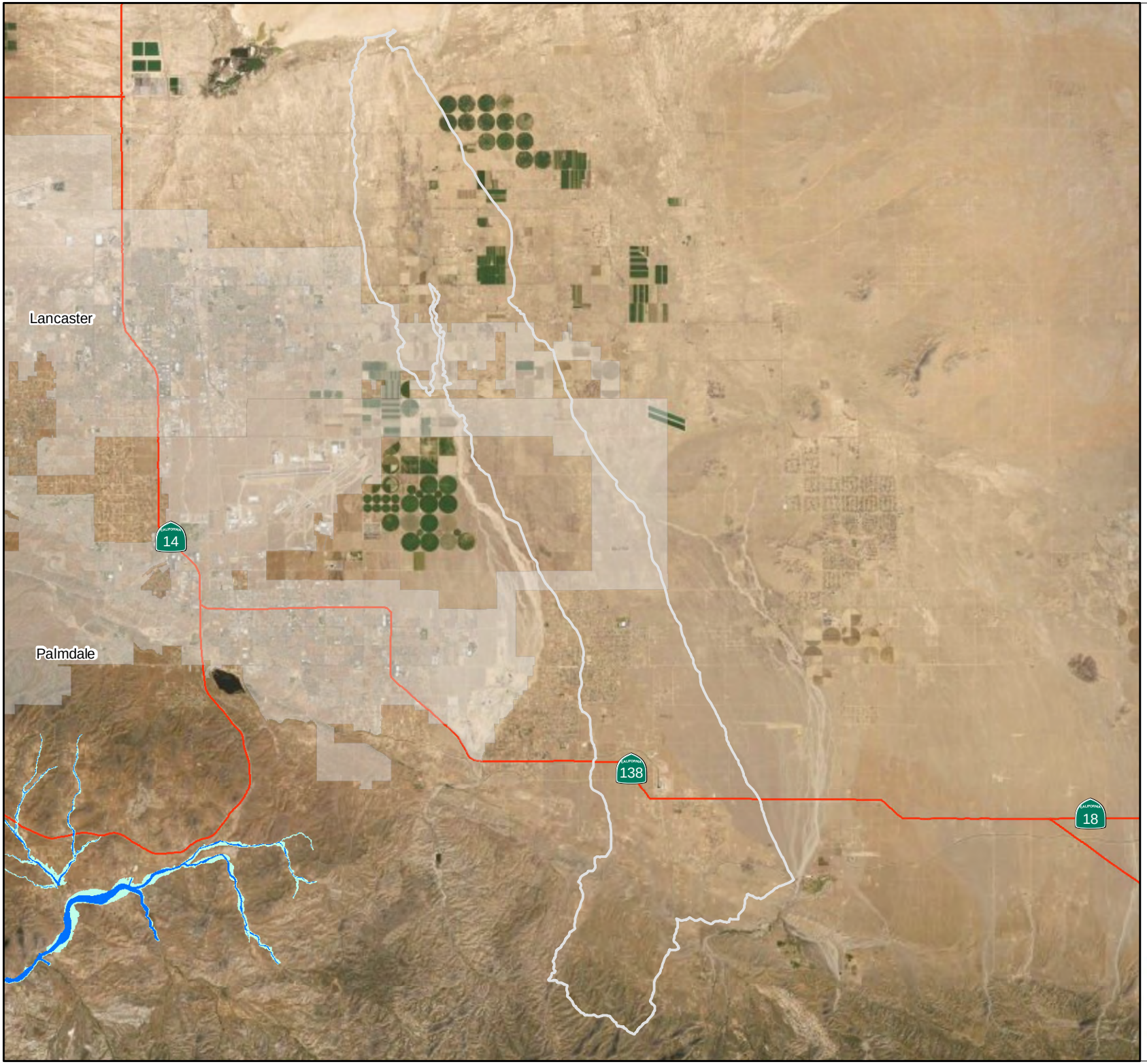
*The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the Los Angeles County Board of Supervisors and to local media outlets and the report is posted on the floodplain management plan website. Any questions or comments regarding the contents of this report should be directed to:*

*Los Angeles County Public Works*

*Stormwater Engineering Division*

*(626) 458-6131*

# Appendix H. Capital Floodplain and Floodway Maps




# 1809020616 (Pearblossom) Watershed

## County Regulated Floodways and Floodplains

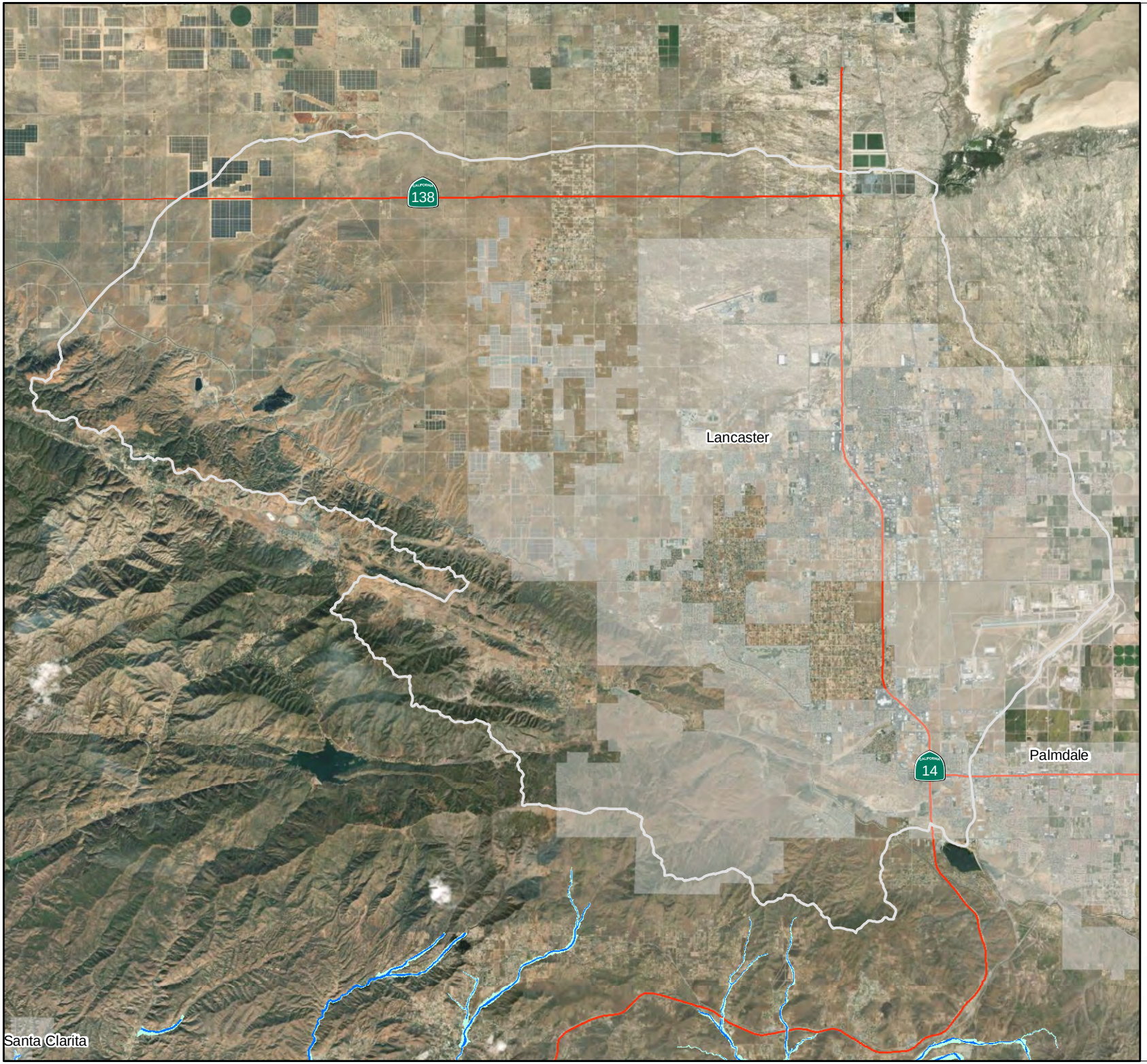
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 11,500 23,000

Meters
0 2,950 5,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Amargosa Creek Watershed

## County Regulated Floodways and Floodplains

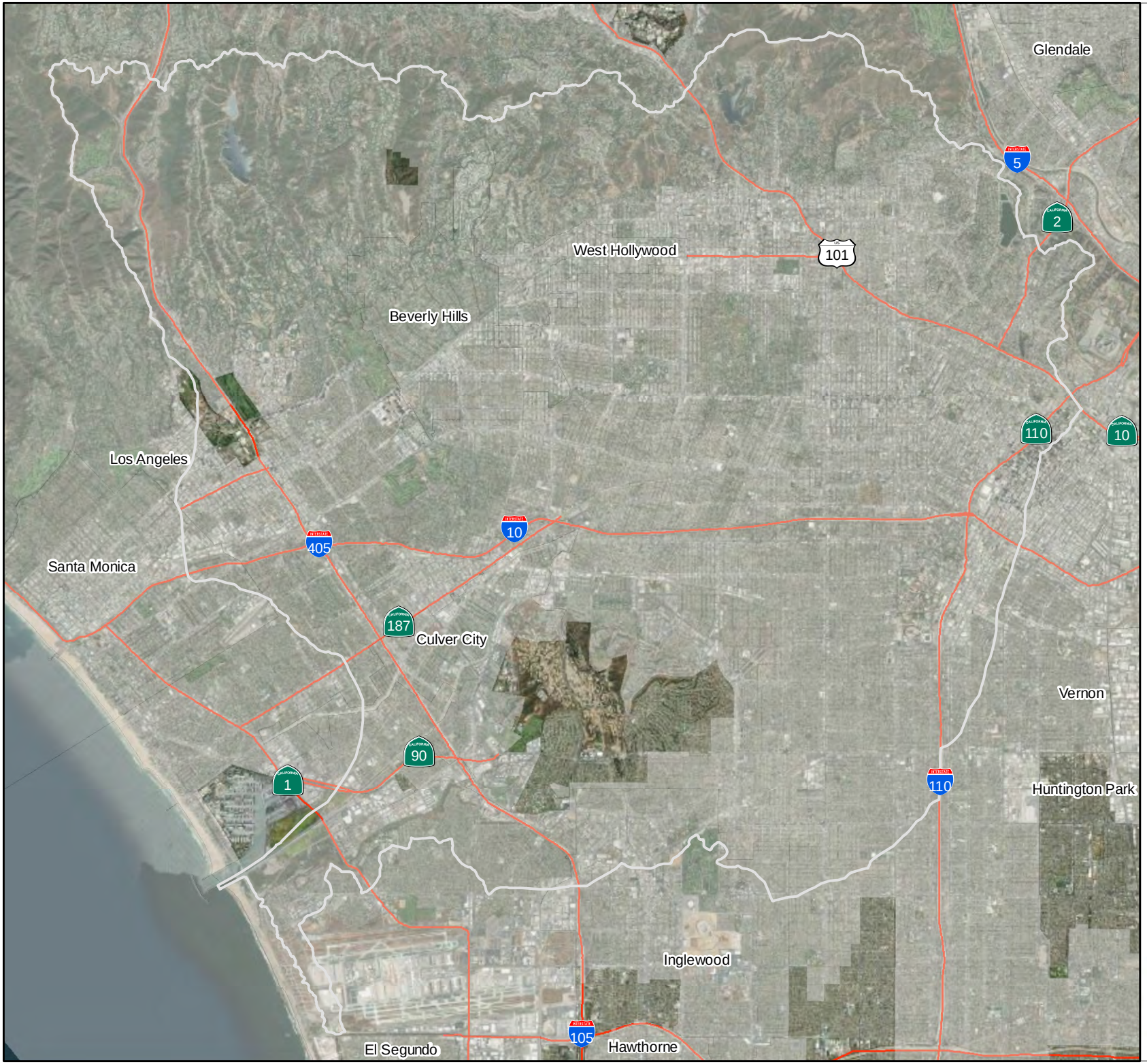
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

0 10,000 20,000 Feet

0 2,600 5,200 Meters

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Ballona Creek Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 6,250 12,500

Meters
0 1,550 3,100

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Rock Creek-Big Rock Wash Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Sycamore Canyon-Frontal Santa Monica Bay Watershed

## County Regulated Floodways and Floodplains

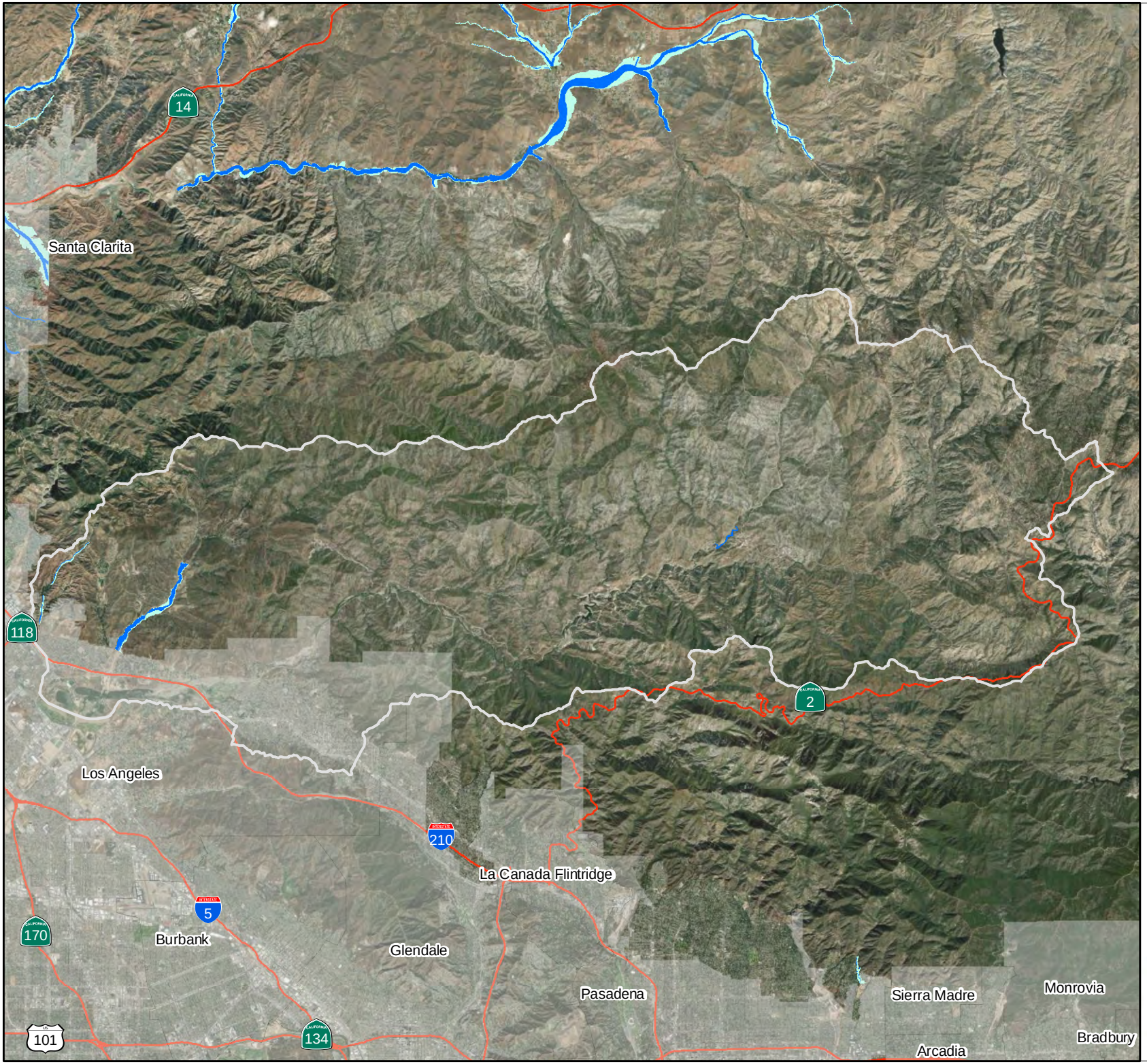
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Big Tujunga Creek Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,500 5,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Bouquet Canyon Watershed

## County Regulated Floodways and Floodplains

Watershed Boundary

Incorporated Cities

County Regulated Floodway (Capital Storm)

County Regulated Floodplain (Capital Storm)

N

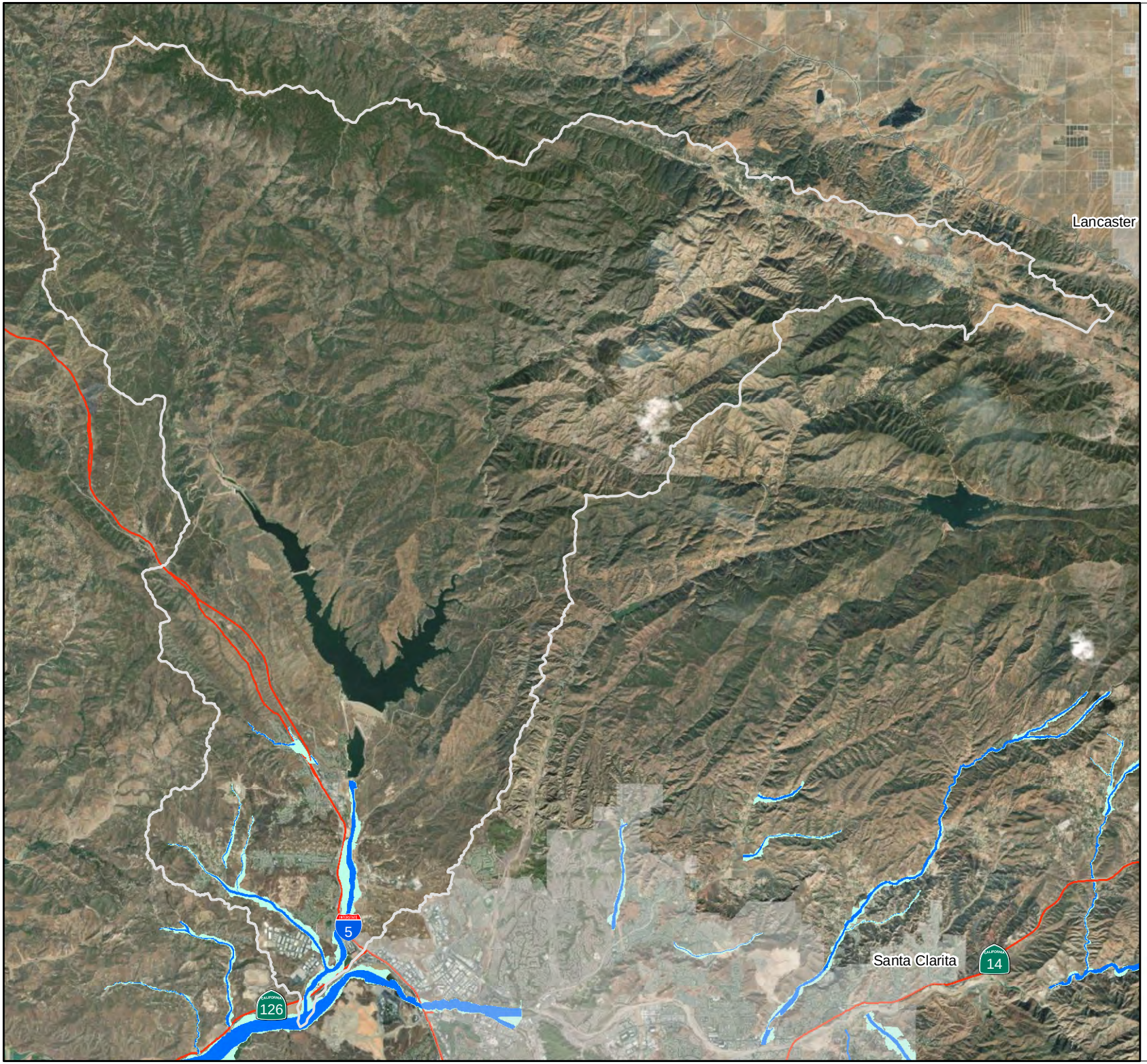
Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Castaic Creek Watershed

## County Regulated Floodways and Floodplains



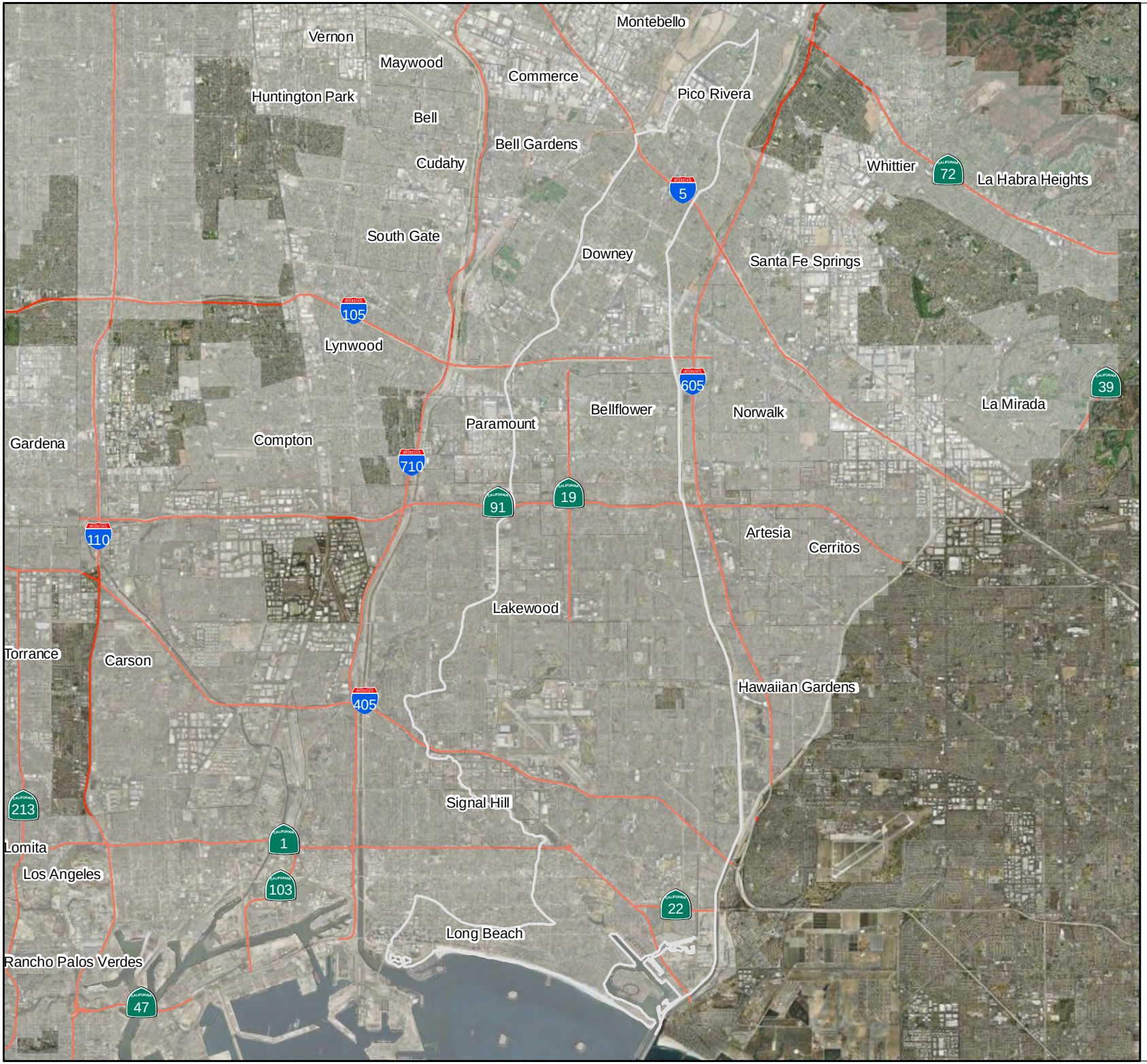

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,500 19,000

Meters
0 2,400 4,800

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Colorado Lagoon-Frontal Alamitos Bay Watershed

## County Regulated Floodways and Floodplains

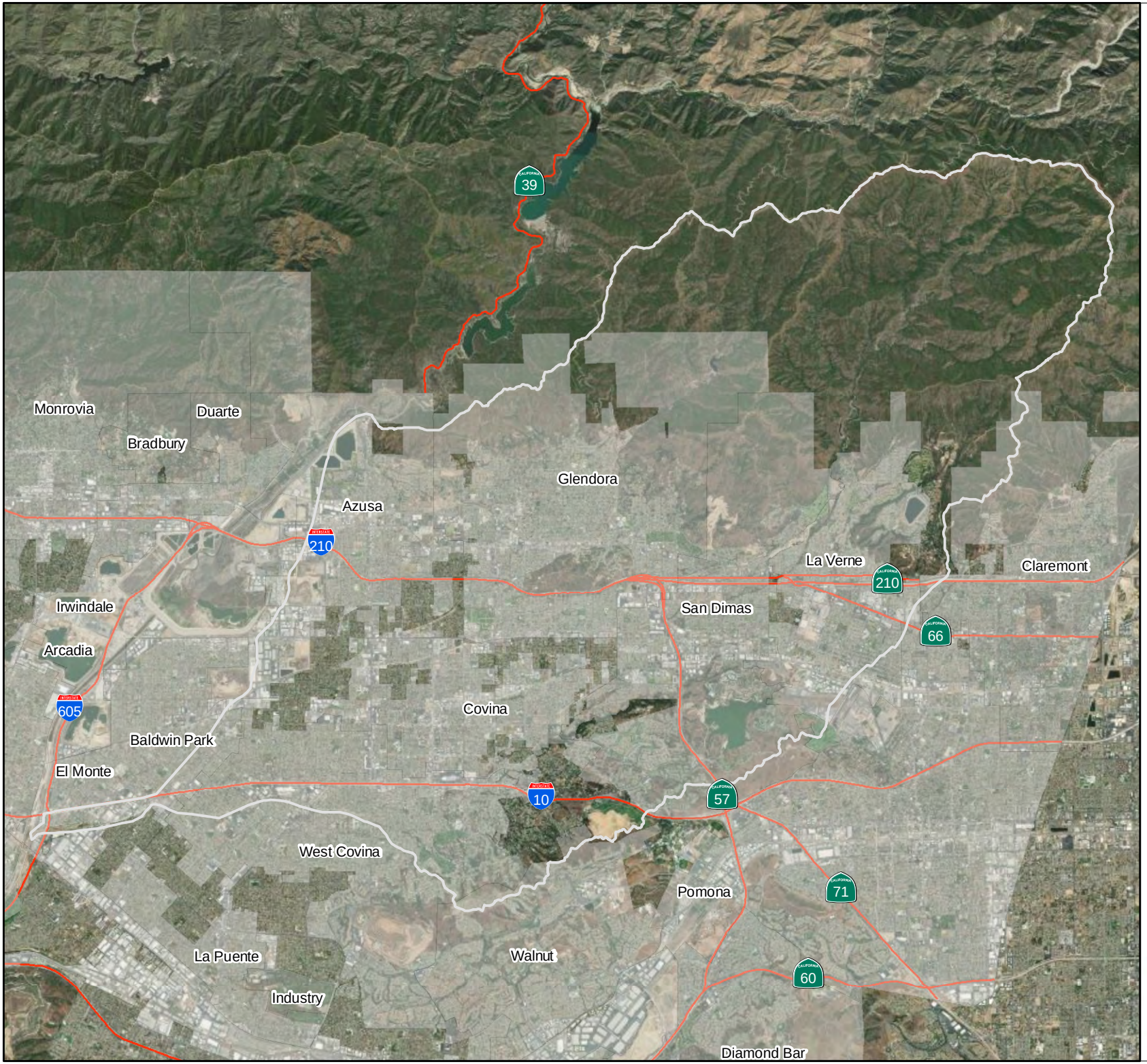
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,950 3,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dalton Wash Watershed

## County Regulated Floodways and Floodplains

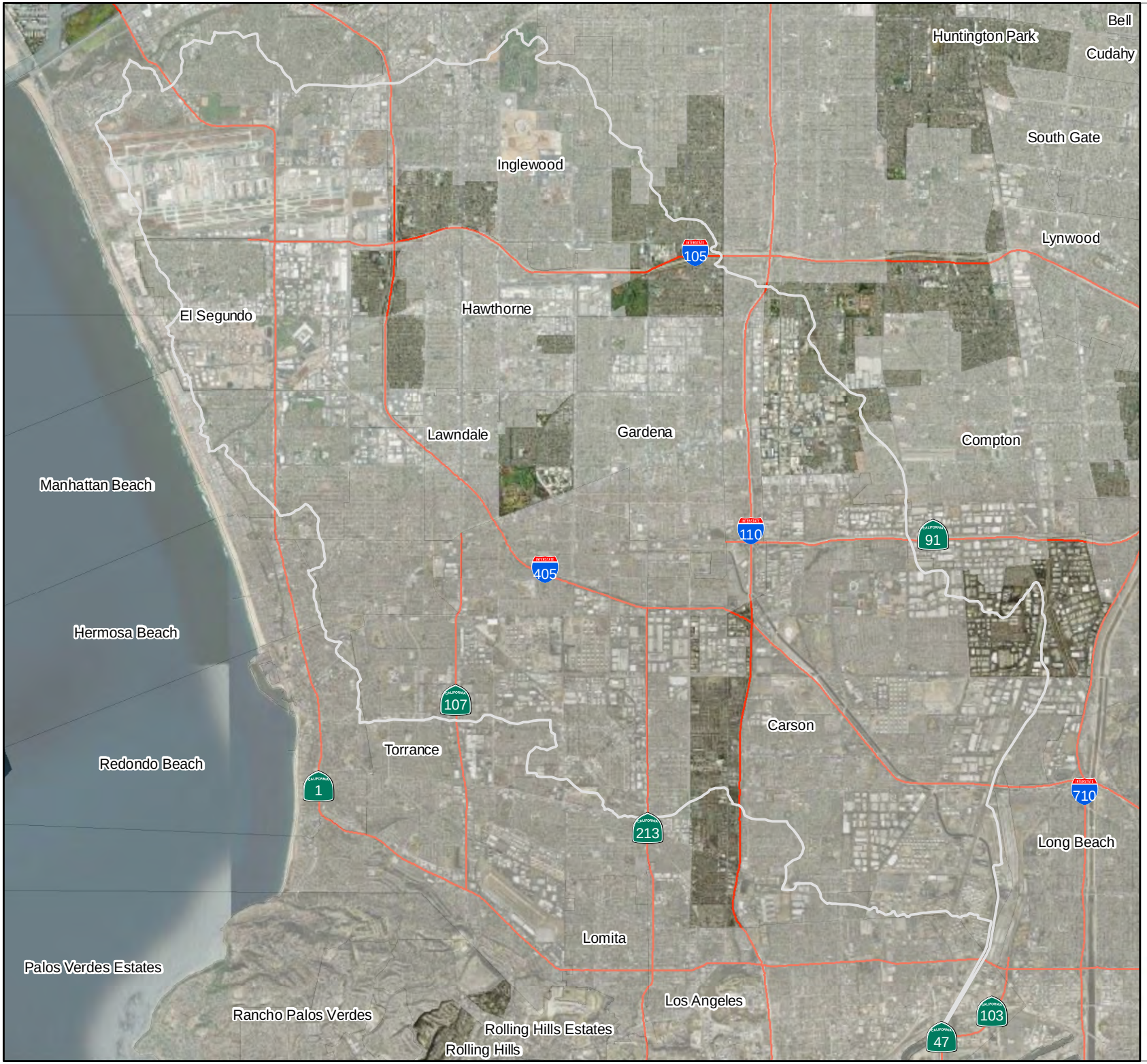
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,000 14,000

Meters
0 1,800 3,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Dominguez Channel Watershed

## County Regulated Floodways and Floodplains

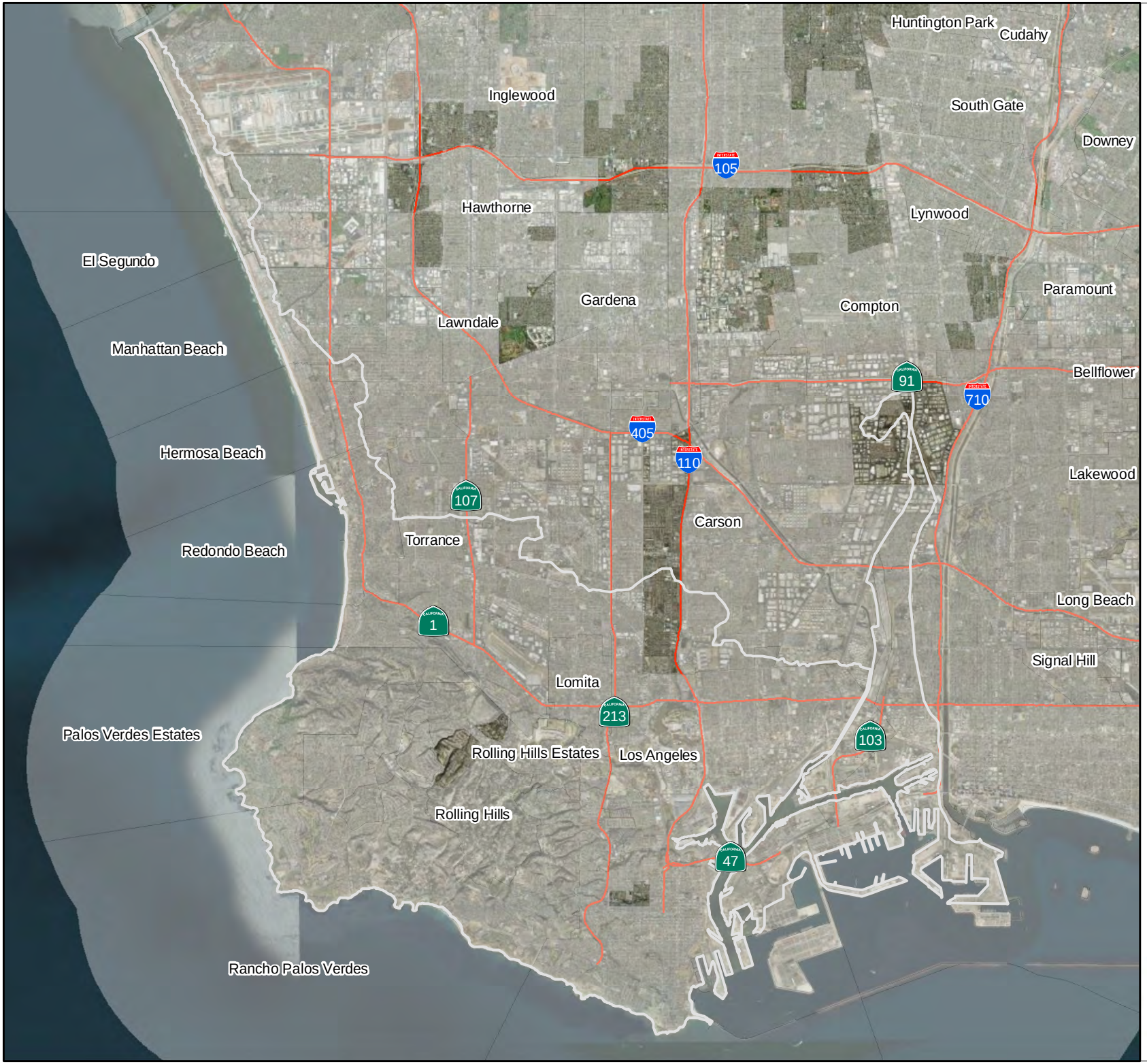
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 5,500 11,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Frontal Santa Monica Bay-San Pedro Bay Watershed

## County Regulated Floodways and Floodplains

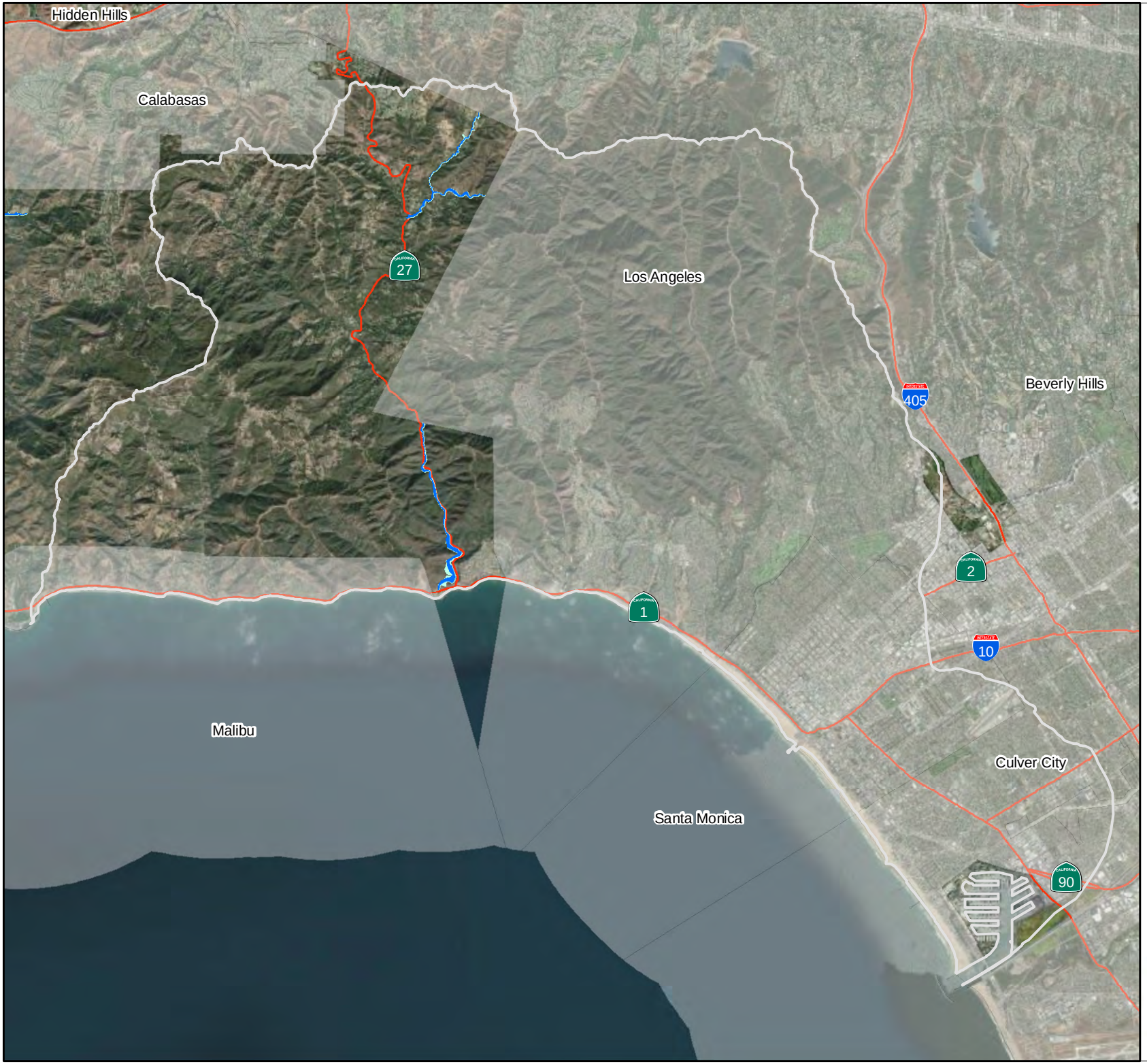
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,950 3,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Garapito Creek-Frontal Santa Monica Bay Watershed

## County Regulated Floodways and Floodplains

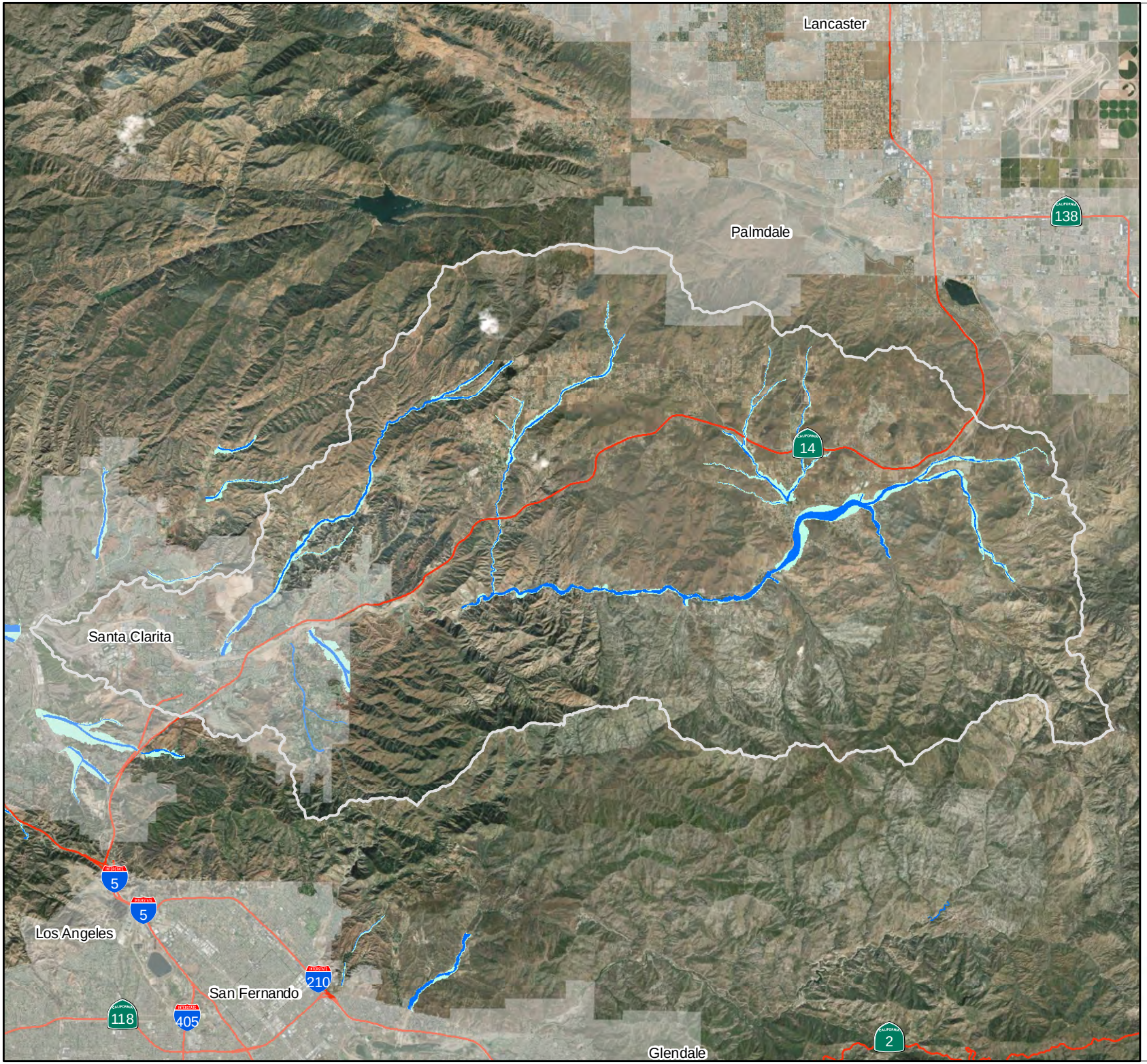
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 6,000 12,000

Meters
0 1,500 3,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Headwaters Santa Clara River Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

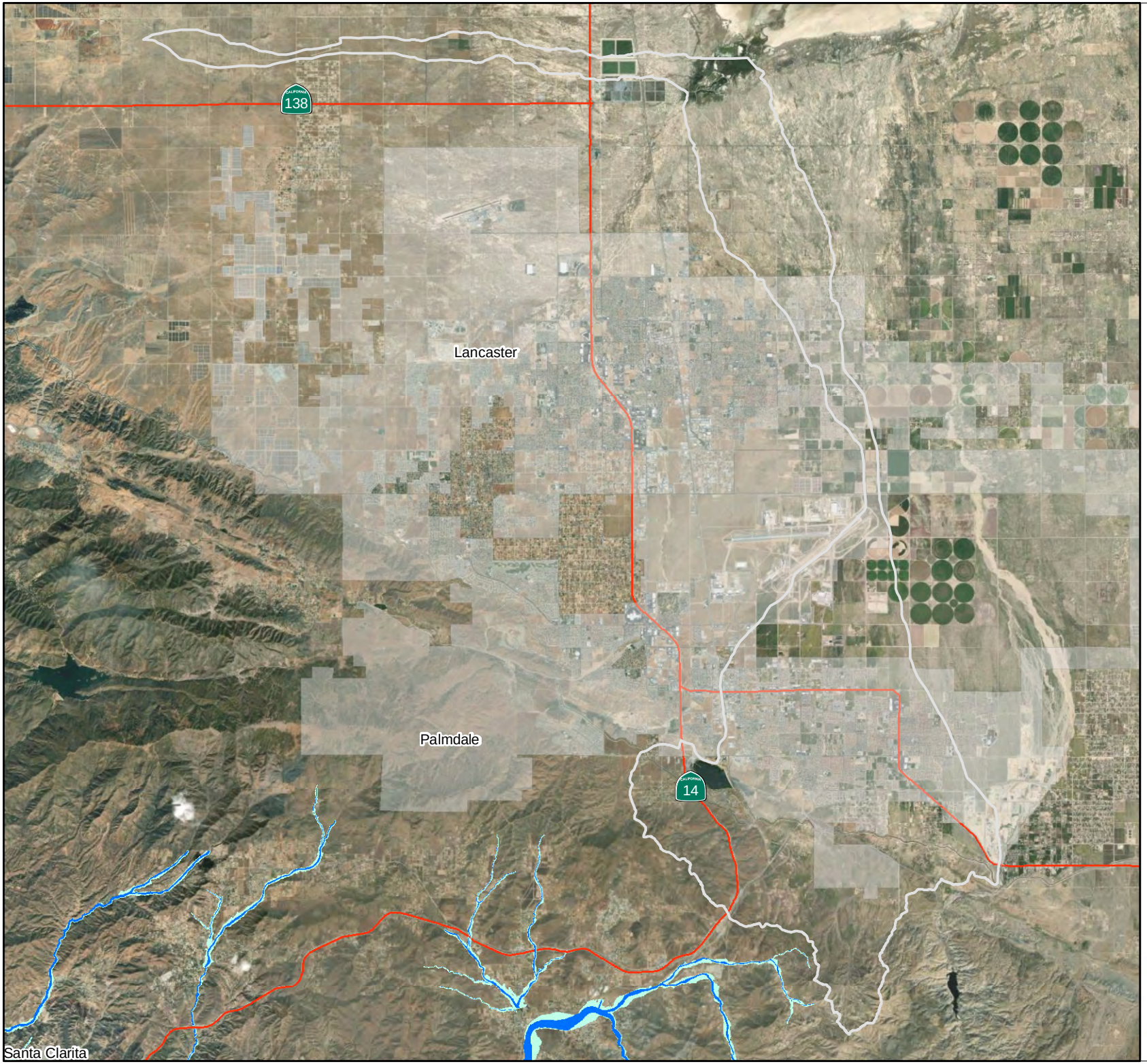
Feet
0 11,250 22,500

Meters
0 2,875 5,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Lake Palmdale-Piute Ponds Watershed

## County Regulated Floodways and Floodplains




- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,000 20,000

Meters
0 2,600 5,200

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Le Montaine Creek-Eller Slough Watershed

## County Regulated Floodways and Floodplains

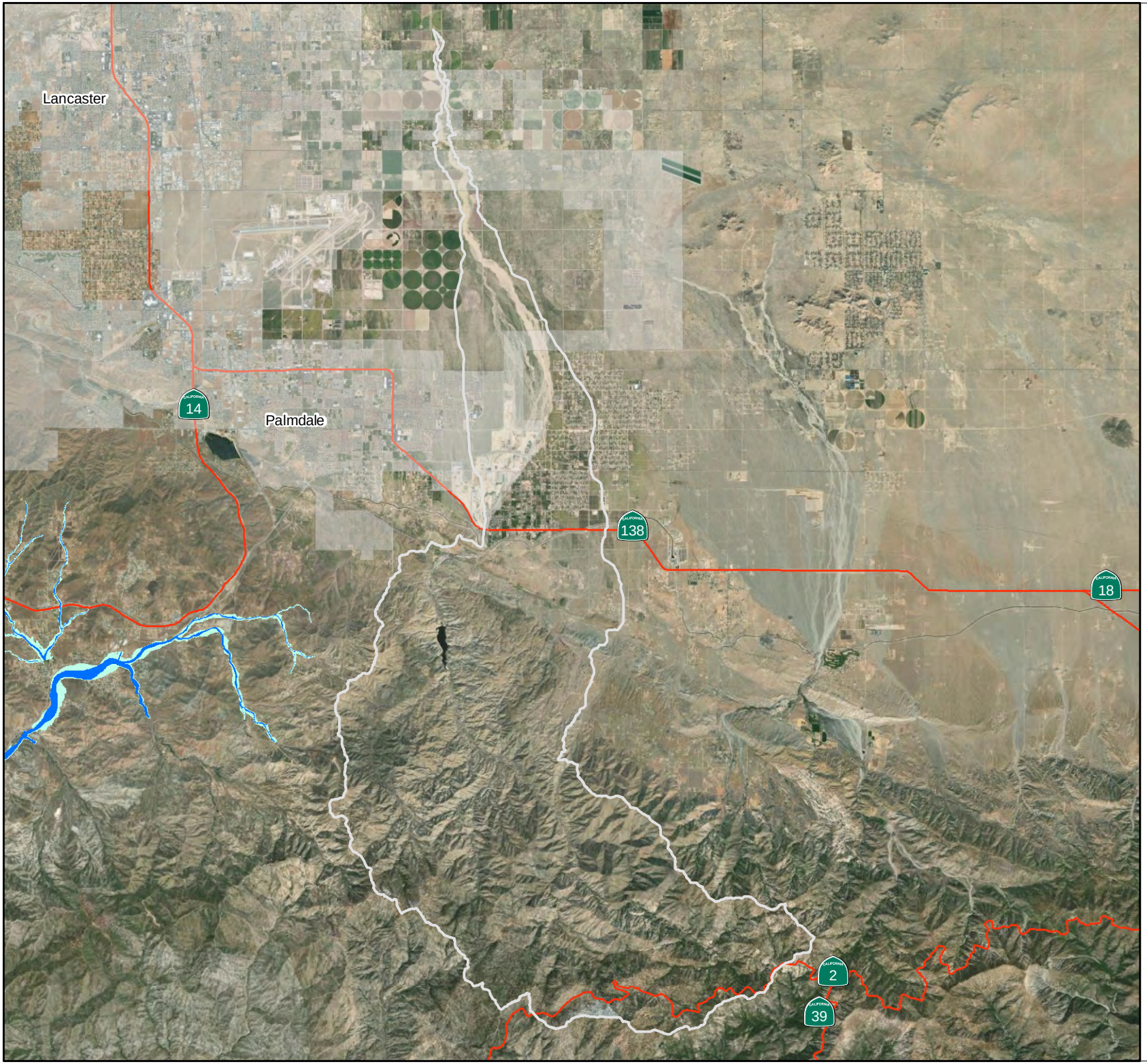
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,500 21,000

Meters
0 2,700 5,400

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Little Rock Wash Watershed

## County Regulated Floodways and Floodplains

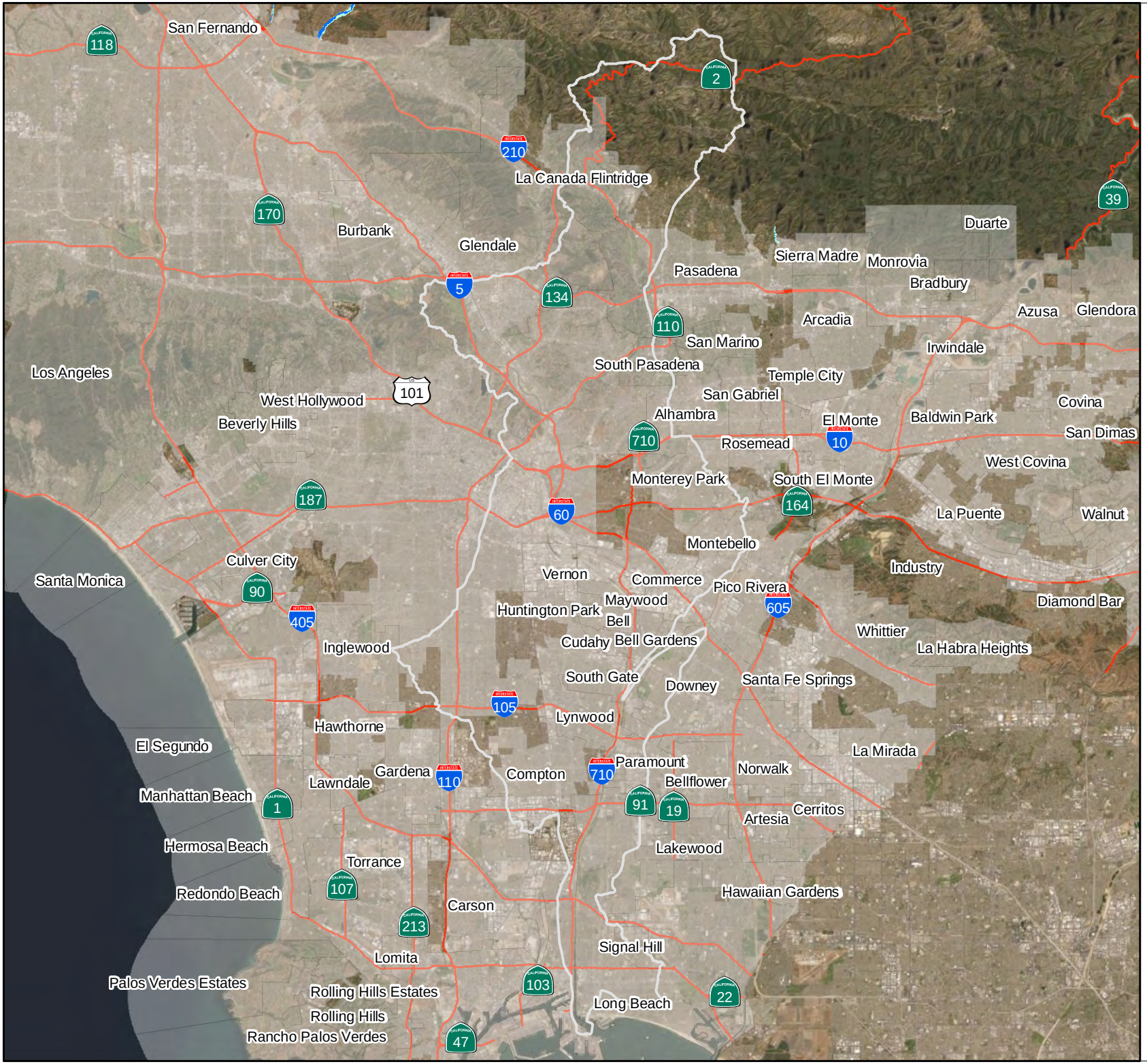
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 11,000 22,000

Meters
0 2,800 5,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower Los Angeles River Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 16,000 32,000

Meters
0 4,100 8,200

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Lower Piru Creek Watershed

## County Regulated Floodways and Floodplains



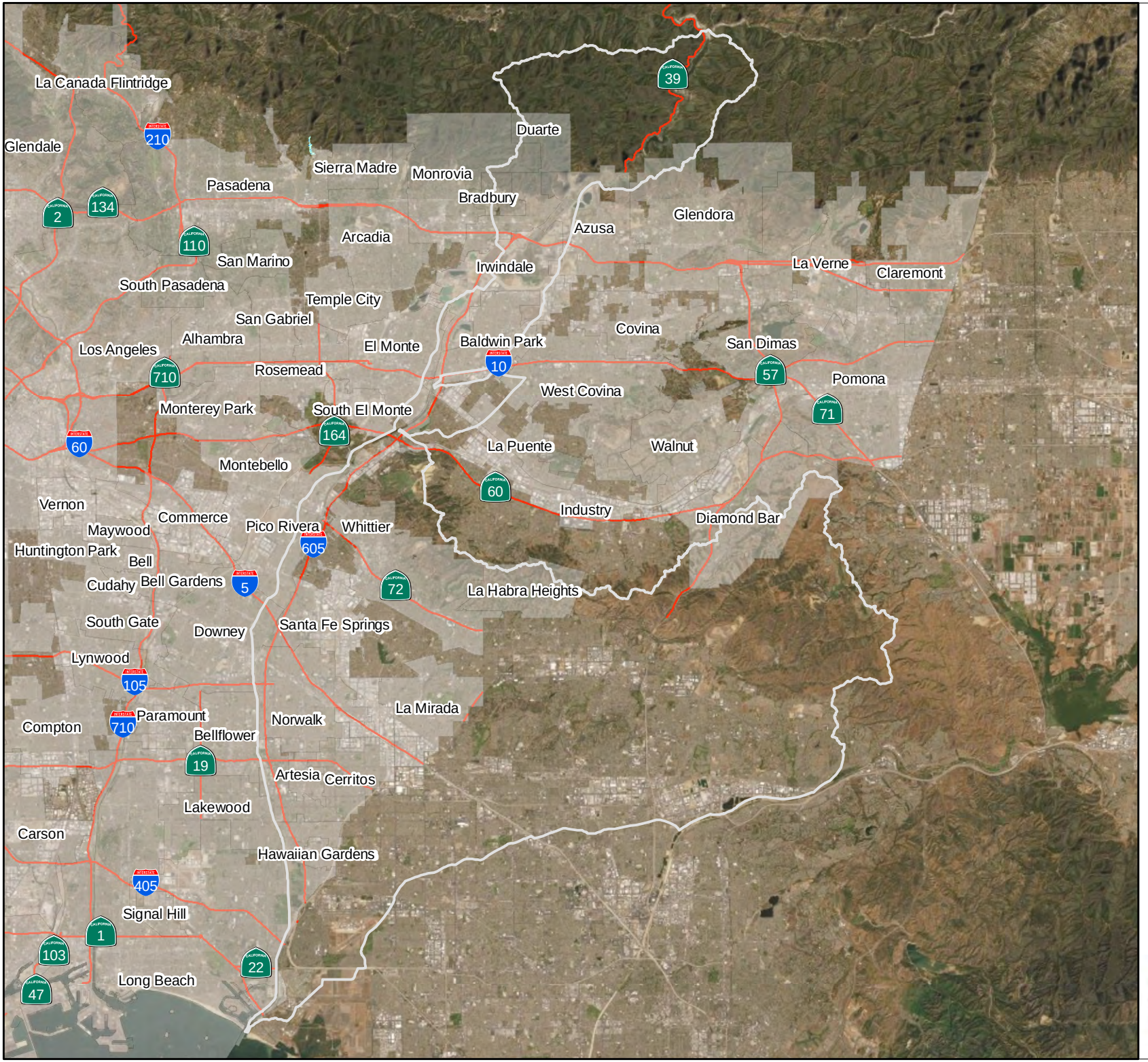

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 1,950 3,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Lower San Gabriel River Watershed

## County Regulated Floodways and Floodplains

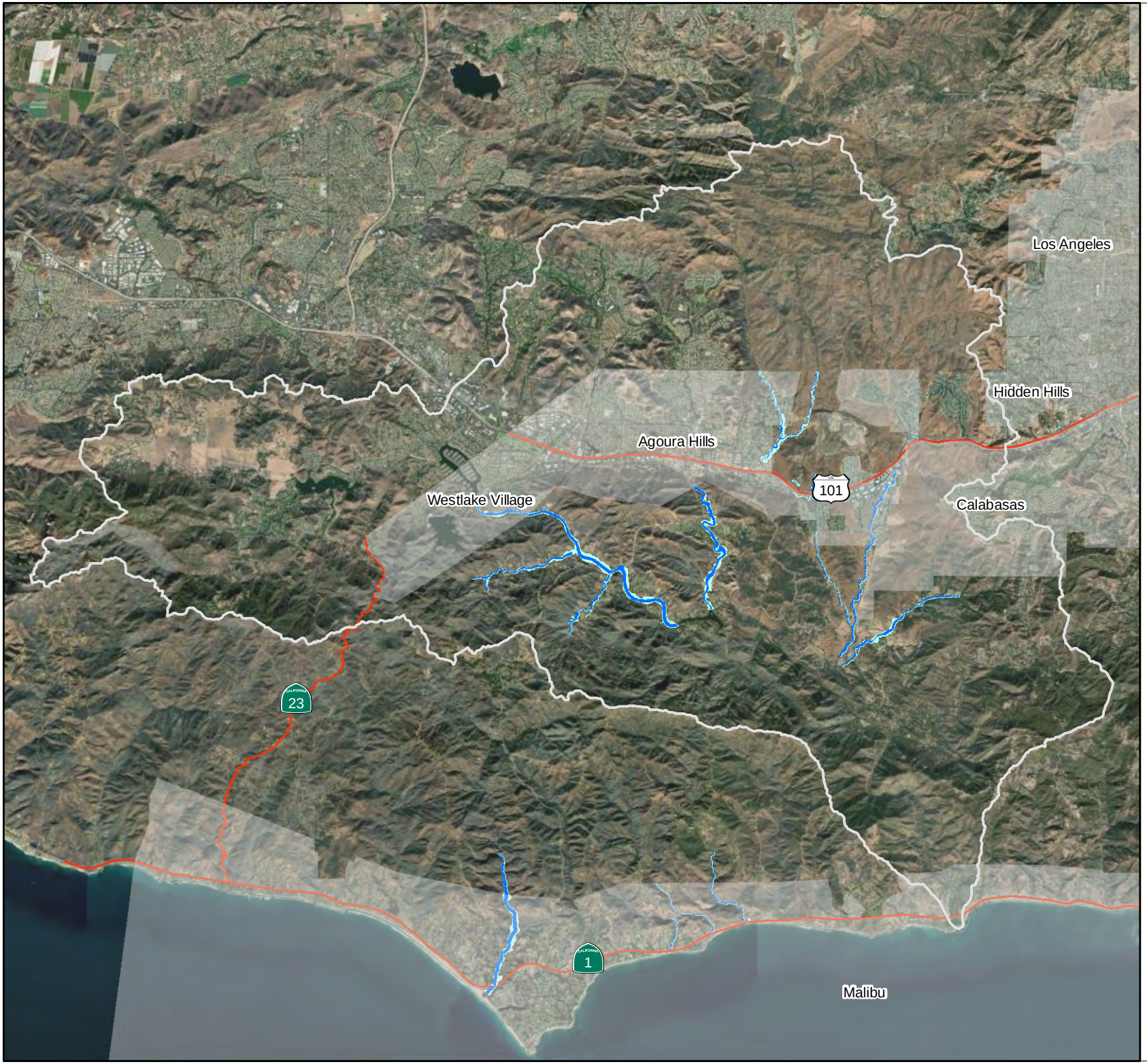
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 15,000 30,000

Meters
0 3,750 7,500

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Malibu Creek Watershed

## County Regulated Floodways and Floodplains

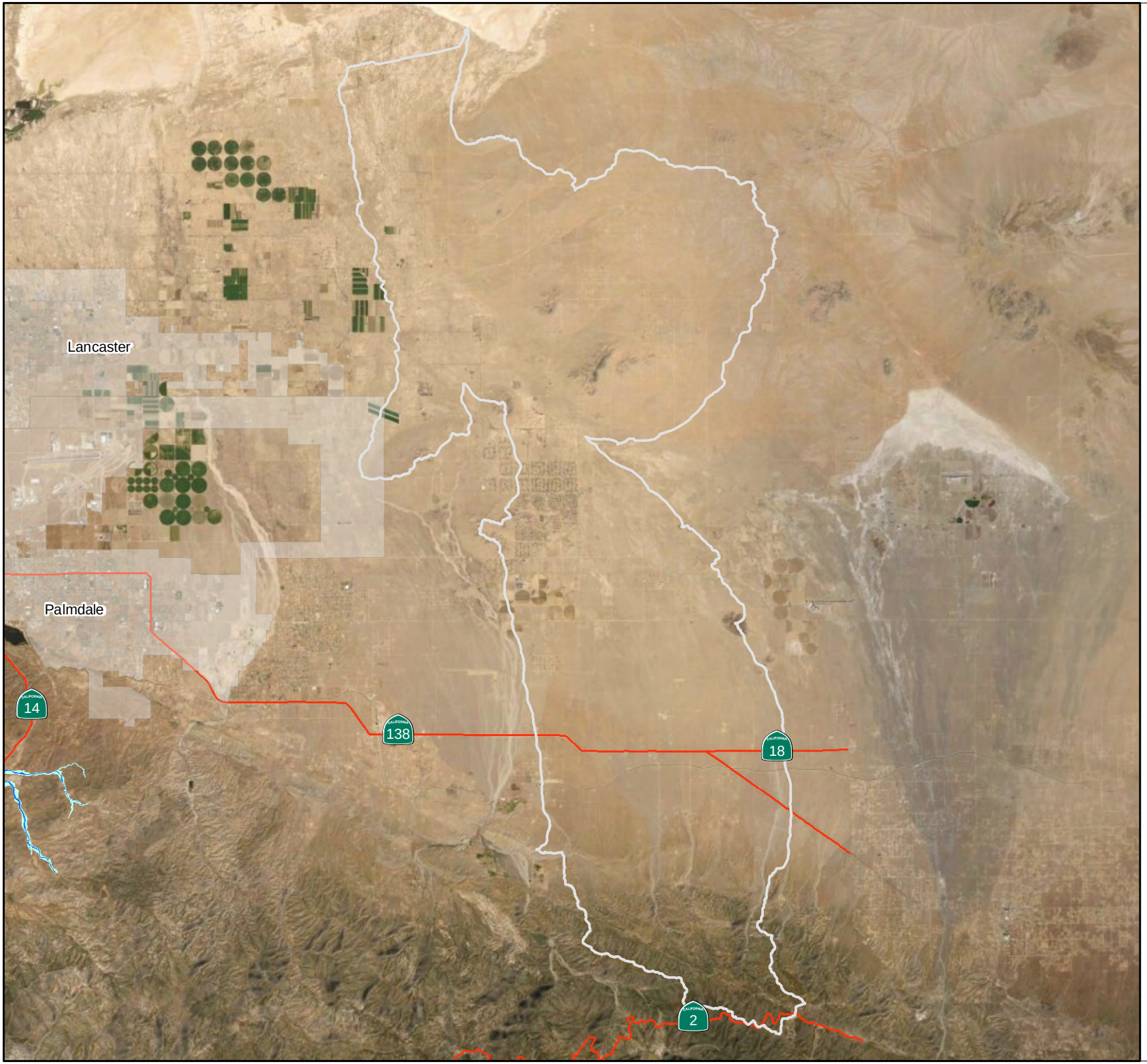
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,000 14,000

Meters
0 1,875 3,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Mescal Creek-Rocky Buttes Watershed

## County Regulated Floodways and Floodplains

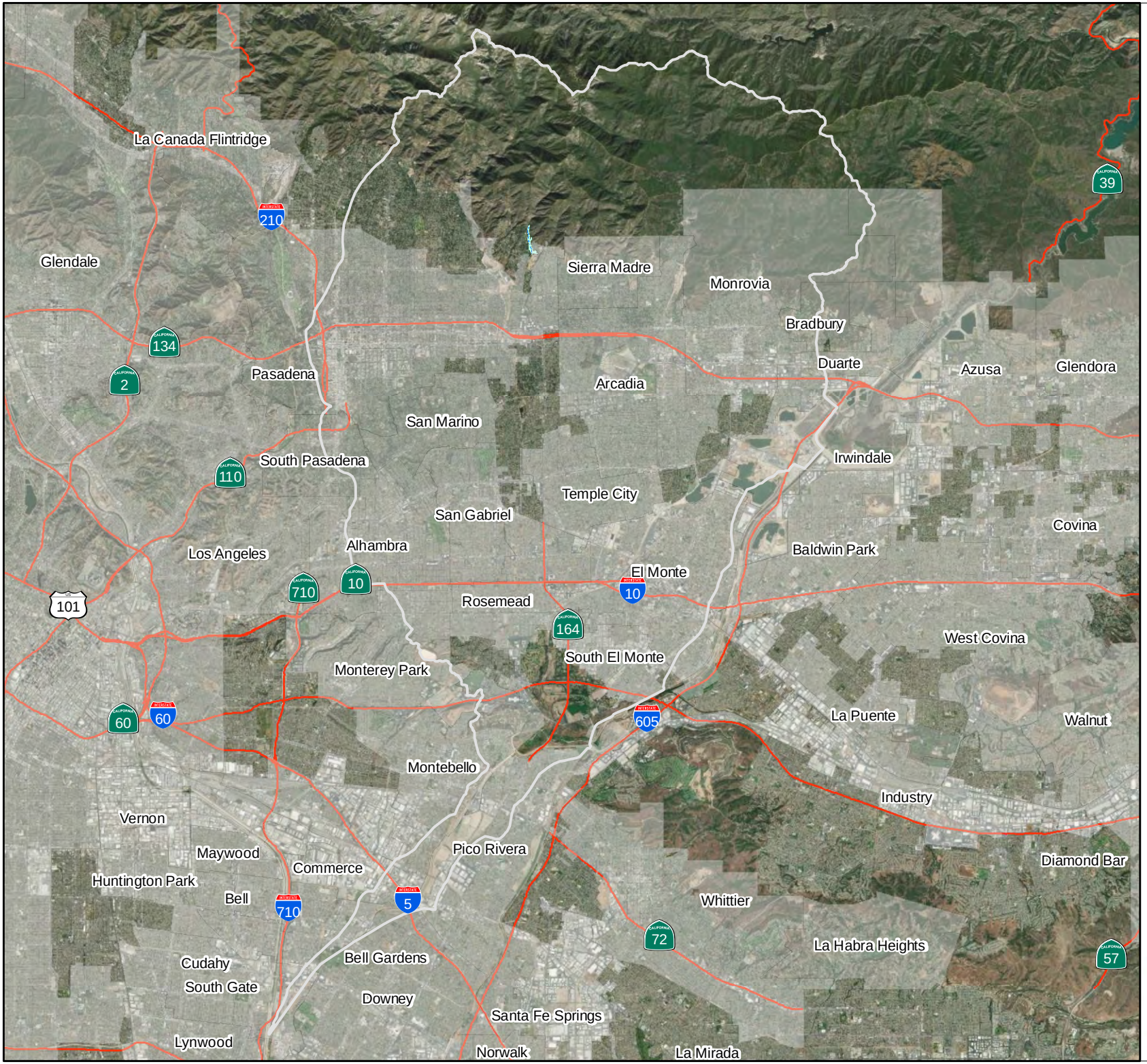
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,750 27,500

Meters
0 3,500 7,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rio Hondo Watershed

## County Regulated Floodways and Floodplains

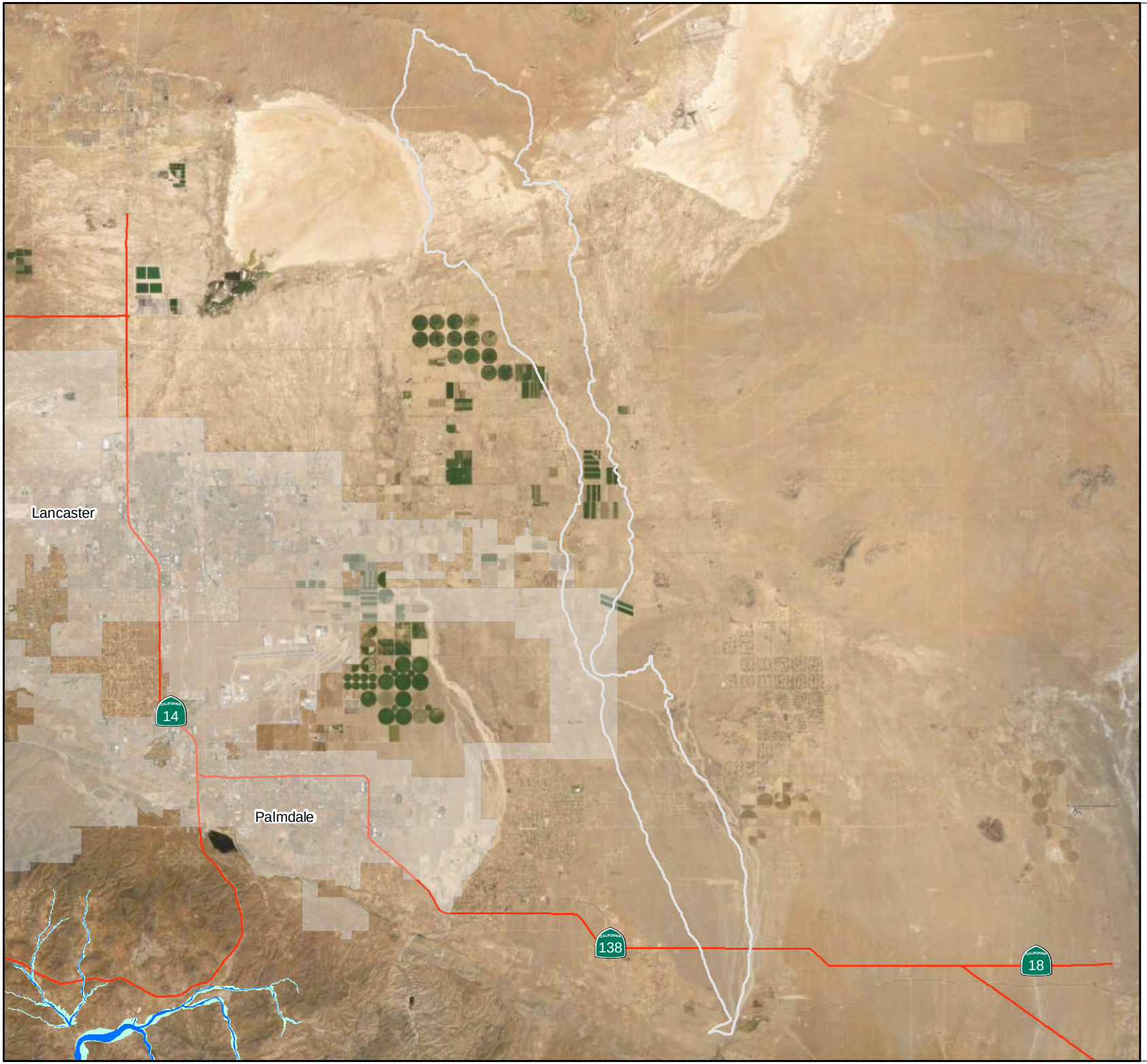
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 9,000 18,000

Meters
0 2,375 4,750

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Rock Creek-Buckhorn Lake Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,000 26,000

Meters
0 3,300 6,600

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps



# Rogers Lake Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

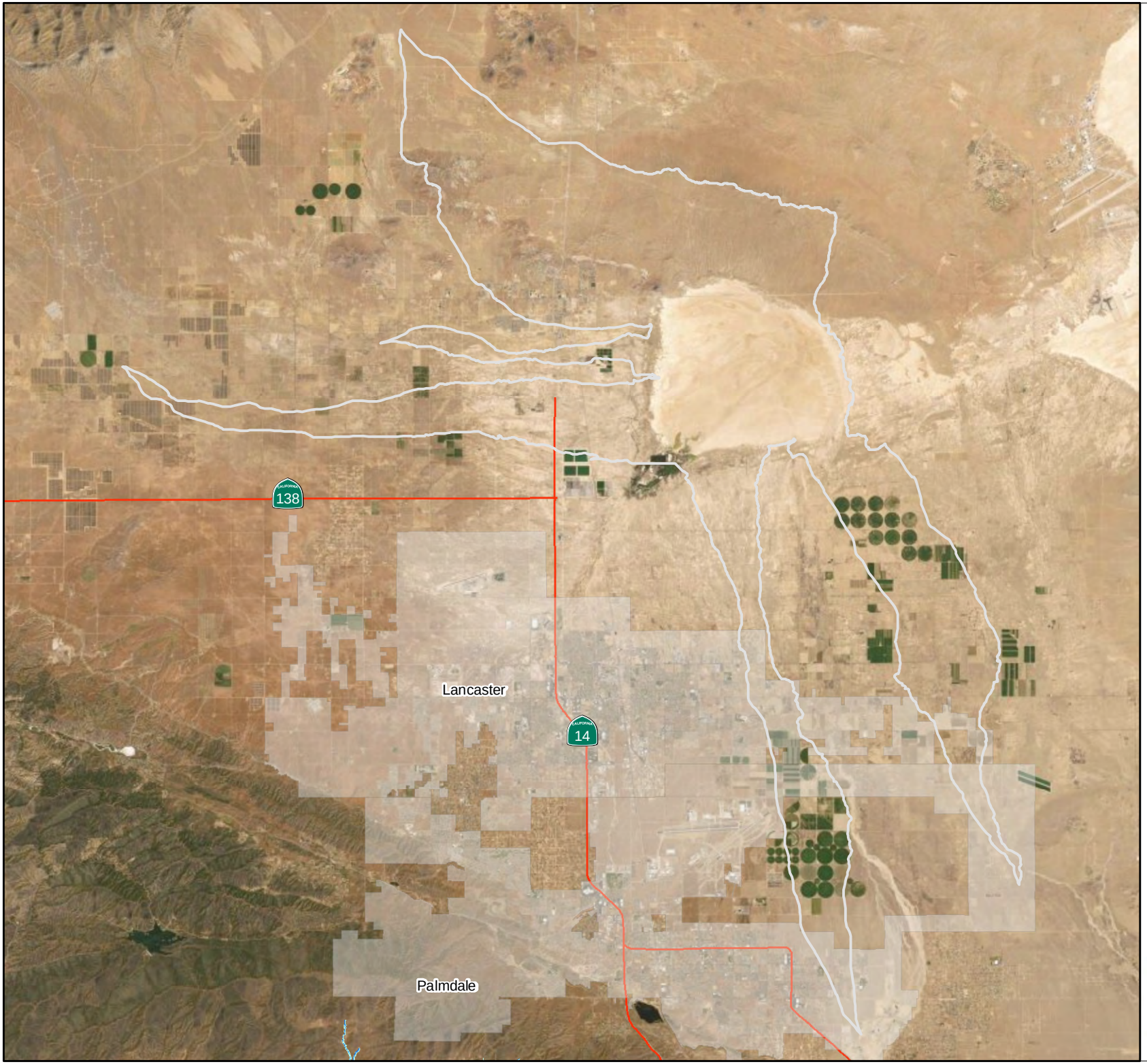
Feet
0 9,500 19,000

Meters
0 2,450 4,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Rosamond Lake Watershed

## County Regulated Floodways and Floodplains



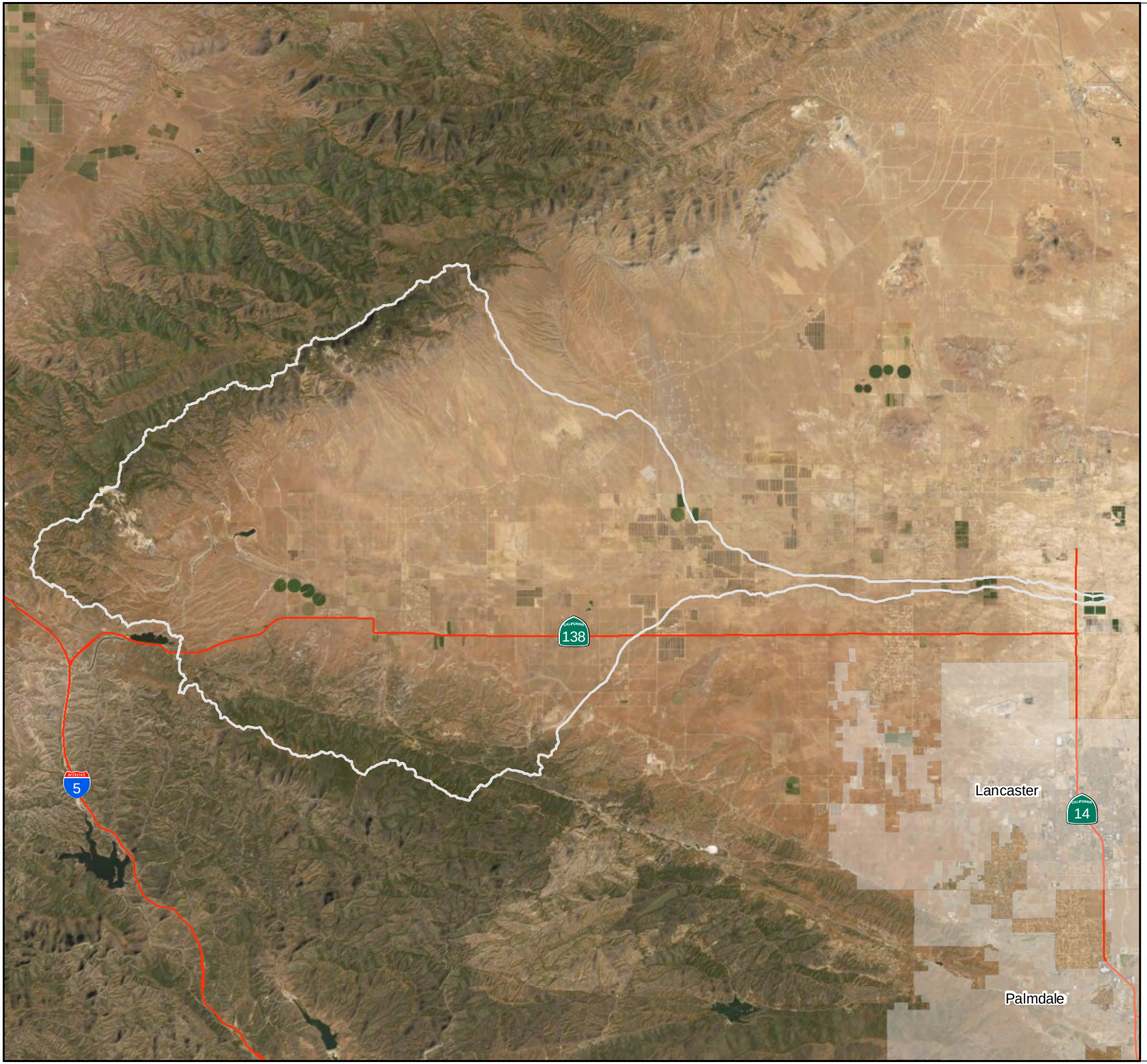

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 13,000 26,000

Meters
0 3,350 6,700

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Sacatara Creek-Kings Canyon Watershed

## County Regulated Floodways and Floodplains

Watershed Boundary

Incorporated Cities

County Regulated Floodway (Capital Storm)

County Regulated Floodplain (Capital Storm)

N

Feet
0 15,500 31,000

Meters
0 3,950 7,900

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# San Jose Creek Watershed

## County Regulated Floodways and Floodplains

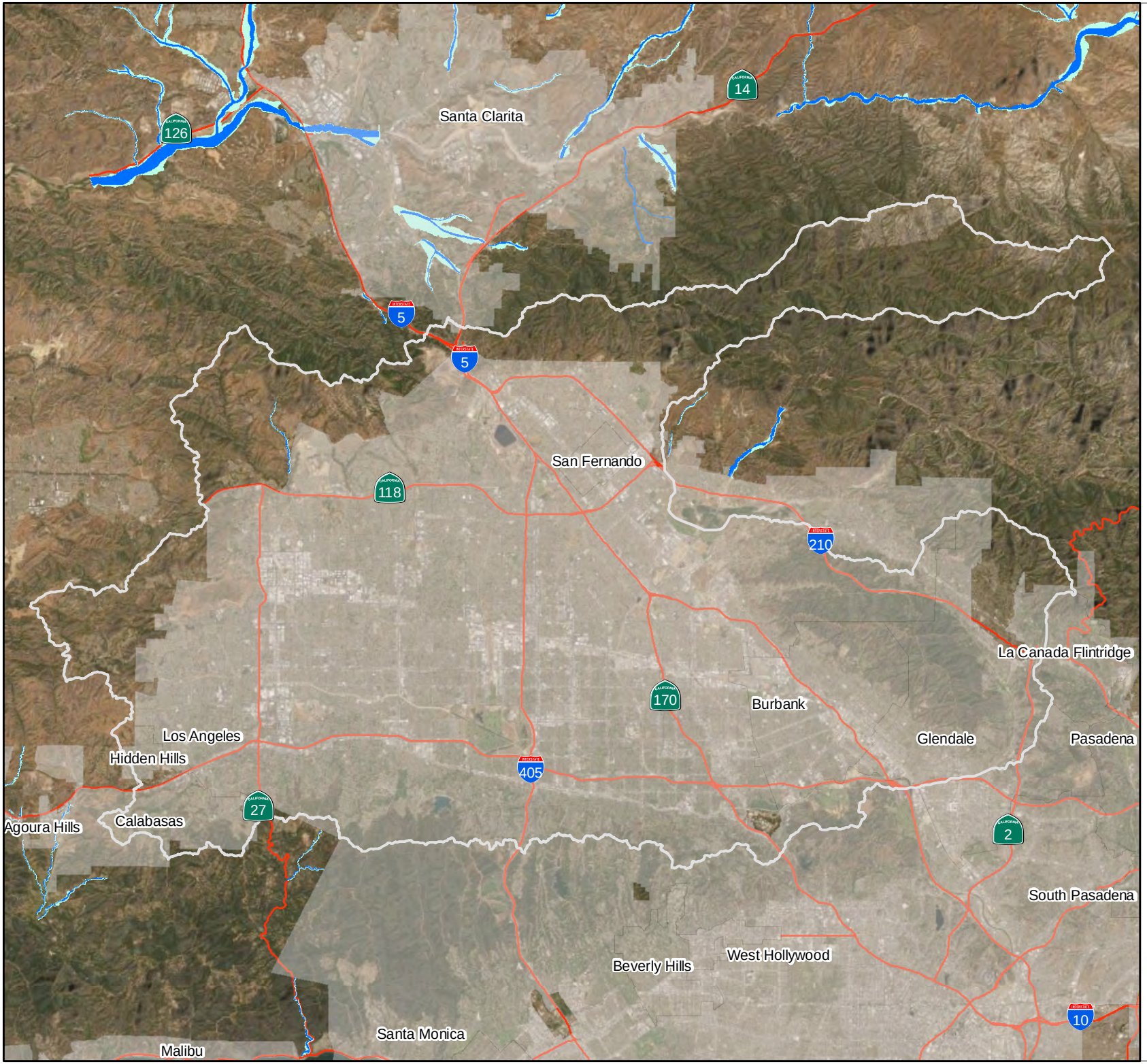
- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 7,500 15,000

Meters
0 2,000 4,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Los Angeles River Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 12,500 25,000

Meters
0 3,200 6,400

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps




# Upper Piru Creek Watershed

## County Regulated Floodways and Floodplains

- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

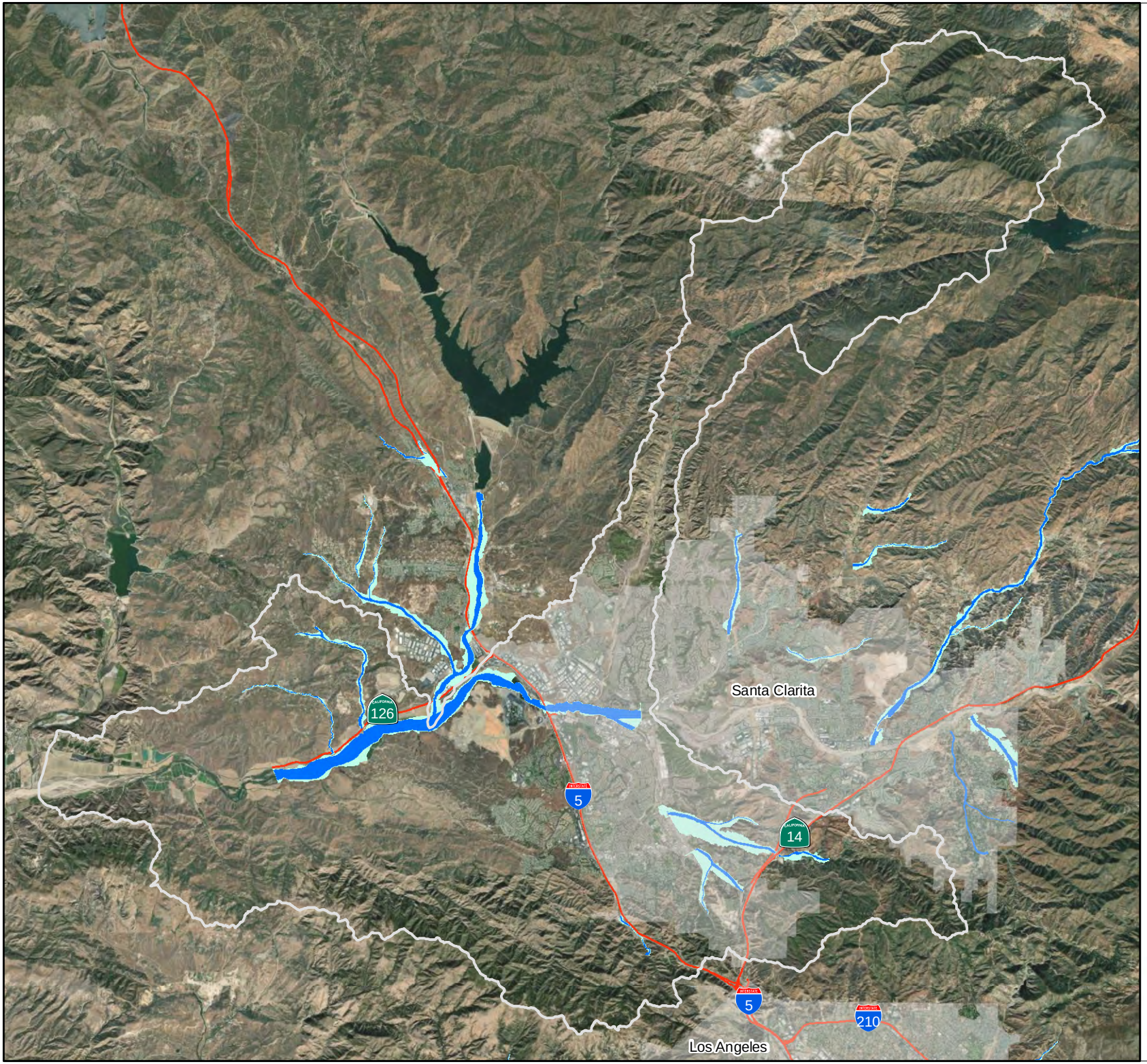
Feet
0 12,000 24,000

Meters
0 3,000 6,000

Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Upper Santa Clara River Watershed

## County Regulated Floodways and Floodplains




- Watershed Boundary
- Incorporated Cities
- County Regulated Floodway (Capital Storm)
- County Regulated Floodplain (Capital Storm)

N

Feet
0 10,000 20,000

Meters
0 2,500 5,000

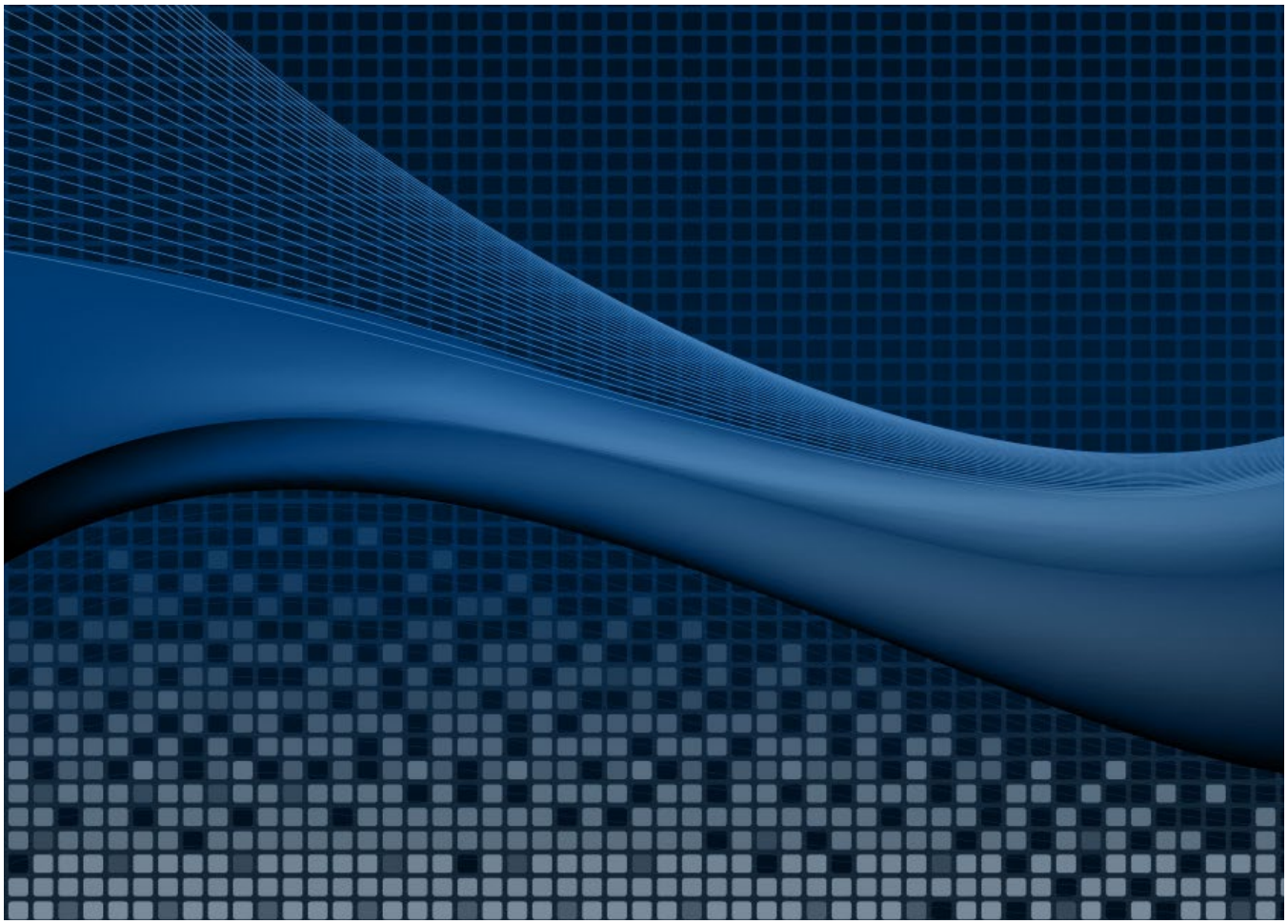
Map Projection: NAD83 State Plane California Zone 5
Vertical Datum: NAVD88
Map Created: 9/24/2020
Data Sources: County of Los Angeles, Bing Maps

# Appendix I. Repetitive Loss Area Analysis

**Los Angeles County**

**Comprehensive Floodplain Management Plan**

# Repetitive Loss Area Analysis



TETRA TECH

March 2021

# Los Angeles County Repetitive Loss Area Analysis

March 2021

## PREPARED FOR

**Los Angeles County Public Works**

Stormwater Engineering Division
900 S. Fremont Avenue
Alhambra, CA 91803

## PREPARED BY

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Tetra Tech Project #103is6345

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# PART 1—PLANNING PROCESS AND PROJECT BACKGROUND

# 1. INTRODUCTION

## 1.1 REPETITIVE LOSS PROPERTIES AND THE COMMUNITY RATING SYSTEM

A repetitive loss property is defined by the Federal Emergency Management Agency (FEMA) as a property for which two or more National Flood Insurance Program (NFIP) losses of at least $1,000 each have been paid within any 10-year rolling period since 1978 (FEMA 2017). From 1978 through 2017, about a quarter of all claims paid under the NFIP nationwide were for repetitive loss properties, even though such properties make up fewer than 2 percent of all NFIP insurance policies (FEMA 2017).

FEMA's Community Rating System (CRS) encourages communities to identify and mitigate the causes of repetitive losses. The first step is to map repetitive loss areas, which are contiguous areas that include one or more properties on FEMA's list of repetitive loss properties and all nearby properties with exposure to the same or similar flooding conditions. FEMA considers listed repetitive loss properties to be indicative of an overall repetitive loss problem that may affect other nearby properties. Designation of repetitive loss areas around listed repetitive loss properties allows an evaluation of actual or potential flooding problems at properties that may not have flood insurance or may have had only a single previous claim. This ensures that all properties with the same exposure to a flood risk are addressed equally. The CRS, which provides reduced flood insurance premiums for communities that carry out flood mitigation activities, requires the following from participating communities with 50 or more repetitive loss properties (Category C communities):

- Prepare a map of repetitive loss areas.
- Review and describe each area's repetitive loss problem.
- Prepare a list of the addresses of all properties in the repetitive loss areas with insurable buildings, which are defined to include the following (FEMA 2017):
    - A structure that is affixed to a permanent site and has two or more outside rigid walls and a fully secured roof
    - A manufactured home (also known as a mobile home) built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation
    - A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community's floodplain management and building ordinances or laws.
- Undertake an annual outreach project to those addresses.
- Prepare a floodplain management plan or area analysis for the repetitive loss areas.

## 1.2 LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS

Los Angeles County had 54 FEMA-designated repetitive loss properties in its unincorporated areas as of September 2018 (the dataset the County used for this analysis), including four that FEMA has approved as being mitigated (see Table 1-1). The 50 remaining unmitigated properties have been mapped into 24 repetitive loss areas, and an analysis has been conducted for each area.

**Table 1-1.** Naming and Numbering of Los Angeles County Repetitive Loss Properties and Areas

| Repetitive Loss Area Name | Repetitive Loss Properties in the Repetitive Loss Area | |
|---|---|---|
| | Los Angeles County 2015 RL Map Number | FEMA RL # |
| Agua Dulce | 37 | 0091339 |
| Altadena A | 35 | 0056933 |
| Altadena B | 36 | 0091348 |
| Calabasas A | 26 | 0072498 |
| Calabasas B | 41 | 0136718 |
| Cold Creek A | 27 | 0071255 |
| Cold Creek B | 45 | 0148768 |
| Del Sur | 55 | 0138781 |
| Lower Topanga Canyon | 19 | 0014900 |
| | 20 | 0017941 |
| | 21 | 0017942 |
| | 22 | 0028440 |
| | 23 | 0017940 |
| Malibou Lake | 46 | 0046576 |
| | 46 | 0001165 |
| | 46 | 0039962 |
| | 46 | 0028487 |
| | 46 | 0040087 |
| | 46 | 0012820 |
| | 46 | 0049496 |
| | 46 | 0028444 |
| | 46 | 0071413 |
| | 46 | 0073653 |
| | 46 | 0072406 |
| | 46 | 0071417 |
| | 46 | 0035727 |
| | 46 | 0052974 |
| | 46 | 0093872 |
| | 46 | 0057971 |
| | 46 | 0137792 |
| | 46 | 0047197 |
| | 46 | 0091232 |
| Malibu | 28 | 0070079 |
| Quartz Hill A | 38 | 0057385 |
| Quartz Hill B | 39 | 0091087 |
| Quartz Hill C | 40 | 0131222 |
| Roosevelt | 42 | 0137354 |
| Rowland Heights | 44 | 0138651 |
| Topanga Canyon A | 30 | 0028394 |
| Topanga Canyon B | 34 | 0012818 |
| Topanga Canyon C | 48 | 0111971 |
| Topanga Canyon D | 49 | 0137970 |
| Topanga Canyon E | 50 | 0138321 |
| Triunfo Canyon A | 24 | 0095737 |
| Triunfo Canyon B | 43 | 0137793 |

| Repetitive Loss Area Name | Repetitive Loss Properties in the Repetitive Loss Area | |
|---|---|---|
| | Los Angeles County 2015 RL Map Number | FEMA RL # |
| **Upper Topanga Canyon** | 29 | 0074656 |
| | 31 | 0074334 |
| | 32 | 0074553 |
| | 33 | 0076269 |
| | 47 | 0074498 |
| **Mitigated and Approved by FEMA** | 46 | 0014896 |
| | 46 | 0017933 |
| | 53 | 0028337 |
| | 54 | 0049465 |

FEMA prescribes the following five-step process for conducting an area analysis:

- Step 1—Advise all the property owners in the repetitive flood loss area that the analysis will be conducted and request their input on the flood hazard and recommended actions.
- Step 2—Contact agencies or organizations that may have plans that could affect the cause or impacts of the flooding.
- Step 3—Collect data on the analysis area and each building in it to determine the causes of the repetitive damage and mitigation measures that would be appropriate.
- Step 4—Review alternative mitigation approaches and determine whether any property protection measures or drainage improvements are feasible.
- Step 5—Document the findings in a report.

This Repetitive Loss Area Analysis (RLAA) documents the fulfillment of the CRS requirements for Category C communities, following the five-step area-analysis process. As required under Step 5, it provides the following information:

- A summary of the process followed (Chapters 2 and 3)
- Problem statements with maps for each area (Chapters 7 – 30)
- A table of basic information about each building in the area (Chapters 7 – 30)
- A description of alternative approaches considered to address the problem (Chapter 6)
- A set of recommended action items to address the problem (Chapters 7 – 30).

Individual properties and structures are counted and described in this document, but specific address information is withheld under the federal Privacy Act of 1974. A separate document on file with Los Angeles County for internal use only correlates the property ID numbers presented here with specific address information.

## 1.3 NUMBERING AND NOMENCLATURE

In designating federally recognized repetitive loss properties, FEMA assigns a seven-digit repetitive loss number (RL #) to each property, using a nationally defined numbering system. The previous Los Angeles County RLAA (from 2015) assigned new sequential numbering to each property, referred to in that document as RL Map numbers. Based on geographic distribution, repetitive loss areas were defined for the current RLAA that include one or more repetitive loss properties. Areas were designated with a place name indicating the general location of the area. Table 1-1 summarizes area naming used in this analysis, the FEMA numbering of repetitive loss properties in each area, and the corresponding map number from the 2015 RLAA.

# 2. REPETITIVE LOSS AREA ANALYSIS METHODOLOGY

## 2.1 BASIC REQUIREMENTS

There are two key sets of requirements to be met for a repetitive loss area analysis (RLAA):

- **Repetitive loss area mapping** requirements contained in Section 503 of the CRS Coordinator's Manual and in the supplemental publication, *Mapping Repetitive Loss Areas* (FEMA 2015).
- **Building data collection** requirements contained in Section 512.b of the CRS Coordinator's Manual (FEMA 2017):

  - Visit each building in the repetitive loss area and collect basic data.
  - Collect data during the site visit that is sufficient to make a preliminary determination of the cause of the repetitive flooding and of mitigation measures that would be appropriate to address the problem. This usually includes a review of drainage patterns around the building, the condition of the structure, and the condition and type of foundation.
  - The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street.
  - Floor elevations or historical flood levels are not required, but can be helpful if available.
  - The date of each building's insurance claim can help identify the cause of flooding (e.g., rainfall or overbank flooding). The amount of the claim can help determine the amount of damage. Every year, each repetitive loss community is provided with a list of its historical insurance claims. This includes single-claim properties. Non-repetitive-loss communities that elect to do an RLAA may request these data from the CRS program.

More information on building data can be found in *Selecting Appropriate Mitigation Measures for Floodprone Structures* (FEMA-551).

## 2.2 REVERSE DAMAGE FUNCTION METHODOLOGY (INITIAL IDENTIFICATION)

### 2.2.1 Rationale for Alternative Approach

For the Los Angeles County RLAA, building data collection requirements were met using an alternative to the approach outlined in the CRS Coordinator's Manual. The RLAA planning team selected the alternative approach—a "reverse damage function" methodology—for initial identification of repetitive loss areas for the following reasons:

- Los Angeles County used the September 2018 repetitive loss data that it received from the Insurance Services Office (ISO) for this RLAA.
- A Level 2, user-defined flood model using FEMA's Hazus hazard-evaluation software (version 4.2) was constructed in 2019 to support the development of the *2020 Los Angeles County Comprehensive*

*Floodplain Management Plan*. The model was possible due to the quality of Los Angeles County Assessor data available to the planning team. The County Assessor data provided key building attributes to model flood risk, such as date of construction, foundation type, occupancy class, square footage and permit history. The detailed model data allowed the use of the selected alternative approach.

## 2.2.2 Description of Selected Approach

The selected reverse damage function approach used available data and capabilities to prepare the RLAA. The alternative approach achieves the same objectives as the approach prescribed in the 2017 CRS Coordinator's Manual (Section 512b), while providing the County a better protocol for maintaining data in the future to identify properties in a defined repetitive loss area and determine the cause of repetitive flooding.

The reverse damage function approach is a quantitative process based on modeling principles rather than the qualitative process outlined in the 2017 CRS Coordinator's Manual. It uses an existing model to apply the principles of the "depth-damage function," which is the cornerstone of risk assessment in FEMA's Hazus and Benefit-Cost Analysis programs. Both of these programs estimate damage using curves that show the percentage of asset value that will be damaged as a function of the depth of floodwaters. These depth-damage curves are well-established as a basis for estimating losses caused by flooding.

The reverse damage function methodology uses known values of damage from a flood event, based on filed claims, to estimate what the floodwater depth was for that event. The following protocol was followed:

- Each repetitive loss property from the ISO 2018 data set was mapped in GIS to look for possible groupings based on proximity. The GIS mapping was based on the LiDAR-generated digital elevation model used to prepare the *2020 Los Angeles County Comprehensive Floodplain Management Plan*. This digital elevation model has a 3-foot resolution.
- The average loss for each repetitive-loss property was determined by taking the average of all claims for that property.
- Replacement cost for each structure was calculated by applying the size and construction class for each repetitive-loss property to the construction-cost-per-square-foot tables in *2015 BNi Home Builder's Costbook* (Building News International, 2015).
- The percent damage "X" was calculated as:

  $X = Z \div Y$
  where:
  X is the percent damage (to be determined)
  Y is the replacement cost of the structure (based on assessor information)
  Z is the estimated loss (based on the flood insurance claim)

- Once the percent damage was determined, the corresponding flood depth was determined by looking at the U.S. Army Corps of Engineers 2003 *Generic Depth-Damage Relationships for Residential Structures* (see Appendix A). These damage functions represent projected flood depths above the top of the finished floor.
- The determined flood depth was applied to the repetitive loss structure. Using the foundation type from the Assessor's data, the depth was added to the top of the finished floor. For a structure with a slab foundation, the top of the finished floor was set at 8 inches above adjacent grade. For a structure with a crawlspace foundation, the finished floor was set at 24 inches above adjacent grade. These parameters are based on standard building practices. None of the repetitive-loss properties were shown to have basements, according the Assessor's data.
- Once the depth was applied to the finished floor, it was extended across the digital elevation model until it ran to zero depth (high ground) and a boundary was delineated. These boundaries were projected north,

south, east and west for each property. In areas with multiple repetitive-loss properties, the property with the highest depth above finished floor was used for this exercise.
- The boundary for each repetitive loss area was intersected with an ortho-photo and parcel boundary map. Each parcel with a structure within the delineated boundary was determined to be a property potentially subjected to repetitive flooding and was added to a repetitive loss area list for Los Angeles County. These additional properties are not FEMA-recognized repetitive-loss properties.
- Property condition assessments included in existing Los Angeles County Assessor's data were used for this RLAA.

Utilizing this methodology, 24 repetitive loss areas were delineated. Maps and descriptions of the causes of flooding for each area can be found in Chapters 7 to 30.

The final step was to determine the cause of flooding, giving consideration to the following findings from the initial identification:

- Only the 50 unmitigated repetitive loss properties were included in the analysis.
- 26 of 50 properties (52 percent) are located in a FEMA-designated 1 percent annual chance (100-year) flood zone.
- 4 of 50 properties (8 percent) are located in a FEMA-designated 0.2 percent annual chance (500-year) flood zone.
- The average number of claims per property was 4.
- The average claim paid, adjusted to 2019 dollars (BLS, 2020), was $23,315. The highest average claim per property was $116,165 and the lowest was $2,169.
- The average replacement cost for the repetitive-loss properties was $329,907.
- The average percent-damage (the average recorded claim divided by the replacement cost) was 6.2 percent.
- This correlated to an average flood depth of less than 1 foot above adjacent grade.

The planning team concluded that the majority of the repetitive losses are associated with localized urban drainage flood problems, even for properties within a FEMA-designated flood zone. There is no record of costly loss events that would indicate the maximum flood risk reflected in FEMA mapping. These findings were validated by the conclusions of the *2020 Los Angeles County Comprehensive Floodplain Management Plan*.

## 2.3 SECONDARY IDENTIFICATION

Once the initial identification of the repetitive loss areas was completed using the reverse-damage-function methodology, the planning team performed a secondary review of each repetitive loss area based on three questions about each area:

- Is there really a repetitive loss problem in this area, based on local knowledge?
- Does the list of properties make sense based on what we know about the area?
- Does the County have any additional qualifying data on the area to justify adding or removing properties?

Adjustments were made after applying these questions to each repetitive loss area. Based on the analysis and Steering Committee feedback, there are 199 properties in repetitive loss areas, with 330 insurable structures. The list of properties became the final repetitive loss area mailing list for the unincorporated areas of Los Angeles County.

## 2.4 PROPERTY CONDITION ASSESSMENT

To assess the condition of the structures in the repetitive loss areas, the planning team relied on the Quality Class value in the Los Angeles County Assessor's data. That value identifies the condition of the building relative to the following characteristics:

- Construction Type
  - Class A: Fireproof construction – structural steel frame
  - Class B: Fireproof construction – reinforced concrete frame
  - Class C: Fire-resistant construction – masonry walls, combustible roof and interior
  - Class D: Non-fireproof construction – usually wood frame
  - Class S: Specialized buildings that do not fit in any of the above categories
- Quality Range (1.0 to 14.5 or "X")
  - The quality class concept is a function of all construction features, depending on quality of materials, construction methods, and workmanship. It considers specifications for foundation, structure, roof, floor, interior, exterior, heat, and bathrooms. 1.0 = lowest quality.
  - "X" Quality: Unique or unusual construction that does not lend itself to being classified using the standard classification system.
- Shape Class (A, B, C, D)
  - The shape class is based on the building's perimeter in relation to the total square footage.
  - A structure with a relatively large perimeter in relation to its square footage (many angles, turns, a 'cut-up' custom shape, etc.) typically costs more to construct than a simple square/rectangle structure.
  - Shape A represents a relatively-square/rectangle structure. It has a relatively small perimeter compared to its total square footage.
  - Shape D represents a structure with many angles, turns, etc. (a "cut-up" custom shape). It has a relatively-large perimeter compared to its total square footage.
  - A structure with a "DX" Construction Type and Quality Range will usually not have a Shape Class.

## 2.5 FOUNDATION TYPE

In Los Angeles County, there are generally three types of foundations (see Figure 2-1):

- A basement foundation has its floor below grade on all sides. Walls may be poured concrete or blocks.
- A slab foundation is usually concrete poured directly onto the ground. This type of foundation uses concrete rather than wood to help support the weight of the home.
- A crawlspace, or raised foundation, is built above the ground, with just enough room to crawl underneath. There are stem walls on the perimeters, pierced in-between, with a girder system and floor joists on top of that. The foundation is high enough to leave at least 2 feet below to crawl into for access to the home's mechanical systems.

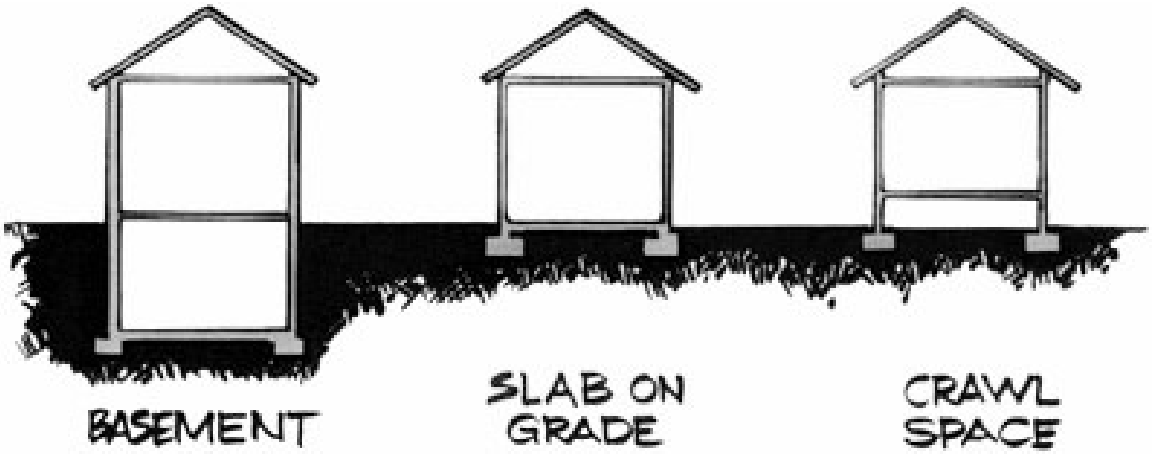



**Figure 2-1.** Foundation Types

# 3. REPETITIVE LOSS AREAS OUTREACH

## 3.1 CRS OUTREACH REQUIREMENTS FOR RLAA

RLAA Step 1 (2017 CRS Coordinator's Manual Section 512.b) requires notification that an analysis is being conducted to all properties in the repetitive loss areas, with a request for input on the hazard and recommended actions. The notice (or any public document) must not identify which properties are on FEMA's repetitive loss list. There are no restrictions on publicizing what properties are in repetitive loss areas that have more than one property and there are no restrictions on publishing aggregate data, such as how many properties received claims or the average value of those claims. Floodplain management staff in the Stormwater Engineering Division may share insurance claim information with the owner of a property but may not make it available to anyone else.

- The notice can be sent to owners OR residents, at the community's discretion, as long as a representative of each property is notified.
- The notice cannot be done via a newspaper or newsletter notice or article.
- The notice must advise the recipients when and how copies of the draft report can be obtained and ask for their comments on the draft.

Several methods were deployed to engage repetitive loss area property owners during the course of this RLAA process. This chapter highlights those efforts.

RLAA Step 2 requires contact with agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding. The analysis report must identify contacted agencies and organizations.

## 3.2 COUNTYWIDE FLOODPLAIN MANAGEMENT PLANNING EFFORT

This Repetitive Loss Area Analysis is considered by Los Angeles County Public Works to be the companion document to the *2020 Los Angeles County Comprehensive Floodplain Management Plan* (FMP). The two plans were created in concert, with oversight by the same planning team. The development of this RLAA benefited from the planning process conducted to develop the FMP. The outreach effort used to develop the FMP included properties in the repetitive loss areas and provided a tangible benefit to the RLAA effort. This section provides an overview of the outreach conducted for the FMP.

### 3.2.1 Contact with Agencies and Organizations

The following agencies were invited to participate in the planning process from the beginning and were kept apprised of plan development milestones:

**Steering Committee**

- Altadena Town Council
- Antelope Valley Resident
- Cal State Los Angeles Geosciences & Environment
- California Department of Water Resources
- City of Los Angeles Bureau of Engineering
- County of Los Angeles Fire Department
- Environmental Restoration Group
- Los Angeles Chamber of Commerce
- Los Angeles County Department of Regional Planning
- Malibou Lake Mountain Club
- Public Works Building & Safety
- Public Works Community Government Relations Group
- Public Works Disaster Services Group
- Public Works Stormwater Engineering - CRS Coordinator
- Public Works Stormwater Engineering – Hydrology & Hydraulics
- Public Works Stormwater Maintenance
- Public Works Stormwater Planning
- Red Cross of Greater Los Angeles

**Other Stakeholders**

- Acton Town Council
- Ana Verde Hills Town Council
- Antelope Acres Town Council
- Association of Rural Town Councils
- California Office of Emergency Services
- Castaic Town Council
- City of Agoura Hills
- City of Arcadia
- City of Bradbury
- City of Calabasas
- City of Claremont
- City of Compton
- City of Glendale
- City of Glendora
- City of Hidden Hills
- City of La Canada Flintridge
- City of La Verne
- City of Lancaster
- City of Long Beach
- City of Malibu
- City of Monrovia
- City of Palmdale
- City of Pasadena
- City of San Dimas
- City of Santa Clarita
- City of Sierra Madre
- City of Westlake Village
- County of Los Angeles Chief Executive Office, Office of Emergency Management
- Crescenta Valley Town Council
- Fairmont Town Council
- FEMA Region IX
- Green Valley Town Council
- Insurance Services Office (ISO)-ISO/CRS Specialist
- Juniper Hills Town Council
- Kern County
- Lake Los Angeles Town Council
- Lakes Town Council
- Leona Valley Town Council
- Littlerock Town Council
- Los Angeles County Community Emergency Response Team
- Orange County Public Works
- Oso Town Council
- Quartz Hill Town Council
- Roosevelt Town Council
- San Bernardino County Flood Control District
- San Gabriel Council of Governments
- Southern California Association of Governments
- Sun Village Town Council
- Three Points-Liebre Mountain Town Council
- U.S. Army Corps of Engineers, Los Angeles District
- Ventura County Watershed Protection District

These agencies received meeting announcements, meeting agendas, and meeting minutes by email throughout the FMP development process, which also informed the RLAA development. All public meetings, such as the Steering Committee meetings and Open Houses, provided accommodations compliant with the Americans with Disabilities Act and Title IV.

## 3.2.2 Strategy

The strategy for involving the public in developing the RLAA emphasized the following elements:

- Include members of the public on the FMP Steering Committee (see Section 3.2.1).
- Attempt to reach as many citizens as possible using multiple media.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders
- Develop a Program for Public Information.
- Conduct public meetings to invite the public's input.

### Website

At the beginning of the development of the current plan, an FMP page was developed on Los Angeles County Public Work's website to keep the public informed about planning activities and to solicit input (see Figure 3-1). The site's address (https://www.dpw.lacounty.gov/WMD/NFIP/FMP2020/) was publicized in all social media releases, mailings and public meetings. The site provided the public with information on the plan development process, the Steering Committee, a project survey, and drafts of the plan. Los Angeles County Public Works will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates. The website was advertised to the public via social media (see Figure 3-2 and Figure 3-3)

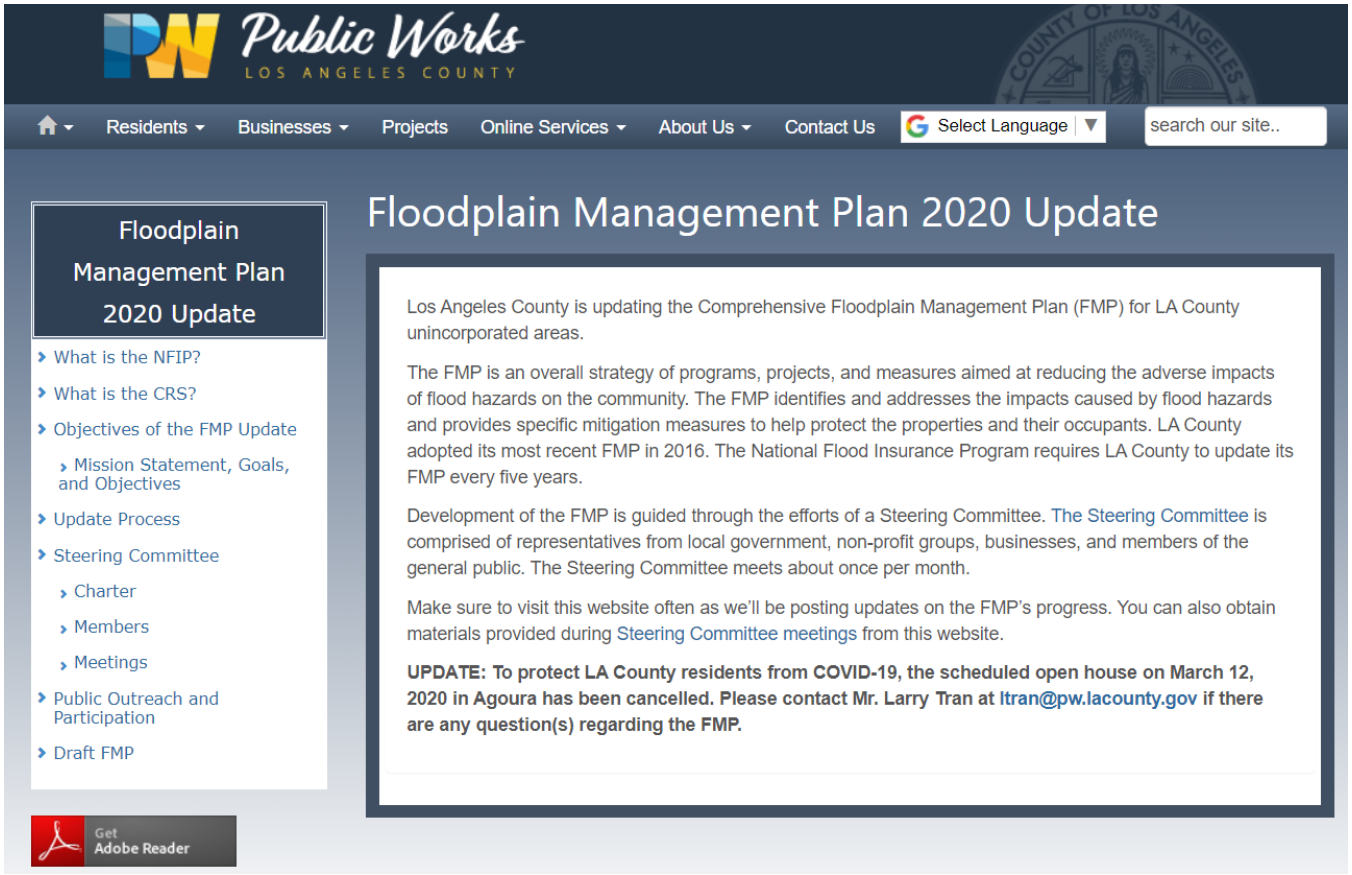



**Figure 3-1.** Sample Page from Floodplain Management Plan Web Site




**Figure 3-2.** Twitter Post




**Figure 3-3.** Facebook Post

## Survey

A survey (see Figure 3-4) was developed by the planning team with guidance from the Steering Committee. The survey was used to gauge household preparedness for the flood hazard and the level of knowledge of tools and techniques that assist in reducing risk and loss from flooding. This survey was designed to help identify areas vulnerable to floods. The answers to its questions helped guide the Steering Committee in affirming the goals and objectives identified during the planning process and in selecting mitigation actions.

Multiple methods were used to solicit survey responses:

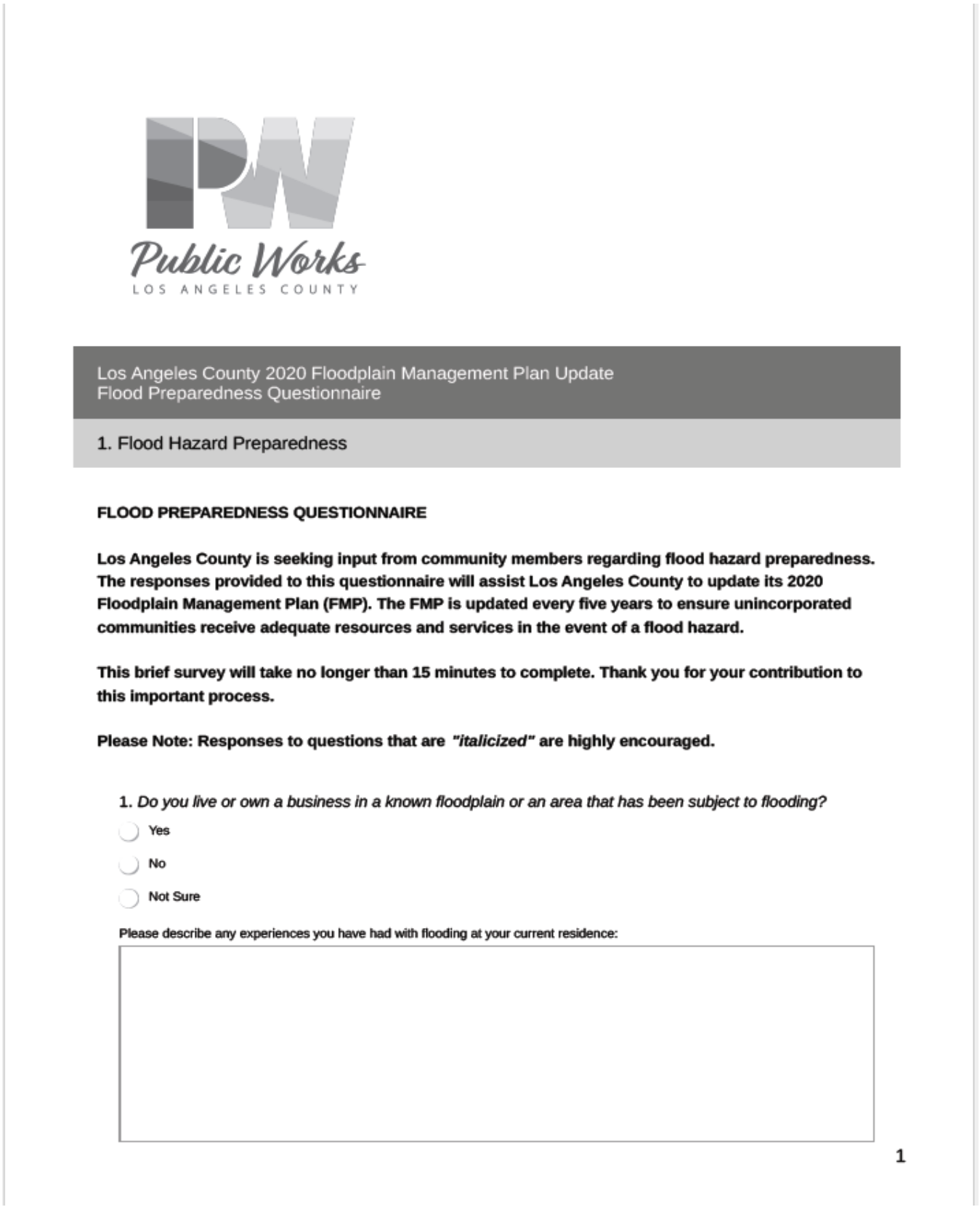
- A web-based version of the survey was made available on the plan website.
- Mailings to residents and property owners notifying them of public meetings included links to the online survey (see Figure 3-5).
- All attendees at public meetings were asked to complete a survey, using the web site or hard copies of the survey form available at the meetings.
- A flyer was prepared advertising the survey.
- E-mail was sent from Public Works to several town councils.
- Individual Steering Committee members contacted organizations to request that they publicize the link to the online survey.

## Open House Public Meetings

Meaningful public participation was essential for the planning process. Public meetings were held to disseminate information and to solicit input from community members, as summarized in Table 3-1.

**Table 3-1.** Floodplain Management Plan Open House Public Meetings

| When | Where |
|---|---|
| **October 7, 2019, 5:30 to 8:00 p.m.** | Agoura: Malibou Lake Mountain Club<br>29033 Lake Vista Drive, Agoura, CA 91301 |
| **March 11, 2020, 6:00 PM to 8:00 p.m.** | Antelope Valley: Lancaster Library<br>601 West Lancaster Boulevard, Lancaster, CA 93534 |



Public Works
LOS ANGELES COUNTY

Los Angeles County 2020 Floodplain Management Plan Update
Flood Preparedness Questionnaire

1. Flood Hazard Preparedness

**FLOOD PREPAREDNESS QUESTIONNAIRE**

**Los Angeles County is seeking input from community members regarding flood hazard preparedness. The responses provided to this questionnaire will assist Los Angeles County to update its 2020 Floodplain Management Plan (FMP). The FMP is updated every five years to ensure unincorporated communities receive adequate resources and services in the event of a flood hazard.**

**This brief survey will take no longer than 15 minutes to complete. Thank you for your contribution to this important process.**

**Please Note: Responses to questions that are *"italicized"* are highly encouraged.**

1. *Do you live or own a business in a known floodplain or an area that has been subject to flooding?*

- Yes
- No
- Not Sure

Please describe any experiences you have had with flooding at your current residence:

1

**Figure 3-4.** Sample Page from Survey Distributed to the Public




**Figure 3-5.** Post Card Mailing Advertising the Survey

Another open house was scheduled for March 12, 2020, but it was cancelled due to the COVID-19 pandemic. Instead, Los Angeles County had a narrated presentation posted on the FMP website. The presentation encouraged viewers to provide input to Public Works.

### *Open House Meeting Notification*

Multiple means were used to provide broad public notice of the open house public meetings:

- Notice of all public meetings was posted on the floodplain management plan website.
- Flyers were developed and distributed throughout the communities (see Figure 3-6).
- Social media (Facebook, Twitter, Nextdoor) posts were also made.

Postcards were mailed to properties located in floodplains near the meeting locations (see Figure 3-7). Over the course of the planning process, 2,472 postcards were distributed.

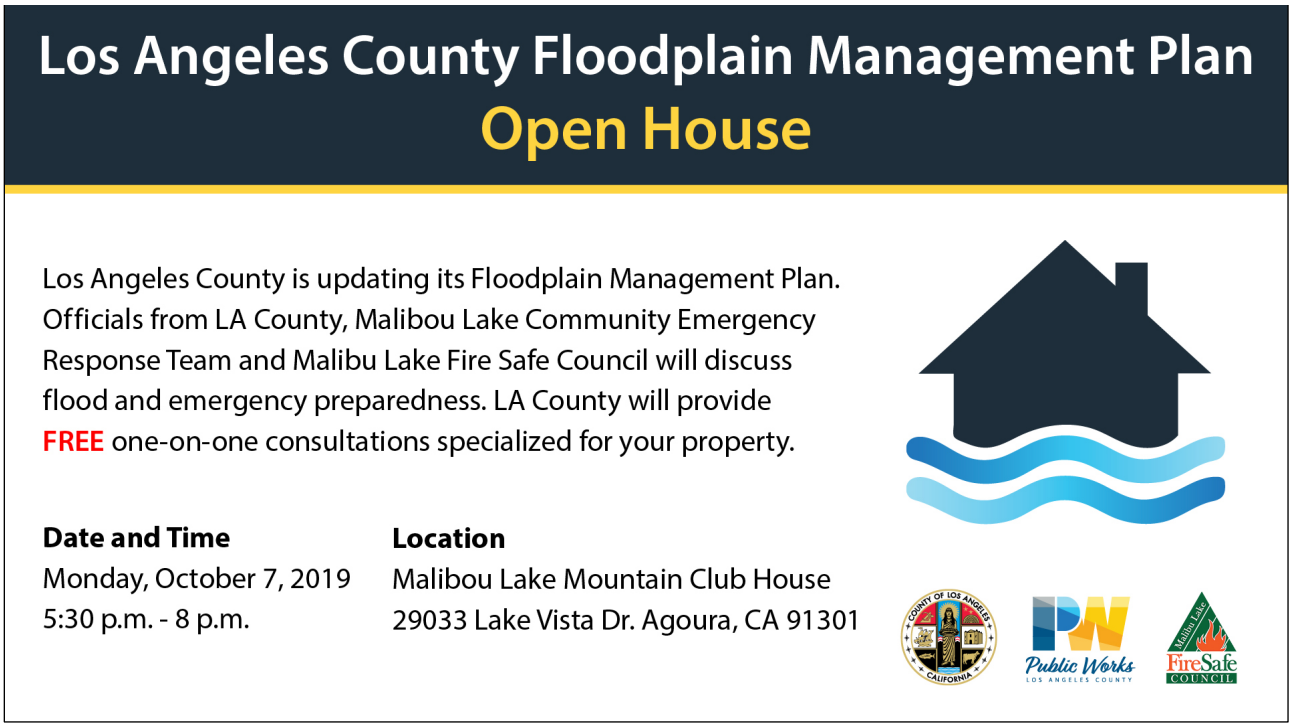



**Figure 3-6.** Flyer Announcing Phase 1 Open Hose for the Floodplain Management Plan




**Figure 3-7.** Postcard Announcing Phase 2 Open House for the Floodplain Management Plan

### *Open House Meeting Format*

The public meeting (open house) format allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with attendees via a PowerPoint presentation. Computer mapping workstations loaded with output from the Hazus modeling allowed attendees to see information on their property, including exposure and damage estimates for flood hazard events (see Figure 3-8). Participating property owners were provided printouts of this information for their properties. This tool was effective in illustrating flood risk to the public. Planning team members were present to answer questions. All open house attendees were asked to complete a survey, and each was given an opportunity to provide written comments to the Steering Committee. Example meeting activities are shown in Figure 3-9 and Figure 3-10.

## 3.2.3 Public Involvement Results

### Survey Results

The City of Los Angeles was facilitating an update to its Comprehensive Flood Hazard Management Plan concurrent with the County's floodplain management plan update, and the City and County were active stakeholder participants in each other's efforts. Both planning efforts used surveys, and the two surveys were similar in the questions asked.

The number of survey responses for both planning efforts was considered to be insufficient for analysis: the County received 76 responses and the City received 174. The City and County decided to combine their survey results to provide an enhanced view of the public's perception of the flood risk. This was a reasonable choice, given the similarities in flooding issues in the two jurisdictions. Residents of the County work and recreate in the City as residents of the City work and recreate in the County. Key results are as follows:

- Nearly half of respondents said their home or business is not located in a floodplain or area subject to flooding; 24 percent said it is; 27 percent said they are not sure.
- Nearly two-thirds of respondents said they do not have flood insurance; just over 20 percent said they do; 9 percent said they are not sure.
- The main reasons given by those without flood insurance for not having it are that they do not need it because their property has never flooded (28 percent), that they do not need it because their property is on high ground (25 percent) or that they did not know about it (17 percent).
- Two-thirds of respondents said that the presence of a flood hazard at their current home was not disclosed to them by a real estate agent, seller, or landlord. More than half said such disclosure would have influenced their decision to buy or rent a home.
- The following flood hazards were identified as greatest issues of concern based on a scale of 1 (not concerned) to 5 (extremely concerned):
    - Stormwater flooding/urban flooding/drainage issues (weighted score of 2.86)
    - Climate change impacts (weighted score of 2.81)
    - Post-fire mud/debris flow (weighted score of 2.62)
    - Infrastructure failure (pipes, tanks) (weighted score of 2.49)
    - Mud-flow hazards (weighted score of 2.49)
    - Coastal Flooding (weighted score of 2.14)
    - Groundwater flooding (weighted score of 2.14)
- Slightly more than half of respondents said they are at least adequately prepared for a flood event; 29 percent indicated feeling not at all prepared.

# Hazard Report

**APN** [redacted]

**Address** [redacted]

**Zip Code** 90221

**100-yr Flood Percent Building Damage**

**100-yr Flood Building Loss**

**100-yr Flood Percent Contents Damage**

**100-yr Flood Contents Loss**

**100-yr Flood Depth (ft)**

**500-yr Flood Percent Building Damage** 7.29

**500-yr Flood Building Loss** $299,343.04

**500-yr Flood Percent Contents Damage** 24.40

**500-yr Flood Contents Loss** $1,001,801.53

**500-yr Flood Depth (ft)** 2.76

**10-yr Flood Percent Building Damage**

**10-yr Flood Building Loss**

**10-yr Flood Percent Contents Damage**

**10-yr Flood Contents Loss**

**10-yr Flood Depth (ft)**

**50-yr Flood Percent Building Damage**

**50-yr Flood Building Loss**

**50-yr Flood Percent Contents Damage**

**50-yr Flood Contents Loss**

**50-yr Flood Depth (ft)**

**County Floodway Percent Building Damage**

**County Floodway Building Loss**

**County Floodway Percent Contents Damage**

**County Floodway Contents Loss**

**County Floodway Flood Depth (ft)**

**Tsunami Inundation Area** N

For Informational Purposes Only

**Figure 3-8.** Example Printout from Hazus Workstation



**Figure 3-9.** Hazus Workstation, Malibou Lake Mountain Club Meeting, October 7, 2019



**Figure 3-10.** Attendees Look at Flood Hazard Maps During the Malibou Lake Public Meeting

- About 45 percent of residents neither agree nor disagree that flood hazard and risk information is easy to find; remaining respondents are evenly split between those who somewhat or strongly agree and those who somewhat or strongly disagree.
- Respondents rated the following as the most effective means for providing general flood hazard and disaster information:

  - Internet (62 percent
  - TV news (48 percent)
  - Public awareness campaign, e.g., flood awareness week (37 percent)
  - Social media, such as Twitter or Facebook (34 percent).
  - Radio news (30 percent)
  - Newspapers (26 percent)
  - Public meetings (20 percent)

- Respondents' top preferred methods for receiving emergency notifications are as follows:

  - Text message (73 percent)
  - Cell phones (49 percent)
  - Email (39 percent)

The following results were from questions that were asked only on the County's survey:

- 74 percent of respondents agree or strongly agree that local, state and federal government should provide programs promoting resident action to reduce exposure to flood risks.
- Respondents ranked government-sponsored flood damage reduction projects in the following order of preference:

  - Retrofitting infrastructure (improving culverts, bridges, and local drainage)
  - Capital projects (dams, levees, flood walls, and drainage improvements)
  - Providing better flood risk information to the public
  - Assisting vulnerable property owners with securing mitigation funding
  - Mitigating future flood impacts caused by climate change
  - Strengthening codes and regulations to higher regulatory standards
  - Acquiring vulnerable properties and maintaining them as open space

- 86 percent of respondents support the preservation of natural land containing a flood hazard, although 29 percent of them support it only for properties other than their own.

### Open House Public Meeting Attendance

Table 3-2 summarizes participation in the public meetings that were held during the outreach effort.

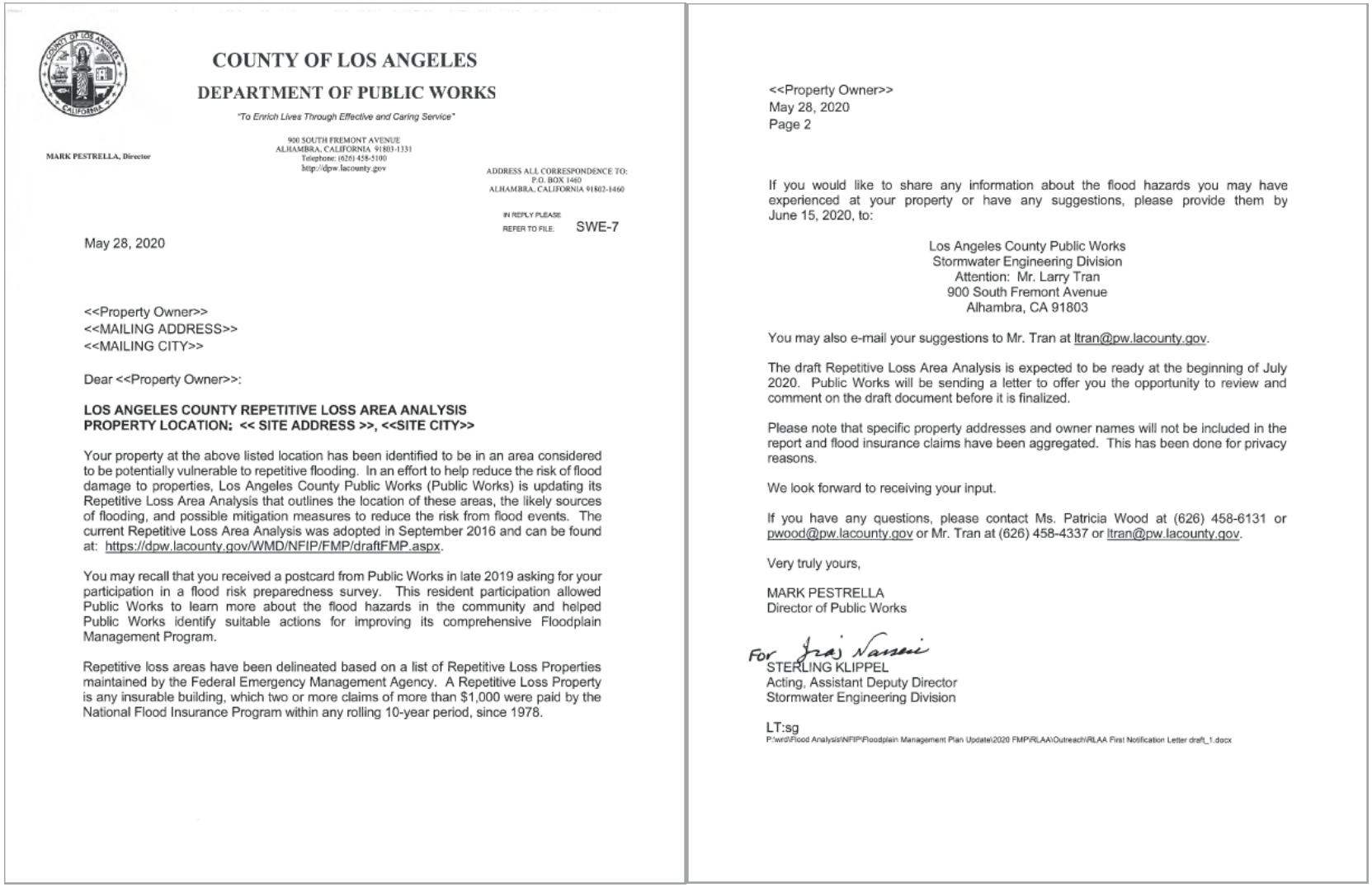
**Table 3-2.** Summary of Public Meetings

| Date | Location | Number of Attendees | Number of Surveys or Comments Received |
|---|---|---|---|
| **October 7, 2019** | Malibou Lake Mountain Club | 32 | 5 |
| **March 11, 2020** | Lancaster Library | 3 | 3 |
| **Total** | | **35** | **8** |

## 3.3 REPETITIVE LOSS AREA SPECIFIC OUTREACH

During the development of the draft of this report, the Los Angeles County Public Works sent a letter to residents in each repetitive loss area informing them that their properties are in identified repetitive loss areas, requesting that they provide information about how flooding affects their properties, and informing them that the RLAA was being conducted and that they would be informed when the draft is ready for review. A copy of the template for this letter is shown in Figure 3-11.

Upon the completion of a draft of this report, Los Angeles County Public Works disseminated the letter to residents in each repetitive loss area informing them of this report, where and how they would be able to review it, and where and how they might submit comments regarding it. The communication document is shown in Figure 3-12.



COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
*"To Enrich Lives Through Effective and Caring Service"*

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: SWE-7

May 28, 2020

<<Property Owner>>
<<MAILING ADDRESS>>
<<MAILING CITY>>

Dear <<Property Owner>>:

**LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS**
**PROPERTY LOCATION: << SITE ADDRESS >>, <<SITE CITY>>**

Your property at the above listed location has been identified to be in an area considered to be potentially vulnerable to repetitive flooding. In an effort to help reduce the risk of flood damage to properties, Los Angeles County Public Works (Public Works) is updating its Repetitive Loss Area Analysis that outlines the location of these areas, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events. The current Repetitive Loss Area Analysis was adopted in September 2016 and can be found at: https://dpw.lacounty.gov/WMD/NFIP/FMP/draftFMP.aspx.

You may recall that you received a postcard from Public Works in late 2019 asking for your participation in a flood risk preparedness survey. This resident participation allowed Public Works to learn more about the flood hazards in the community and helped Public Works identify suitable actions for improving its comprehensive Floodplain Management Program.

Repetitive loss areas have been delineated based on a list of Repetitive Loss Properties maintained by the Federal Emergency Management Agency. A Repetitive Loss Property is any insurable building, which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period, since 1978.

<<Property Owner>>
May 28, 2020
Page 2

If you would like to share any information about the flood hazards you may have experienced at your property or have any suggestions, please provide them by June 15, 2020, to:

Los Angeles County Public Works
Stormwater Engineering Division
Attention: Mr. Larry Tran
900 South Fremont Avenue
Alhambra, CA 91803

You may also e-mail your suggestions to Mr. Tran at ltran@pw.lacounty.gov.

The draft Repetitive Loss Area Analysis is expected to be ready at the beginning of July 2020. Public Works will be sending a letter to offer you the opportunity to review and comment on the draft document before it is finalized.

Please note that specific property addresses and owner names will not be included in the report and flood insurance claims have been aggregated. This has been done for privacy reasons.

We look forward to receiving your input.

If you have any questions, please contact Ms. Patricia Wood at (626) 458-6131 or pwood@pw.lacounty.gov or Mr. Tran at (626) 458-4337 or ltran@pw.lacounty.gov.

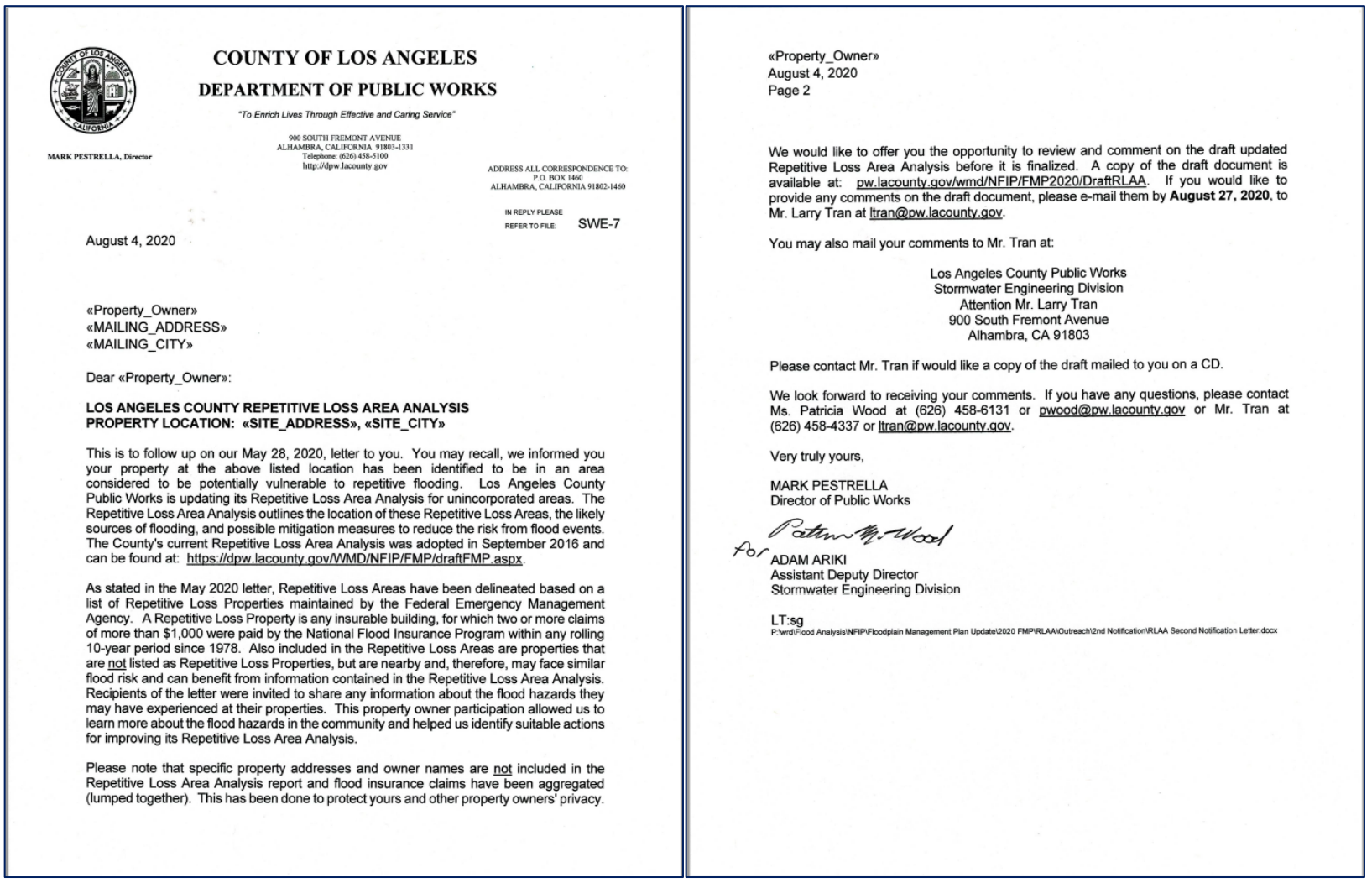
Very truly yours,

MARK PESTRELLA
Director of Public Works

For Jraj Nassri
STERLING KLIPPEL
Acting, Assistant Deputy Director
Stormwater Engineering Division

LT:sg
P:\wrd\Flood Analysis\NFIP\Floodplain Management Plan Update\2020 FMP\RLAA\Outreach\RLAA First Notification Letter draft_1.docx

**Figure 3-11.** Repetitive Loss Area Target Mailing #1



**COUNTY OF LOS ANGELES**
**DEPARTMENT OF PUBLIC WORKS**

*"To Enrich Lives Through Effective and Caring Service"*

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: SWE-7

August 4, 2020

«Property_Owner»
«MAILING_ADDRESS»
«MAILING_CITY»

Dear «Property_Owner»:

**LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS**
**PROPERTY LOCATION: «SITE_ADDRESS», «SITE_CITY»**

This is to follow up on our May 28, 2020, letter to you. You may recall, we informed you your property at the above listed location has been identified to be in an area considered to be potentially vulnerable to repetitive flooding. Los Angeles County Public Works is updating its Repetitive Loss Area Analysis for unincorporated areas. The Repetitive Loss Area Analysis outlines the location of these Repetitive Loss Areas, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events. The County's current Repetitive Loss Area Analysis was adopted in September 2016 and can be found at: https://dpw.lacounty.gov/WMD/NFIP/FMP/draftFMP.aspx.

As stated in the May 2020 letter, Repetitive Loss Areas have been delineated based on a list of Repetitive Loss Properties maintained by the Federal Emergency Management Agency. A Repetitive Loss Property is any insurable building, for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period since 1978. Also included in the Repetitive Loss Areas are properties that are not listed as Repetitive Loss Properties, but are nearby and, therefore, may face similar flood risk and can benefit from information contained in the Repetitive Loss Area Analysis. Recipients of the letter were invited to share any information about the flood hazards they may have experienced at their properties. This property owner participation allowed us to learn more about the flood hazards in the community and helped us identify suitable actions for improving its Repetitive Loss Area Analysis.

Please note that specific property addresses and owner names are not included in the Repetitive Loss Area Analysis report and flood insurance claims have been aggregated (lumped together). This has been done to protect yours and other property owners' privacy.

«Property_Owner»
August 4, 2020
Page 2

We would like to offer you the opportunity to review and comment on the draft updated Repetitive Loss Area Analysis before it is finalized. A copy of the draft document is available at: pw.lacounty.gov/wmd/NFIP/FMP2020/DraftRLAA. If you would like to provide any comments on the draft document, please e-mail them by **August 27, 2020**, to Mr. Larry Tran at ltran@pw.lacounty.gov.

You may also mail your comments to Mr. Tran at:

Los Angeles County Public Works
Stormwater Engineering Division
Attention Mr. Larry Tran
900 South Fremont Avenue
Alhambra, CA 91803

Please contact Mr. Tran if would like a copy of the draft mailed to you on a CD.

We look forward to receiving your comments. If you have any questions, please contact Ms. Patricia Wood at (626) 458-6131 or pwood@pw.lacounty.gov or Mr. Tran at (626) 458-4337 or ltran@pw.lacounty.gov.

Very truly yours,

MARK PESTRELLA
Director of Public Works

for ADAM ARIKI
Assistant Deputy Director
Stormwater Engineering Division

LT:sg
P:\wrd\Flood Analysis\NFIP\Floodplain Management Plan Update\2020 FMP\RLAA\Outreach\2nd Notification\RLAA Second Notification Letter.docx

**Figure 3-12.** Repetitive Loss Area Target Mailing #2

# 4. RELEVANT PROGRAMS AND REGULATIONS

This chapter provides a comprehensive review of existing laws, ordinances and plans at the federal, state and local level that can support or impact action items identified in this RLAA. Federal, state, and local agencies share and coordinate responsibilities for flood protection in Los Angeles County. The two main federal agencies are the U.S. Army Corps of Engineers, which implements federal flood protection policies, and FEMA. The California Department of Water Resources (DWR) is responsible for managing the state's waterways. Los Angeles Public Works and the Los Angeles County Flood Control District work to reduce flood risk in Los Angeles County. Development of the RLAA included a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process. Pertinent federal, state and local laws are described below.

## 4.1 FEDERAL AND STATE

Federal and state regulations and programs that need to be considered in floodplain management are constantly evolving. For this plan, a review was performed to determine which regulations and programs are currently most relevant to local comprehensive floodplain management. The findings are summarized in Table 4-1 and Table 4-2. Short descriptions of each program are provided in Appendix B.

## 4.2 LOCAL

### 4.2.1 General Plan

The Los Angeles County 2035 General Plan, adopted in October 2015, is the latest update to the County of Los Angeles general plan. It provides a policy framework for how and where the unincorporated County will grow through 2035. It accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the broader region. The General Plan includes the following elements (Los Angeles County Department of Regional Planning, 2015b):

- Land Use Element
- Mobility Element
- Air Quality Element
- Conservation and Natural Resources Element
- Parks and Recreation Element
- Noise Element
- Safety Element
- Public Services and Facilities Element
- Economic Development Element
- Housing Element.

General Plan elements that are particularly applicable to implementation of the floodplain management plan are the Conservation and Natural Resources Element, which guides the long-term conservation of natural resources and preservation of available open space areas, and the Safety Element, which reduces the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards. By inclusion of these elements, the Los Angeles County General Plan is in compliance with the First Validating Act of 2019.

**Table 4-1.** Summary of Relevant Federal Agencies, Programs and Regulations

| Agency, Program or Regulation | Local Relevance and Response |
|---|---|
| **National Flood Insurance Program** | The NFIP provides property owners insurance against potential losses from flooding. Los Angeles County participates in the NFIP on behalf of the unincorporated areas and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1980, and the first Los Angeles County FIRMs were issued December 2, 1980. The index date for the currently effective FIRMs is December 21, 2018. Los Angeles County is in good standing with the NFIP as monitored by FEMA Region IX and the California Department of Water Resources. Table 4-7 (at the end of this chapter) summarizes local NFIP capabilities. |
| **Community Rating System** | Los Angeles County has participated in the CRS program since 1990. The County has a Class 7 rating (out of 10), so residents who live in a 1 percent annual chance (100-year) floodplain in unincorporated areas of the County can receive up to a 15 percent discount on flood insurance; outside the 1 percent annual chance floodplain they receive a 5 percent discount. This equates to a savings of $78 to $254 per policy, for a total countywide premium savings of $214,926 (Insurance Services Office, 2019). To maintain or improve its rating, the County goes through recertification and re-verification every five years. This plan is developed to help the County maintain or enhance its CRS classification. |
| **Disaster Mitigation Act of 2000** | Los Angeles County, in conjunction with emergency services partners, has prepared a local All-Hazards Mitigation Plan that sets strategies for coping with the natural and man-made hazards. The scope of this plan is for the unincorporated County areas only. The plan correlates information from County departments with known and projected hazards that face Southern California. It was formally adopted by the Los Angeles County Board of Supervisors for use in the development of specific cost-effective hazard mitigation proposals. The plan complies with requirements of FEMA and the Governor's Office of Emergency Services and was approved by both agencies in 2014. It has a 5-year performance period through 2019. The County is currently updating this All-Hazard Mitigation Plan; it is anticipated to be approved in 2020. |
| **2012 Biggert-Waters Flood Insurance Reform Act; 2014 Homeowner Flood Insurance Affordability Act** | The Biggert-Waters Flood Insurance Reform Act of 2012 required flood insurance premiums to reflect real flood risk, leading to increased premiums for homeowners. The Homeowner Flood Insurance Affordability Act for 2014 delayed the increases in premiums. |
| **Endangered Species Act** | In some parts of the United States, court rulings have found that floodplain management measures can conflict with goals of the Endangered Species Act. Those rulings have required FEMA and local governments to consult with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects. No such rulings currently affect the Los Angeles area, but floodplain managers should be aware of any potential activities that could fall under the ESA. |
| **Clean Water Act** | The Clean Water Act provides regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff in order to support propagation of wildlife and recreation in and on the water. |
| **National Incident Management System** | Los Angeles County adopted the *County of Los Angeles Operational Area Emergency Response Plan* in March 2012. The Governor's Office of Emergency Services approved it on August 31, 2011, as fully compliant with the National Incident Management System (NIMS). |
| **Americans with Disabilities Act** | The Americans with Disabilities Act intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may implement a special-needs registry to identify the home addresses, contact information, and needs of residents who require more assistance for emergency management purposes. |
| **Public Law 84-99, Flood Control and Coastal Emergencies (33 U.S.C. 701n) (69 Stat. 186)** | This law gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods. It authorizes the Corps' Chief of Engineers to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water in the event of drought or contaminated source. |

**Table 4-2.** Summary of Relevant State Agencies, Programs and Regulations

| Agency, Program or Regulation | Local Relevance and Response |
|---|---|
| **California General Planning Law** | The *Los Angeles County 2035 General Plan* provides a policy framework for how and where the unincorporated County will grow through 2035, while recognizing the County's diversity of cultures, abundant natural resources, and status as an international economic center. The *Los Angeles County 2035 General Plan* accommodates new housing and jobs in unincorporated areas in anticipation of population growth in the County and the region. |
| **California Environmental Quality Act** | This RLAA does not require CEQA environmental review. It constitutes a feasibility and planning study for possible future actions, which the County has not approved, adopted or funded, and therefore is exempt from CEQA under Section 15262 of the CEQA Guidelines. However, future mitigation actions implemented as recommended by this plan may be subject to CEQA review. |
| **AB 162: Flood Planning, Chapter 369, Statutes of 2007** | Compliance with this law constitutes inclusion of certain General Plan elements. Los Angeles County's compliance with Chapter 369, Statutes of 2007 is described in Appendix B. |
| **AB 2140: General Plans—Safety Element** | This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans. |
| **AB 747: General Plans—Safety Element** | The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies. |
| **AB 2800: Climate Change—Infrastructure Planning** | This act requires State agencies to take into account the impacts of climate change when developing State infrastructure. |
| **SB 92 and New Standards for Submitting Dam Inundation Maps** | This bill (SB 92, part of the 2017-18 budget package) makes significant legislative changes related to dam safety. It requires owners of dams under the regulatory jurisdiction of the California Department of Water Resources' Division of Safety of Dams to prepare inundation maps and emergency action plans and provides for fees and enforcement. |
| **SB 379: Land Use, General Plan, Safety Element** | Los Angeles County's compliance with SB 379 is described in Appendix B. |
| **California State Building Codes** | Los Angeles County has adopted the State's Building Codes by reference, except where the County has made amendments or revisions to apply higher standards. The permitting process in Los Angeles County ensures compliance with the State's Building Codes. |
| **Standardized Emergency Management System** | Los Angeles County has adopted an emergency response plan that is fully NIMS compliant (the *County of Los Angeles Operational Area Emergency Response Plan*, March 2012). The Governor's Office of Emergency Services approved it as NIMS compliant on August 31, 2011. |
| **California State Hazard Mitigation Plan** | The 2014 County of Los Angeles All Hazards Mitigation Plan was determined to be consistent with the State Plan by the Governor's Office of Emergency Services during its review and approval of the plan in 2013. The County is currently updating this All-Hazard Mitigation Plan and it is anticipated to be approved in 2020. |
| **Governor's Executive Order S-13-08** | This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects. Climate impact information developed under this executive order is used in the climate change evaluation of the *2020 Los Angeles County Comprehensive Floodplain Management Plan*. |
| **California Civil Code 1102** | The flood hazard disclosure requirements established under this code apply to all real estate transactions in Los Angeles County. |
| **Local Flood Protection Planning Act** | This State statute provides guidance on what a flood mitigation plan should include. |
| **California Water Code Division 5, Part 2, Chapter 4, Article 4** | This code provides floodplain regulations for public agencies within a floodplain or the planning area of a floodplain management plan. |
| **California Coastal Management Program** | This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard. |

## Conservation and Natural Resources Element

### *Watershed Management*

The Conservation and Natural Resources Element of the General Plan addresses watershed management, noting that it is an effective and comprehensive way to address water resource challenges. Watershed management integrates habitat enrichment and recreation availability with water supply, flood protection, and clean runoff (Los Angeles County, 2015).

Because a watershed encompasses many jurisdictions, water supply, water quality, flood protection and natural resource issues are best managed at a regional or multiple-agency level. The County works within its jurisdiction to improve the health of rivers, streams and lesser tributaries to enhance overall water resources, runoff quality and wildlife habitat. However, watershed integration requires the County to also participate with other stakeholders to manage the function and health of watersheds. Collaboration with local stakeholders and jurisdictions and with educational and professional institutions is needed to develop and implement watershed plans to protect and augment local water supplies, maintain flood protection standards, provide assistance in the event of flooding, encourage recreational opportunities, conserve habitats of native species, and improve the quality of water that flows to rivers, lakes, and the ocean.

### *Significant Ecological Areas and Coastal Resource Areas*

The Conservation and Natural Resources Element of the General Plan establishes the Significant Ecological Area (SEA) designation for land in unincorporated areas that contains irreplaceable biological resources (SEAs also have been identified in cities, but they function differently from those in unincorporated areas). Coastal Resource Areas (CRAs) are located within the coastal zone and include biological resources equal in significance to SEAs. The General Plan identifies 21 SEAs and 9 CRAs. Two CRAs are linked to SEAs that are not entirely within CRAs (the Santa Monica Mountains Coastal Zone and Palos Verde Coastline) (Los Angeles County, 2015):

**Significant Ecological Areas**

- Cruzan Mesa Vernal Pools
- East San Gabriel Valley
- Griffith Park
- Harbor Lake Regional Park
- Joshua Tree Woodlands
- Madrona Marsh Preserve
- Palos Verdes Peninsula and Coastline
- Puente Hills
- Rio Hondo College Wildlife Sanctuary
- San Andreas
- San Dimas Canyon / San Antonio Wash
- San Gabriel Canyon
- Santa Clara River
- Santa Felicia
- Santa Monica Mountains
- Santa Susana Mountains / Simi Hills
- Tujunga Valley / Hansen Dam
- Valley Oaks Savannah
- Verdugo Mountains

**Coastal Resource Areas**

- El Segundo Dunes
- Malibu Coastline
- Palos Verdes Coastline (ocean and shoreline portions)
- Point Dume
- Santa Catalina Island
- Coastal Zone of the Santa Monica Mountains
- Terminal Island (Pier 400)

The objective of the SEA program is to conserve genetic and physical diversity by designating biological resource areas that are capable of sustaining themselves into the future. However, SEAs are not wilderness preserves. Much of the land in SEAs is privately held, used for public recreation, or abuts developed areas. The SEA program must therefore balance the overall objective of resource preservation against other critical public needs. The General Plan goals and policies are intended to ensure that privately held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs (Los Angeles County, 2015).

### Safety Element

Flooding is among the natural hazards addressed in the Safety Element of the General Plan. The element presents goals and policies for uses in flood hazard zones, as well as tsunami hazard areas and potential dam failure inundation areas. The Safety Element of the County's General Plan is currently being updated and will be in compliance with the provisions of California's SB 379.

## 4.2.2 Community Plans

The Los Angeles County General Plan (2015) serves as the foundation for community-based plans, such as area plans, community plans, and coastal land use plans. Area plans focus on land use and policy issues that are specific to the planning area. Community plans cover smaller geographic areas within the planning area and address neighborhood and/or community-level policy issues. Coastal land use plans are components of local coastal programs; they regulate land use and establish policies to guide development in the coastal zone.

The following is a list of adopted community-based plans in unincorporated Los Angeles County:

- Altadena Community Plan
- Antelope Valley Area Plan
- East Los Angeles 3rd Street Plan
- East Los Angeles Community Plan
- Florence-Firestone Community Plan
- Hacienda Heights Community Plan
- Marina del Rey Land Use Plan
- Pepperdine Long Range Development Plan
- Rowland Heights Community Plan
- Santa Catalina Island Local Coastal Land Use Plan
- Santa Clarita Valley Area Plan
- Santa Monica Mountains North Area Plan
- Twin Lakes Community Plan
- Walnut Park Neighborhood Plan
- West Athens-Westmont Community Plan.

## 4.2.3 Watershed Management Program

Municipalities and community stakeholders throughout Los Angeles County developed a total of 31 collaborative Watershed Management Programs and Enhanced Watershed Management Programs for the County's six watersheds—Dominguez Channel, Los Angeles River, Los Cerritos Channel, San Gabriel River, Santa Monica Bay and Upper Santa Clara River. Each Watershed Management Group meets regularly to implement its plan.

Each plan identifies programs and projects to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve aesthetics, and support public education. Each includes water quality priorities, watershed control measures, the scheduling of projects, and monitoring, assessment and adaptive management for projects. The plans rely heavily on three approaches:

- **Regional Multi-Benefit Projects**—Regional multi-benefit projects retain, divert or treat stormwater and non-stormwater from subwatershed areas, while also providing water conservation, flood, recreation, habitat and other benefits.
- **Green Street Projects**—Green street projects improve streets, sidewalks or other paved areas using permeable materials and drought-tolerant plants to capture, clean or infiltrate rainwater. Green infrastructure projects help to clean surface water bodies, recharge groundwater, beautify neighborhoods, and cool communities by increasing the amount of vegetation.
- **Low Impact Development**—Low impact development consists of site design approaches and best management practices that address runoff and pollution at the source. These practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.

### 4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan

The 2017 Integrated Regional Water Management (IRWM) Plan Update defines the direction for collaborative planning to achieve sustainable management of water resources in the Greater Los Angeles County Region. The update meets the California Department of Water Resources' 2016 updated IRWM guideline requirements. The Plan identifies solutions to achieve the following objectives over the 25-year planning horizon:

- Reduce the region's reliance on imported water
- Comply with water quality regulations by improving the quality of urban runoff, stormwater and wastewater
- Protect, restore and enhance natural processes and habitats
- Increase watershed-friendly recreational space for all communities
- Reduce flood risk in flood-prone areas by increasing protection or decreasing needs using integrated flood management approaches
- Adapt to and mitigate against climate change vulnerabilities.

### 4.2.5 Los Angeles County Flood Control District

The Los Angeles County Flood Control Act was adopted by the State Legislature in 1915 after a regional flood took a heavy toll on lives and property. The act established the Los Angeles County Flood Control District and empowers it to provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries (authority to address recreation and aesthetics was added via subsequent amendments). The County of Los Angeles Board of Supervisors is the ex-officio governing body for the Los Angeles County Flood Control District. In 1984, the Flood Control District entered into an operational agreement transferring its administration, planning, and operational activities to Los Angeles County Public Works.

Within the Greater Los Angeles County area, the Flood Control District and the U.S. Army Corps of Engineers share responsibilities for managing flood risk. The Flood Control District is the primary agency able to address large regional drainage needs within its boundaries. It uses available funds to operate and maintain flood control facilities and systems that cross various cities. In years of heavy rainfall, the flood control system has largely prevented serious flooding that affected the Los Angeles area many years ago.

The Flood Control District boundaries encompass more than 2,700 square miles, six major watersheds, 86 incorporated cities, and the unincorporated County areas. Its municipal flood protection and water conservation system is one of the largest in the world. It includes 14 major dams and reservoirs, 491 miles of open channels, 27 spreading grounds, 175 debris basins, operates 61 pump stations, 3,411 miles of underground storm drains, and an estimated 82,800 catch basins. Planning efforts to rehabilitate flood control facilities also consider other potential beneficial uses of those facilities, such as environmental restoration, enhancement of water quality, and recreation.

### 4.2.6 Antelope Valley Comprehensive Plan and Amendments

Los Angeles County prepared and adopted the Antelope Valley Areawide General Plan in 1986, a comprehensive plan for the unincorporated County area of Antelope Valley. The Plan was updated in June 2015, renamed the Antelope Valley Area Plan. The Antelope Valley differs from other parts of the County because it lacks an ocean drainage outlet. It also lacks defined natural channels below the foothills, as well as an adequate flood control system, resulting in unpredictable and varying flood risk across the valley floor. The Plan explores flood control and water conservation measures to reduce the negative effects of regional private development and to better address local flood hazard needs. It seeks to provide a cohesive approach to drainage, stormwater management,

and flood risk mitigation. The Plan evaluates the fee structures available to finance drainage solutions (Los Angeles County Public Works, 1987). Two amendments to the original plan update costs and drainage fees to continue implementing recommended improvements (Los Angeles County Public Works, 1991 and 2006). The most recent update to the plan in 2015 provided for zone changes, including residential, agricultural, commercial, industrial, special purpose, C-RU (rural commercial) and MXD-RU (rural mixed use) zones.

### 4.2.7 Antelope Valley Integrated Regional Water Management Plan and Salt and Nutrient Management Plan

The Antelope Valley Integrated Regional Water Management (IRWM) group developed a water resource management plan in 2007. The 2007 plan was updated in 2013 to reflect new state integrated planning requirements, include more detailed and updated content, and solicit future project funding opportunities. The 2013 Antelope Valley IRWM Plan explores key issues, including uncertain and variable water supply, water demand exceeding supply, water quality and flood management, environmental resources, water management and land use, and climate change. It identifies and prioritizes a series of projects to address key concerns in the region, particularly those related to water supply (Antelope Valley Integrated Regional Water Management Group, 2013).

The Antelope Valley Salt and Nutrient Management Plan of 2014 was developed to manage salts, nutrients, and other elements from various sources to ensure that water quality objectives of the State Water Resource Control Board's Recycled Water Policy are met and safeguarded. The State Water Resources Control Board requires a Salt and Nutrient Management Plan for any community to qualify for recycled water projects through the Lahontan Regional Water Quality Control Board.

### 4.2.8 Upper Santa Clara River Watershed Integrated Regional Water Management Plan

The Upper Santa Clara River Watershed Integrated Regional Water Management group updated its IRWM plan in 2018 to meet the 2016 IRWM Guidelines under Proposition 1 (the Water Quality, Supply, and Infrastructure Improvement Act of 2014). The 2018 Upper Santa Clara River Watershed IRWM Plan examines current and future water-related needs, identifies regional objectives for water-related resource management, develops strategies to address identified needs, and evaluates projects to meet the regional objectives. It integrates planning and implementation and facilitates regional cooperation, with the goals of reducing water demand, improving operational efficiency, increasing water supply, improving water quality, and promoting resource stewardship over the long term (Los Angeles County, 2019).

### 4.2.9 Sediment Management Strategic Plan

The Los Angeles County Flood Control District developed a Sediment Management Strategic Plan in response to challenges in managing sediment. These challenges included wildfires occurring in 2007 and 2009 that led to an increased inflow of sediment and debris and increased pressure on the capacity of sediment placement sites. This plan provides an overview of sediment management issues and evaluates various projects. The plan, designed to be effective from 2012 to 2032, is guided by the following objectives (Los Angeles County Public Works, 2019):

- Maintaining flood risk management and water conservation
- Recognizing opportunities for increased environmental stewardship
- Reducing social impacts related to sediment management
- Identifying ways to use sediment as a resource
- Ensuring that the Flood Control District is fiscally responsible in its decision-making.

## 4.2.10 Local Coastal Programs

Los Angeles County local coastal programs (LCPs) comply with the 1976 California Coastal Act, which requires coastal cities and counties to establish coastal resource conservation and development programs. The LCPs consist of planning and regulatory measures to manage development in coastal zones. Each LCP includes a land use plan and implementation program. LCPs must consider unique factors of the coastal community and regional and state concerns. There are five coastal areas within the unincorporated Los Angeles County jurisdiction: the Santa Monica Mountains, Marina Del Rey, Santa Catalina Island, San Clemente Island and Ballona Wetlands Area A. Of these five areas, three have certified LCPs: Marina del Rey, Santa Catalina Island, and the Santa Monica Mountains. Certified LCPs are not required for San Clemente Island or Ballona Wetlands Area A.

## 4.2.11 Los Angeles County Low Impact Development Ordinance

In November 2012, the Los Angeles Regional Water Quality Control Board adopted a Municipal Separate Storm Sewer System (MS4) Permit to regulate stormwater and non-stormwater discharges in the Los Angeles region. The permit included low impact development (LID) requirements for certain projects to reduce the discharge of stormwater and associated pollutants into receiving water bodies and to control hydromodification. In November 2013, Los Angeles County amended its LID Ordinance in response to the 2012 MS4 Permit. The LID Ordinance applies to certain new development and re-development projects and is intended to accomplish the following:

- Lessen adverse impacts of stormwater and urban runoff from development on natural drainage systems, receiving waters and other water bodies
- Minimize pollutant loadings from impervious surfaces by requiring certain projects to incorporate appropriate best management practices and other LID strategies
- Require hydromodification to minimize erosion and other hydrologic impacts on natural drainage systems

In 2014 Los Angeles County created the *Low Impact Development Standards Manual* to comply with requirements of the National Pollutant Discharge Elimination System MS4 Permit for discharges within the coastal watersheds of Los Angeles County. The manual provides guidance in new development as well as redevelopments within unincorporated areas of Los Angeles County. Its intent is to improve water quality and mitigate potential water quality impacts from stormwater and non-stormwater discharges.

## 4.2.12 Los Angeles County Operational Area Emergency Response Plan

The Los Angeles County Operational Area Emergency Response Plan provides details for coordinated response to large-scale emergency situations in the County, whether natural, man-made, or technological. It focuses on potentially catastrophic disasters that require more than normal response measures. It reviews capabilities in prevention, protection, response, recovery, and mitigation. It describes continuity of government plans and provides annexes for specific situations, including tsunamis, oil spills, and terrorism (Los Angeles County, 2012).

## 4.2.13 Topanga Creek Watershed Management Plan

The Topanga Creek Watershed covers 18 square miles, has the greatest diversity of native plants and animals of all watersheds in the Santa Monica Mountains, and is the third largest drainage to Santa Monica Bay. In 2002, the Topanga Creek Watershed Committee updated its 1996 Topanga Creek Watershed Management Study with new preventive planning strategies and best management practices. These projects and practices were developed to maintain and enhance the watershed's current physical, chemical, biological, economic, and social characteristics, including its diversity in land use (i.e., residential, business development, infrastructure, wilderness recreation, and biological habitat). The plan also seeks to protect life and property from vulnerability to natural hazards such as stormwater runoff, floods, earthquakes, and wildfires (Topanga Creek Watershed Committee, 2002).

## 4.2.14 Rio Hondo Watershed Management Plan

The 2018 Rio Hondo Watershed Management Plan provides goals and strategies to all affected municipalities and conservation organizations as a way to improve water quality, health, habitat and recreational opportunities for the Rio Hondo watershed. The Rio Hondo watershed is a sub-watershed of the Los Angeles River watershed and is linked to the San Gabriel River watershed as a result of both natural hydrologic processes and human intervention. The watershed contains both rural and urban areas, with the San Gabriel Mountains and Angeles National Forest defining the upper reaches and the more urban and developed San Gabriel Valley below the foothills. The watershed encompasses 22 cities and six unincorporated communities in Los Angeles County (San Gabriel Valley Council of Governments, 2018).

## 4.2.15 Gateway Watershed Management Program

The Gateway Watershed Management Authority is a coalition of 25 cities and government entities that manage regional water planning needs for the Gateway Cities region. The Gateway Watershed Management Authority developed an integrated regional water management plan in 2013. Although the plan primarily focuses on needs for cities in this region, it includes a few unincorporated County areas. Recommendations developed for this plan include coordinating regional water management efforts, continued maintenance of projects and grant opportunities, addressing MS4 permit watershed monitoring and reporting, and developing a funding and finance plan to implement projects (Gateway Management Authority, 2013).

## 4.2.16 Los Angeles River Master Plan and Corridor Highlights

The Los Angeles River is 51 miles long, and its watershed covers 834 square miles. It extends from the Santa Monica Mountains to the Simi Hills in the east and from the Santa Susana Mountains to the San Gabriel Mountains in the west. The Los Angeles River flows eastward from its headwaters in the mountains to the northern corner of Griffith Park, where the channel turns southward through the Glendale Narrows before it flows across the coastal plain and into San Pedro Bay near Long Beach. The river is a valuable resource for the County, as well as a major source of flooding.

The County developed the Los Angeles River Master Plan in 1996 to seek ways to utilize the natural assets of the Los Angeles basin for economic, recreational, and environmental benefits while maintaining the waterway as a flood protection resource. The plan highlights water conservation as a major concern, noting that 30 to 40 percent of the County's water supply comes from local sources. It also recommends multi-use and multi-benefit projects, which not only strengthen flood control measures but also educate residents, create environmental habitats, or increase recreational opportunities (Los Angeles County Public Works, 1996).

In 2005, the County released the Master Plan and Corridor Highlights document, which provides information about Master Plan projects implemented since the Master Plan's adoption and those planned for future construction. Many of the projects are structural but highlights also include natural resource preservation and education and outreach projects. Where sufficient data was available, the report documents specific benefits as well as implementation and location information (Los Angeles County Public Works, 2019). Los Angeles County is currently updating the 1996 Los Angeles River Master Plan.

## 4.2.17 Los Angeles County Annual Hydrologic Reports

Los Angeles County releases an annual report containing hydrologic data relevant to the County; the most recent report covers 2017 through 2018. The report is organized into eight major sections providing background and statistics on the following areas (Los Angeles County Public Works, 2018):

- **Los Angeles County—**County's topography, geology, and land use
- **Runoff**—Mean daily and peak annual runoff flow rates for active stream gaging stations
- **Flood Control District**—Flood events summaries
- **Reservoirs**—Summary of annual inflow, outflow, and storage data for County dams and reservoirs
- **Precipitation**—Daily and annual rainfall data from County rain gage stations
- **Erosion control**—Debris basin design data, production summary, and production history
- **Evaporation**—Data for the County's active evaporation stations
- **Water conservation**—Groundwater recharge facility data and historical well data

These reports are a resource for County personnel evaluating water management.

## 4.2.18 Los Angeles County Drainage Area

In 1915, the State Legislature created the Los Angeles County Flood Control District to control floods and conserve water. Early bond issues financed construction of 14 dams in the San Gabriel Mountains as well as flood channel modifications. District funding financed construction of debris basins to trap sediment. The federal Emergency Relief Appropriations Act of 1935 financed the construction of Eaton Wash Dam. The federal Flood Control Act of 1936 made the Army Corps of Engineers a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities. The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the Los Angeles County Drainage Area (LACDA) study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel and Ballona Creek. Flood control facilities in the LACDA system fall into four general categories: debris basins, flood control reservoirs, improved tributary channels, and improved main channels. In total, the system has over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 15 flood control and stormwater capture dams, and five flood control dams.

## 4.2.19 Trash Best Management Practices

The 2004 *Technical Report of Trash Best Management Practices* identifies necessary measures to meet trash total maximum daily load goals for the Los Angeles River and Ballona Creek. Recommendations include trash and runoff source-control best management practices as the top preference. Also recommended are structural projects for high-trash generation areas, such as drain system retrofits, channel-cleaning contracts, and replacement of impervious surfaces (Los Angeles County Public Works, 2004). Keeping flood control facilities, including catch basins, free from trash and debris helps prevent localized street flooding.

## 4.2.20 Los Angeles County Response to the Americans with Disabilities Act

The *Los Angeles County Operational Area Emergency Response Plan Access and Functional Needs Annex* defines "individuals with disabilities and access and functional needs" as populations whose members may have additional needs before, during and after an incident in functional areas including but not limited to the following:

- Maintaining independence
- Communication
- Transportation
- Supervision
- Medical care.

These populations may include any of the following:

- Individuals with mobility and transportation impairments
- Individuals with vision, hearing and dual sensory impairment
- Individuals with health, behavioral and mental health needs
- Individuals with intellectual and developmental disabilities
- Individuals who live in institutionalized settings
- Seniors and children
- Culturally diverse populations
- Individuals with limited English proficiency or non-English speakers
- Individuals with socio-economic barriers, including the homeless population.

### Reasonable Accommodations Ordinance

The ordinance, which was adopted by the Board of Supervisors on November 28, 2011, creates an administrative procedure for persons with disabilities to request reasonable accommodation from land use and zoning standards or procedures, when those standards or procedures are a barrier to equal housing access, pursuant to state and federal Fair Housing laws. The ordinance applies to all the unincorporated areas of Los Angeles County.

### Plan Action Implementation

The Americans with Disabilities Act protocol will be applied when implementing any actions in this plan that could impact individuals with disabilities and access and functional needs. This will involve measures such as review by the Los Angeles County Inclusive Emergency Management Advisory Committee or whatever protocol has been established by the County at the time of project implementation.

## 4.3 CAPABILITY ASSESSMENT

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out.

Table 4-3 summarizes the legal and regulatory capability of Los Angeles County. This table describes the legal authorities available to the county and/or enabling legislation at the state level affecting planning and land management tools that can support floodplain management action items. Each of these capabilities represents an ongoing program that supports Los Angeles County's commitment to floodplain resilience. Any gap in capability identified in this table should be considered as an action by the County in the action plan component of this plan. The table identifies the following information for each program:

- **Local Authority**: Does the County have the authority to implement the identified capability through policy or formal adoption?
- **State or Federal Prohibitions**: Are there are any regulations that may impact the implementation of an identified capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)?
- **Other Regulatory Authority**: Are there are any regulations that may impact the implementation of a capability that are enforced or administered by another agency (e.g., a state agency or special purpose district)? This can also be referred to as delegated authority.
- **State Mandated**—Do state laws or other requirements enable or require the listed item to be implemented at the local level?

**Table 4-3.** Los Angeles County Legal and Regulatory Capability

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Codes, Ordinances & Requirements** | | | | |
| **Building Code** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 26 – Building Code | | | | |
| **Zoning Code** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 22 – Planning and Zoning | | | | |
| **Subdivisions** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code, Title 21 – Subdivision Code. The California State Subdivision Map Act sets out how long a map approval can be valid, and the County cannot grant time longer than that. | | | | |
| **Post-Disaster Recovery** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code, Title 2 – Administration, Division 3 – Departments and Other Administrative Bodies, Chapter 2.68 – Emergency Services, Part 6 – Director of Recovery Operations | | | | |
| **Flood Damage Prevention Ordinance** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code:<br>Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites<br>Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations<br>Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard<br>Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation<br>Title 20, Division 5, Chapter 20.94 – Channels<br>Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control | | | | |
| **Low-Impact Development Standards** | Yes | No | No | Yes |
| *Comment:* County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.84 Low Impact Development Standards | | | | |
| **Real Estate Disclosure** | Yes | No | No | Yes |
| *Comment:* State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1103.2) | | | | |
| **Growth Management** | No | No | Yes | Yes |
| *Comment:* County of Los Angeles County Code, Title 22 – Planning and Zoning, Chapter 22.46 – Specific Plans. Specific Plans are available for Santa Catalina Island, Marina Del Rey, Universal Studios, and East Los Angeles Third Street. | | | | |
| **Site Plan Review** | Yes | No | No | No |
| *Comment:* County of Los Angeles County Code, Title 26 – Building Code, Chapter 1 – Administration, Inspections. | | | | |
| **Special Purpose (flood management, critical areas)** | — | — | — | — |
| *Comment:* County of Los Angeles County Code, Title 11 – Health and Safety, Division 2 – General Hazards, Chapter 11.52 – Water Hazards.<br>County of Los Angeles County Code, Title 11 – Health and Safety, Division 3 – Miscellaneous Regulations, Chapter 11.60 – Floodways and Water Surface Elevations.<br>County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.80 – Stormwater and Runoff Pollution Control<br>County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.20 – Depositing Petroleum Products on Beaches or into Pacific Ocean<br>County of Los Angeles County Code, Title 20 – Utilities, Division 5 – Flood Control District Property and Facilities<br>County of Los Angeles County Code, Title 31 – County Green Building Standards Code<br>County of Los Angeles County Code, Flood Control District Code, Chapter 21 – Stormwater and Runoff Pollution Control | | | | |

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Planning Documents** | | | | |
| **General Plan** | Yes | No | No | Yes |
| *Comment:* The *Los Angeles County 2035 General Plan,* adopted by the Los Angeles County Board of Supervisors on October 6, 2015, provides a policy framework for how and where the unincorporated County will grow through 2035. Comprising 2,650 square miles, unincorporated Los Angeles County is home to over one million people. The General Plan accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the region. | | | | |
| **Capital Improvement Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Public Works develops and implements capital projects, and manages projects implemented by consultants. The 2035 General Plan Implementation Program identifies a goal project of Public Works and the Department of Regional Planning jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas. Some current community plans have capital improvements listed, but level of detail varies based on community and plan age. | | | | |
| **Economic Development Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Strategic Plan for Economic Development, 2016<br>2035 General Plan, Chapter 14 – Economic Development Element. Available online | | | | |
| **Floodplain or Basin Plan** | Yes | No | No | No |
| *Comment:* Los Angeles County Comprehensive Floodplain Management Plan, 2015. Available online. | | | | |
| **Stormwater Plan** | Yes | No | Yes | Yes |
| *Comment:* Low Impact Development Standards Manual, February 2014 | | | | |
| **Watershed Management Plan** | Yes | No | Yes | No |
| *Comment:* Enhanced Watershed Management Programs in progress and to be submitted for approval to the Los Angeles Regional Water Quality Control Board by June 28, 2015. These plans will include the County's five watersheds: Ballona Creek, Dominguez Channel, Marina Del Ray, Santa Monica Bay, and Upper Los Angeles River. All available online.<br>Other unincorporated community watershed management plans: Topanga Creek, Upper Santa Clara River, Rio Hondo and Gateway Cities Region | | | | |
| **Habitat Conservation Plan** | Yes | No | Yes | No |
| *Comment:* 2035 General Plan, Chapter 9 – Conservation and Natural Resources Element, Significant Ecological Areas. Available online. The General Plan has policies related to habitat and resource conservation, but the Conservation and Natural Resources Element is not the equivalent of a habitat conservation plan. Other regulatory authority lies with the California Department of Fish & Wildlife or the U.S. Fish & Wildlife Service, depending upon the species. | | | | |
| **Shoreline Management Plan** | Yes | No | No | Yes |
| *Comment:* Los Angeles County Stormwater Monitoring Reports, Section 1.1.1.4 – Shoreline Monitoring (released annually and with most recent report of 2014-2015)<br>Local Coastal Programs (LCP)<br>• Santa Monica Mountains LCP, adopted on August 26, 2014, and certified on October 10, 2014<br>• Marina Del Rey LCP, adopted in 1996, and amended and certified in 2012<br>• Santa Catalina Island LCP, adopted on March 15, 1983, and certified on November 17, 1983<br>All available online | | | | |
| **Emergency Response Plan** | Yes | No | No | Yes |
| *Comment:* Los Angeles County Operational Area Emergency Response Plan (ERP), 2012. Available online | | | | |
| **Post-Disaster Recovery Plan** | Yes | No | No | No |
| *Comment:* Recovery Annex to the ERP<br>ERP, Section 2.7: Recovery Considerations also reviews County Recovery Procedures | | | | |
| **Sediment Management Plan** | Yes | No | No | No |
| *Comment:* Sediment Management Strategic Plan, 2012-2032. Available online | | | | |

| | Local Authority | State or Federal Prohibitions | Other Regulatory Authority | State Mandated |
|---|---|---|---|---|
| **Continuity of Operations Plan** | Yes | No | No | Yes |
| *Comment:* All Los Angeles County departments and/or divisions must develop, exercise, and maintain plans for business continuity functions and processing resources. Each department and/or division must develop a plan for its business operations that can sufficiently support the service requirements of other operations and functions involved in the incident. Plans must address the full range of resources including data processing, data communications links, personnel, personal computers, terminals, workspace, voice communication, and documents. Additionally, Chapter 3 of the ERP includes Continuity of Government information. | | | | |
| **Water Resource Management Plan** | Yes | No | Yes | Yes |
| *Comment:* Greater Los Angeles County Region Integrated Regional Water Management Plan, 2013, Antelope Valley Integrated Regional Water Management Plan, 2013, Upper Santa Clara River Watershed Integrated Regional Water Management Plan, 2014 | | | | |
| **Best Management Practices** | — | — | — | — |
| *Comment:* Technical Report of Trash Best Management Practices, 2004 These best management practices were identified and evaluated to provide effective alternatives to meet the goals of the trash total maximum daily load for Los Angeles River and Ballona Creek. | | | | |

Table 4-4 summarizes fiscal capability of Los Angeles County. This table identifies what financial resources (other than grants) are available to the county to support the implementation of repetitive loss area action items.

**Table 4-4.** Fiscal Capability

| Financial Resources | Accessible or Eligible to Use? |
|---|---|
| **Community Development Block Grants** | Yes |
| **Capital Improvements Project Funding (Flood Control District)** | Yes |
| **Authority to Levy Taxes for Specific Purposes** | Yes |
| **Incur Debt through General Obligation Bonds** | Yes |
| **Incur Debt through Special Tax Bonds** | Yes |
| **State Sponsored Grant Programs** | Yes |
| **Development Impact Fees for Homebuyers or Developers** | Yes |

Table 4-5 summarizes community based classification programs that rate facets of a community's floodplain management capability. The Community Rating System is described in Section 1.1. The Building Code Effectiveness Grading Schedule assesses the building codes in effect in a community and how the community enforces them, with emphasis on mitigation of losses from natural hazards. The National Oceanic and Atmospheric Administration administers the StormReady and TsunamiReady programs. StormReady helps arm communities with communication and safety skills needed to save lives and property before, during and after an event. It helps community leaders and emergency managers strengthen local safety programs.

**Table 4-5.** Community Classifications

| | Participating? | Classification | Date Classified |
|---|---|---|---|
| **Community Rating System** | Yes | 7 | 11/5/2015 |
| **Building Code Effectiveness Grading Schedule** | Yes | 2/2 | 2015 |
| **StormReady** | No | N/A | N/A |
| **TsunamiReady** | No | N/A | N/A |

Table 4-6 summarizes the administrative and technical capability of Los Angeles County. This table inventories the staff/personnel resources available to Los Angeles County to help with floodplain management and the implementation of specific actions.

**Table 4-6.** Administrative and Technical Capability

| Staff/Personnel Resources | Available? | Department/Agency/Position |
|---|---|---|
| **Planners or engineers with knowledge of land development and land management practices** | Yes | Los Angeles County Public Works (Public Works) Land Development Division; Los Angeles County Department of Regional Planning |
| **Engineers or professionals trained in building or infrastructure construction practices** | Yes | Public Works Geotechnical and Materials Engineering Division; Public Works Building and Safety Division |
| **Planners or engineers with an understanding of flooding hazards** | Yes | Public Works Geotechnical and Materials Engineering Division; Public Works Stormwater Engineering Division and associated subdivisions |
| **Staff with training in benefit/cost analysis** | Yes | Public Works multiple divisions, including the Stormwater Planning Division |
| **Floodplain manager** | Yes | Public Works Stormwater Engineering Division |
| **Surveyors** | Yes | Public Works Survey/Mapping and Property Management (Land Records) Division |
| **Personnel skilled or trained in GIS applications** | Yes | Public Works Survey/Mapping and Property Management (Land Records) Division; Public Works Stormwater Engineering Division; and Public Works GIS Managers |
| **Scientists familiar with flooding hazards in local area** | Yes | Public Works Stormwater Engineering Division and associated subdivisions |
| **Emergency manager** | Yes | Public Works Disaster Services Group; Los Angeles County Office of Emergency Management |
| **Grant writers** | Yes | Public Works Stormwater Planning Division, Stormwater Engineering Division, and Transportation Planning and Programs Division; Los Angeles County Office of Emergency Management |

Table 4-7 summarizes the County's participation in national flood-related programs.

**Table 4-7.** National Flood Insurance Program Compliance

| | |
|---|---|
| **What department is responsible for floodplain management in your community?** | Los Angeles County Public Works Stormwater Engineering Division |
| **Who is your community's floodplain administrator?** | Los Angeles County Public Works Stormwater Engineering Division |
| **Do you have any certified floodplain managers on staff in your community?** | No |
| **What is the date of adoption of your flood damage prevention ordinance?** | County of Los Angeles County Code:<br>• Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites, last amended by ordinance 2013-0048 § 2, effective 2013<br>• Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations, last amended by ordinance 2016-0062 § 2, effective 2016<br>• Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard, last amended by ordinance 11665 § 38, effective 1978<br>• Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation, last amended by ordinance 11665 § 39, effective 1978<br>• Title 20, Division 5, Chapter 20.94 – Channels, last amended by ordinance 86-0032 § 1, effective 1986; Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control, last amended by ordinance 1494 Ch. 7 Art. 5 § 705.1, effective 1927 |
| **When was the most recent Community Assistance Visit or Community Assistance Contact?** | Last Community Assistance Visit: December 19, 2019<br>Community Assistance Visit Report: Pending<br>Community Assistance Visit Closed: Pending<br>Issues: None |
| **To the best of your knowledge, does your community have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.** | No issues that would render Los Angeles County out of full compliance with the provisions of the NFIP were identified during the last Community Assistance Visit. |
| **Do your flood hazard maps adequately address the flood risk within your community?** | Flood hazard mapping has been identified as an issue that needs to be addressed by this planning process. See Section 6.14 lists mapping issues, which are addressed by Mitigation Action #33 (Chapter 11). |
| **Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?** | Los Angeles County Public Works Stormwater Engineering Division staff actively participate in programs of the Floodplain Management Association as well as other trainings offered by the State and FEMA where feasible. County staff welcomes opportunities for training on floodplain management programs and principles. |
| **Does your community participate in the CRS? If so, is your community seeking to improve its CRS Classification? If not, is your community interested in joining the CRS program?** | Los Angeles County has participated in the CRS since 10/1/1991 and is currently rated a CRS Class 7 |

# 5. MITIGATED REPETITIVE LOSS PROPERTIES

## 5.1 REPETITIVE LOSS LIST CORRECTION

As part of their application and cycle verification obligations, CRS-participating communities must review their lists of repetitive-loss properties for accuracy, for correct addresses, to determine whether the properties are actually in the community's corporate limits, and to determine whether the insured buildings have been removed, retrofitted or otherwise protected from the cause of the repetitive flooding. The result of this review is recorded on a Repetitive Loss Update Worksheet (AW-501; see Figure 5-1).

A community with repetitive losses must sign the Repetitive Loss List Community Certification, CC-RL, certifying that each address has been checked. If there are updates, the submittal must include corrected Repetitive Loss Update Worksheets (AW-501) with any required supporting documentation. The community must note the following situations in which the form should be updated:

1. The property is not located in the community's jurisdiction. The property may be outside the community's corporate limits, it may be in another city, or it may have been annexed by another community. If it can be determined in which community the property belongs, the property will be reassigned to the correct community. If a property is not in the community, it will not be reassigned unless the community in which the property does belong can be definitely identified.
2. There was an error in the repetitive loss data base, such as a duplicate listing or an incorrect address.
3. The property has subsequently been protected from the types of events that caused the losses. Buildings that have been acquired, relocated, retrofitted, or otherwise protected from the types of frequent floods that caused the past damage are not counted in determining the community's CRS requirements.
4. The property is protected from damage by the base flood shown on the current Flood Insurance Rate Map (FIRM). For example, the community may demonstrate that the building is elevated or flood-proofed above the base flood elevation but was flooded by a higher level. If the property is outside the Special Flood Hazard Area, the community may show that all of the repetitive losses were caused by events with recurrence intervals of over 100 years (e.g., two 200-year storms).

For corrections made under situations 3 or 4 above, all future AW-501s issued for the community will be segregated into two categories; mitigated and unmitigated.

## 5.2 MITIGATED REPETITIVE LOSS PROPERTIES

Los Angeles County is using the ISO repetitive loss list and AW-501s dated September 2018 as the basis for this Repetitive Loss Area Analysis. This is the last officially sanctioned CRS repetitive loss data set issued to Los Angeles County. According to the AW-501s issued, Los Angeles County has 54 repetitive loss properties, of which four are officially recognized as "mitigated," as shown in Table 5-1. No area analysis has been conducted for these mitigated properties. The County is seeking mitigated status approval for an additional eight properties, and another three have been destroyed by wildfires; these properties are all included in the area analyses provided in this RLAA.

OMB Control Number: 1660-0022
Expiration: xxxx, xxxx

**Federal Emergency Management Agency**

**National Flood Insurance Program**

## NFIP REPETITIVE LOSS UPDATE WORKSHEET (AW-501)

**THE INFORMATION ON THIS FORM IS BASED ON CLAIMS ON OR BEFORE:** 01/31/2011

**REPETITIVE LOSS NUMBER:** 0987654

*Internal use only* ☒ A ☐ N/A ☐ FRR

| | |
|---|---|
| NFIP Community Name: BALDWIN COUNTY | CID#: 015000 |
| Local Property Identifier: 56-09-29-999-000 | |
| Current Property Address | Previous Property Address/Community ID# |
| 12345 MEMORY LANE FAIRHOPE, AL 36532-5963 | ---------- |
| Last Claimant: | Last Claimant: |
| Insured: Yes / Name Insured: | ELMER FLOOD |
| Date of Losses: 20040916 19980927 | Total Number of Losses for Property: 2 |

### REQUESTED UPDATES

**MARK ALL UPDATES BELOW THAT APPLY (IMPORTANT - SEE INSTRUCTIONS)**

1. ☐ **INFORMATION PROVIDED NOT SUFFICIENT TO IDENTIFY PROPERTY.**
   Choose this update if all attempts to locate the property fail. Please describe the steps you took to locate the property in the comments section below.

2. ☐ **COSMETIC CHANGES REQUIRED TO THE ADDRESS:**
   Update the address shown above and/or add our local alternative property identifier such as a Tax Assessor #.

3. ☐ **PROPERTY NOT IN OUR COMMUNITY OR JURISDICTION:**
   Choose this update if you have positively determined that the property shown is not located in your community. Please provide the correct NFIP community name and if known the NFIP community ID Number. If available, please attach a map showing the property location.
   ASSIGN TO NFIP COMMUNITY NAME: _____ NFIP COMMUNITY ID#: _____

4. ☒ **FLOOD PROTECTION PROVIDED.**
   Choose this update only if some type of structural intervention has occurred to the building, property or the source of flooding that protects the building from future events similar to those that occurred in the past. The update must be supported by documentation such as an Elevation Certificate and the Mitigation action and funding below must be provided.

   (Mitigation Action 1.) (Source of Primary Mitigation Funding 3.) (Secondary Source of Funding 3.)

CC-RL-2 (AW-501-1) *[continued on next page]*

**Figure 5-1.** Example AW-501

**Table 5-1.** Mitigated Repetitive Loss Properties

| Repetitive Loss Number | Date Corrected |
|---|---|
| **#0014896** | April 25, 1995 |
| **#0017933** | May 10, 1995 |
| **#0028337** | June 11, 1996 |
| **#0049465** | May 10, 1995 |

# 6. MITIGATION ALTERNATIVES CONSIDERED

Although this report presents separate analyses for each identified repetitive loss area in unincorporated Los Angeles County, the list of potential measures to address repetitive flooding problems was the same for each area. This chapter summarizes the alternatives that were identified for consideration. These alternatives can be implemented by the County, the homeowner, or other entities. The selection of suitable alternatives for each at-risk property in the repetitive loss areas is described in the chapters presenting individual repetitive loss area analyses.

Many types of flood hazard mitigation exist, and there is not one mitigation measure that fits every case or even most cases. Successful mitigation often requires multiple strategies. The CRS Coordinator's Manual breaks the primary types of mitigation down as follows (FEMA, 2017):

- **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.
- **Property protection** activities are usually undertaken by property owners on a building-by- building or parcel basis.
- **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.
- **Emergency services** are measures taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.
- **Structural projects** keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.
- **Public information** activities advise property owners, potential property owners, and visitors about hazards and ways to protect people and property from them, as well as the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

## 6.1 PREVENTIVE

Los Angeles County regulates residential and commercial development through its building code, planning and zoning requirements, stormwater management regulations and floodplain management ordinances. Any project in an unincorporated area located in a floodplain outside state or federally owned lands, regardless of the project's size, requires a permit from Los Angeles County, unless the project can be characterized as routine maintenance.

## 6.2 PROPERTY PROTECTION

These measures are generally performed by property owners or their agents. FEMA has published numerous manuals that help a property owner determine which property protection measures are appropriate for particular situations:

- FEMA 259, Engineering Principles and Practices of Retrofitting Floodprone Residential Structures
- FEMA 312, Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding
- FEMA 551, Selecting Appropriate Mitigation Measures for Floodprone Structures
- FEMA 348, Protecting Building Utilities from Flood Damage
- FEMA 511, Reducing Damage from Localized Flooding
- FEMA 102, Floodproofing Non-Residential Structures
- FEMA 84, Answers to Questions about the NFIP
- FEMA 54, Elevated Residential Structures Book
- FEMA 268, Protecting Floodplain Resources: A Guidebook for Communities
- FEMA 347, Above the Flood: Elevating Your Floodprone House
- FEMA 85, Protecting Manufactured Homes from Floods and Other Hazards

The manuals listed above are available for review at FEMA's website. For a complete guide to retrofitting homes for flood protection, see FEMA P-312, *Homeowner's Guide to Retrofitting 3rd Edition* (FEMA 2014). The primary methods of property protection in Los Angeles County are:

- Demolition/relocation.
- Elevation (structure or damage-prone components such as furnace or AC unit)
- Dry flood-proof (so water cannot get in).
- Wet flood-proof portions of the building (so water will not cause damage).
- Direct drainage away from the building.
- Drainage maintenance.
- Sewer Improvements.

### 6.2.1 Acquisition

One of the most effective approaches to preventing further flood damage to a building is acquisition and relocation or clearing of the structure. The property would then serve as open space or recreation area. Property owners retain the right to select this as a mitigation method. They may sell their property to a government agency or an agency dedicated to the preservation and management of local open space. The property owner can also relocate the building to another property. Alternatively, the building can be moved to another area of the same property, if that area is outside the flood hazard. The property owner can also take advantage of federal funding for such mitigation.

For the Los Angeles County RLAA, it has been determined that acquisition would not be a cost-effective alternative for structures with probable flood depths of 2 feet or less. "Cost-effective" means that the benefits of the action would equal or exceed the costs to implement the action. For this RLAA, a benefit is considered to be an avoided loss. The high value of property in Los Angeles County makes it unlikely that acquisition projects can be cost-effective.

### 6.2.2 Home Elevation

Sometimes dry or wet flood-proofing are not enough and greater measures must be taken. For example, if the floodwaters are too high for dry flood-proofing and the inhabited area is too low for wet flood-proofing, it may be necessary to raise the structure. Whenever the floor of a home is below the 1 percent annual chance (100-year) flood elevation, physically elevating the structure is often recommended as it is one of the most effective means to prevent flood damage. Financial assistance may be available for floodproofing. Los Angeles County requires all substantially improved residential buildings to have their lowest floor elevated 1 foot above the 100-year elevation. No basements are allowed in the flood hazard.

## 6.2.3 Dry Flood-Proofing

Dry flood-proofing consists of completely sealing around the exterior of the building so that water cannot enter the building (see Figure 6-1). Dry flood-proofing is not a good option for areas where floodwater is deep or flows quickly. The hydrostatic pressure and/or hydrodynamic force can structurally damage the building by causing the walls to collapse or causing the entire structure to float. However, in areas that have minimal velocity and low depth, dry flood-proofing can be a good option.

*Source: FEMA P-312, June 30, 2014*

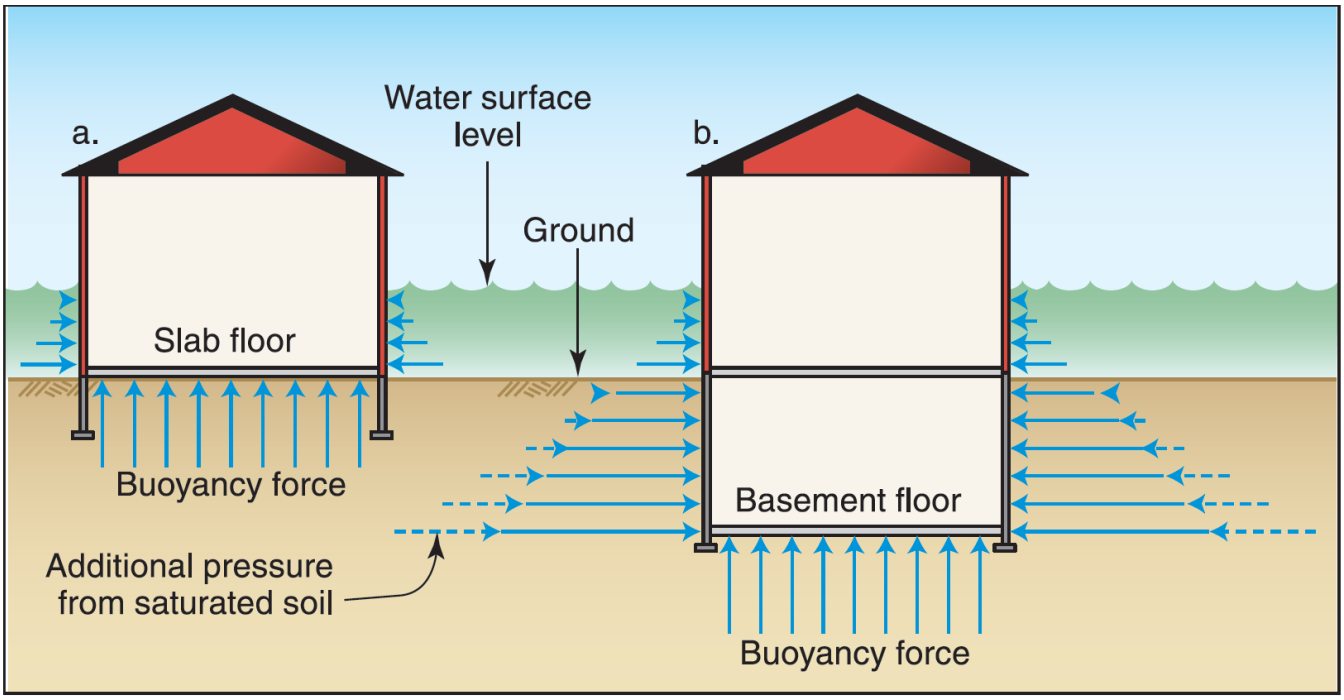



**Figure 6-1.** Dry Flood-Proofing Example

Many flood hazards can be mitigated with various forms of dry flood-proofing. Properties that do not have adequate protection of their low opening (window or basement door) can effectively raise the low opening height with a window well or a flood gate. The ultimate height of the low opening depends on several factors, such as: the level of flood protection desired, the appearance, and cost. The flood protection elevation could be set 1-foot higher than the existing low opening elevation, or it could be set to match the elevation of the lowest opening into a home that cannot be raised. This might be the elevation of the threshold of a door, for example.

The NFIP only allows dry flood-proofing for residential retrofits that are not classified as a substantial improvement. A substantial improvement is any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement.

## 6.2.4 Wet Flood-Proofing

Wet flood-proofing consists of modifying uninhabited portions of a home, such as a crawlspace, garage, or unfinished basement with flood-damage resistant materials, to allow floodwaters to enter the structure without causing damage (see Figure 6-2). Wet flood-proofing requires portions of the building to be cleared of valuable items and mechanical utilities.

*Source: FEMA P-312, June 30, 2014*

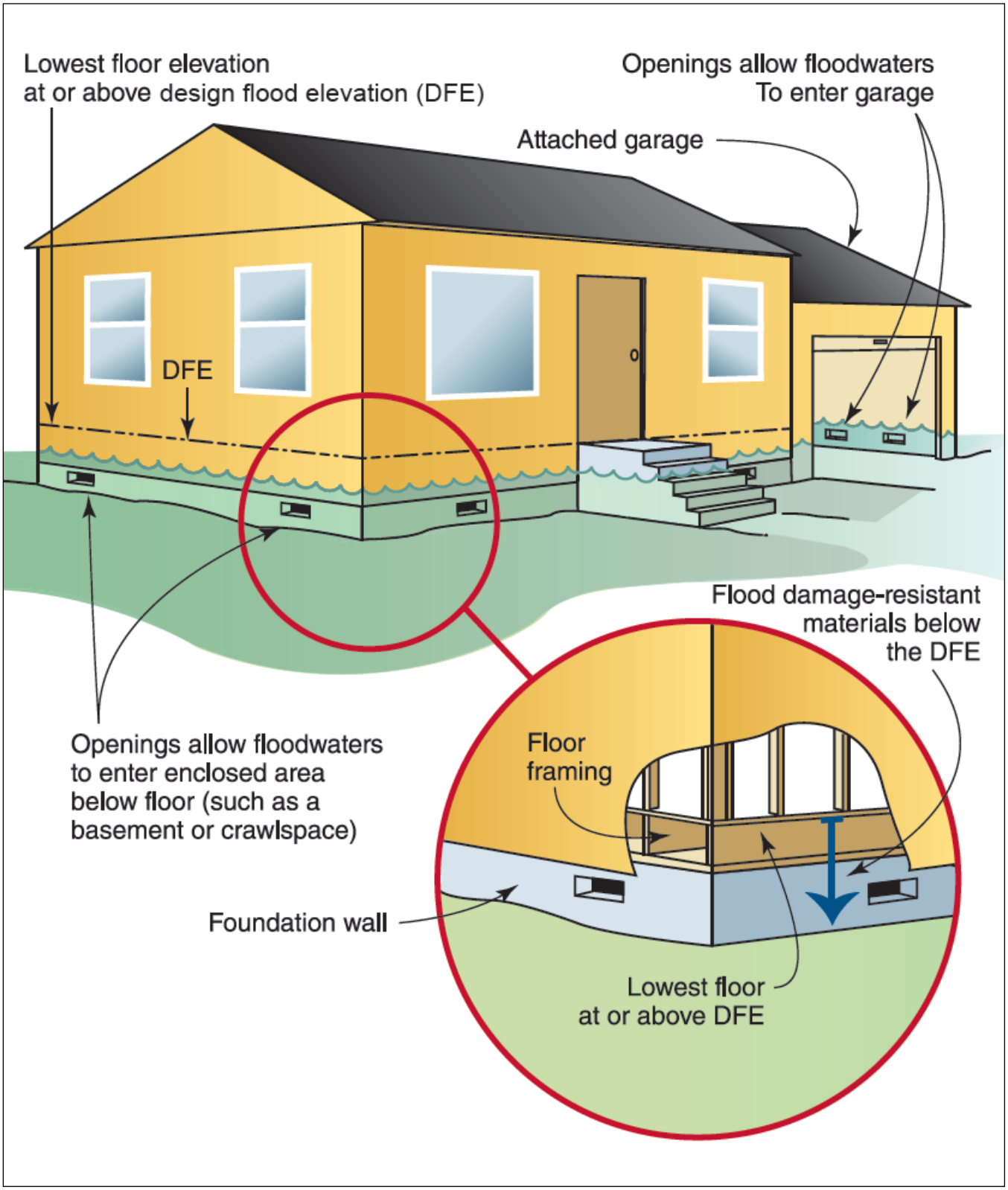



**Figure 6-2.** Wet Flood-Proofing Example

A key component of wet flood-proofing is providing openings large enough for the water to flow through the structure such that the elevation of the water in the structure is equal to the elevation of the water outside of the structure. This equilibrium of floodwater prevents hydrostatic pressure from damaging structural walls. The NFIP requires the bottoms of the openings to be no more than 1 foot above the lowest adjacent grade, whether that lowest adjacent grade is outside the structure or in the crawlspace.

### 6.2.5 Direct Drainage Away from the Building

In some cases, there are things that the property owner can do on-site such as directing shallow floodwater away from a flood-prone structure. Shallow flooding can often be kept away from a structure if some simple improvements are made to the yard. Sometimes structures are built at the bottom of a hill or in a natural drainage way or storage area, so that water naturally flows toward them.

One solution is to regrade the yard. If water flows toward the building; a new swale or wall can direct the flow to the street or a drainage way. Filling and grading next to the building can also direct shallow flooding away. Although water may remain in the yard temporarily, it is kept away from the structure. When these types of drainage modifications are made, care must be taken not to adversely affect the drainage patterns of adjacent properties. Over time, the swales along the lot lines or in the back yard may get filled in as property owners build fences, garages, sheds, swimming pools, and other obstructions up to the lot line. These drainage problems can be fixed by removing the obstructions and restoring the swales so they will carry water away from the building.

### 6.2.6 Drainage Maintenance

Dumping into the drainage system is a Los Angeles County Code violation. Debris can accumulate and restrict the flow of stormwater, increasing the potential of localized flooding. To report flood problems or illegal dumping to the drainage system, call (888) CLEAN LA (253-2652).

### 6.2.7 Sewer Improvements

Heavy rains can saturate the soil and infiltrate the sanitary sewer system through leaky joints or cracks in the pipes. The inflow of stormwater floods the sanitary sewer system causing water to back-up into the home through lower level plumbing fixtures. This occurrence can be prevented by installing a sewer backflow preventer (see Figure 6-3). A backflow preventer will allow the sanitary sewer water to flow freely from the home to the sewer, but restrict the reverse flow. Backflow preventers do require maintenance and can fail if debris in the sewer prevents the valve seating properly. An overhead sewer system pumps wastewater from basement level plumbing fixtures up to an elevation near the ground level, where it can drain by gravity into the sewer service line. This higher sewer makes it unlikely that water will back-up into the building.

### 6.2.8 Temporary Barriers

Several types of temporary barriers are available to address typical flooding problems. They work to direct drainage away from structures with the same principles as permanent barriers such as floodwalls or levees, but can be removed, stored, and reused in subsequent flood events.

## 6.3 NATURAL RESOURCE PROTECTION

Care should be taken to maintain the streams, wetlands and other natural resources within a floodplain or repetitive loss area. Removing debris from streams and channels prevents obstructions. Preserving and restoring natural areas provides flood protection, preserves water quality and provides natural habitat.

*Source: FEMA P-312, June 30, 2014*

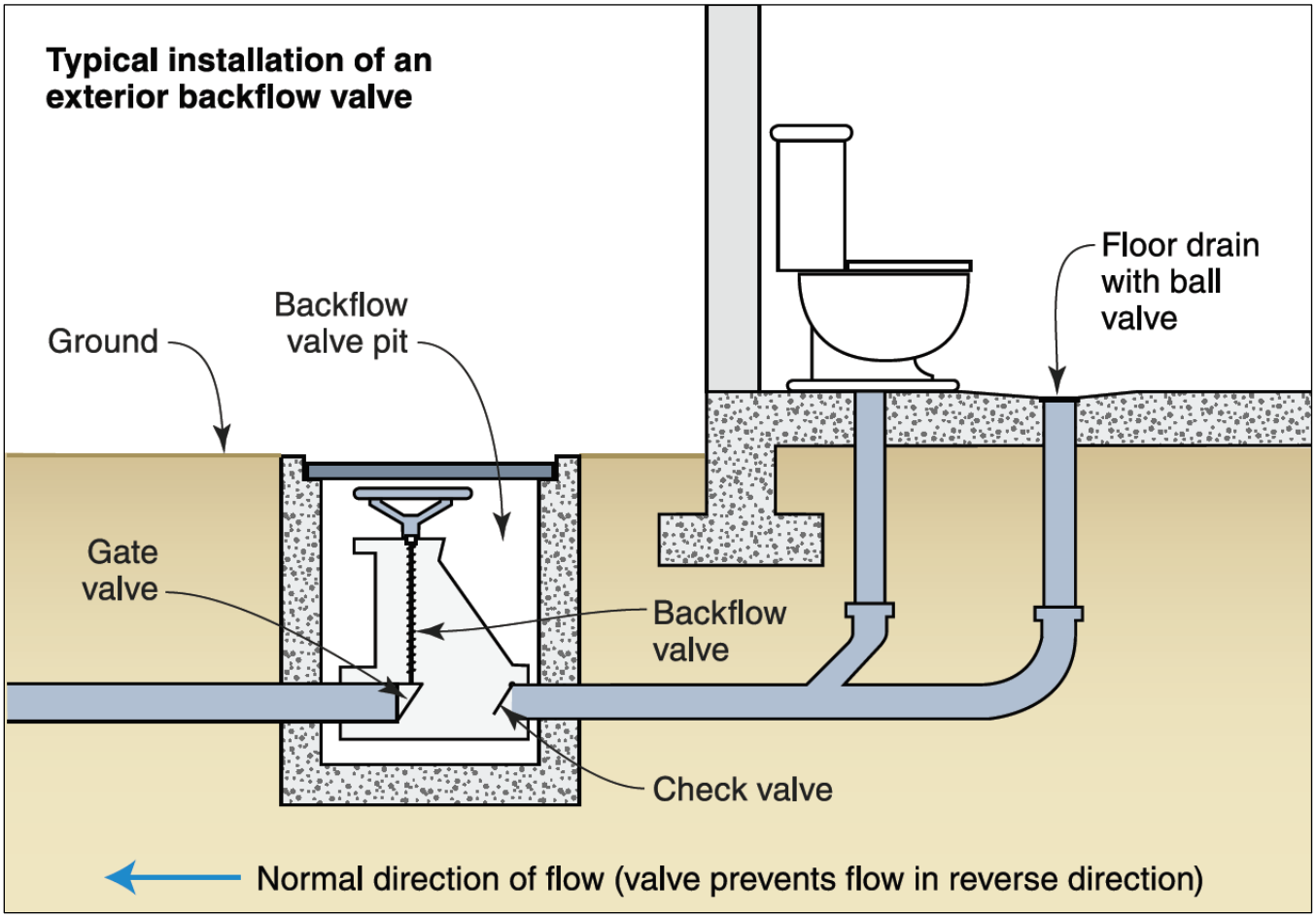



**Figure 6-3.** Sewer Backflow Valve Installation Example

## 6.4 EMERGENCY SERVICES

Advance identification of an impending storm is only the first part of an effective Flood Warning and Response Plan. To truly realize the benefit of an early flood warning system, the warning must be disseminated quickly to floodplain occupants, repetitive loss areas and critical facilities. Appropriate response activities must then be implemented, such as: road closures, directing evacuations, sandbagging, and moving building contents above flood levels. Finally, a community should take measures to protect public health and safety and facilitate recovery. These measures may include cleaning up debris and garbage, clearing streets, and ensuring that citizens have shelter, food, and safe drinking water.

## 6.5 STRUCTURAL PROJECTS

Structural projects keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff. Los Angeles County Public Works develops and implements capital projects. The 2035 General Plan Implementation Program identifies a goal project of the Los Angeles County Department of Regional Planning and Los Angeles County Public Works jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas.

## 6.6 PUBLIC INFORMATION

One of the most important, and often overlooked, aspects of mitigation is public awareness. Awareness starts with recognition of the flood risk. FIRM panels, which designate areas of a community according to various levels of flood risk, can be viewed at www.FEMA.gov. Also, real estate transactions require disclosure of known flood hazards. The next level of awareness is related to flood hazard mitigation measures. Often homeowners can greatly reduce their risks with mitigation efforts if they are aware of the risks.. For that reason, as part of this analysis, every resident in the repetitive loss area has been contacted and informed of the opportunity to review this Report. In addition, Los Angeles County Public Works sends out an annual outreach letter to every resident in each repetitive loss area.

Los Angeles County has defined a program for public information as part of its *2020 Comprehensive Floodplain Management Plan*. This program for public information includes a strategy for providing important information about property protection to property owners in the repetitive loss areas identified under this RLAA.

# PART 2—ANALYSIS OF INDIVIDUAL REPETITIVE LOSS AREAS

# 7. Agua Dulce Repetitive Loss Area

## 7.1 PROBLEM STATEMENT

Figure 7-1 shows the Agua Dulce Repetitive Loss Area. Flood zones are mapped on the FEMA FIRM. This repetitive loss area is in the San Gabriel Mountains, east of Santa Clarita. The targeted repetitive loss property for this area is located within the floodplain of Mint Canyon. The property is in Zone A, which has significant risk from a 1 percent annual chance (100-year) flood. The culvert under Sierra Highway approximately 250 feet upstream from the repetitive loss property is subject to becoming obstructed by debris from upstream. When runoff exceeds the capacity of the culvert, street flooding occurs and the subject property is subject to inundation. In addition, the property owner reported that the upstream neighbor improperly altered the natural creek and encroached on the floodplain and caused flow breakout from the channel. Mint Canyon borders the repetitive loss property, eroding and flooding its backyard. The property owner placed log retaining walls around the street-side property entrance. The County built a berm on top of the channel bank near the culvert under the Sierra Highway in an effort to contain the water inside the channel.

## 7.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 7-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 7-1.** Repetitive Loss Properties in Agua Dulce Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0091339** | 37 | 3/95, 2/98 | $4,321.16 | No |
| ***Identified Flood Cause:*** Property is located in the floodplain. Repetitive flooding possibly caused by street flooding when storm flows exceed the capacity of an upstream culvert. No reported losses since 1998. | | | | |

## 7.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There are three properties with a total of 20 insurable buildings included in this repetitive loss area. Table 7-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 7-2.** All Properties in Agua Dulce Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **AD-1** | 6 | Crawlspace | D7B | Enlarge culvert<br>Drainage system maintenance<br>Acquisition<br>Elevation<br>Public education |
| **AD-2** | 12 | Crawlspace | D7 | Enlarge culvert<br>Drainage system maintenance<br>Acquisition<br>Elevation<br>Public education |
| **AD-3** | 2 | Crawlspace | D55C | Enlarge culvert<br>Drainage system maintenance<br>Acquisition<br>Elevation<br>Public education |
| **Total** | **20** | | | |

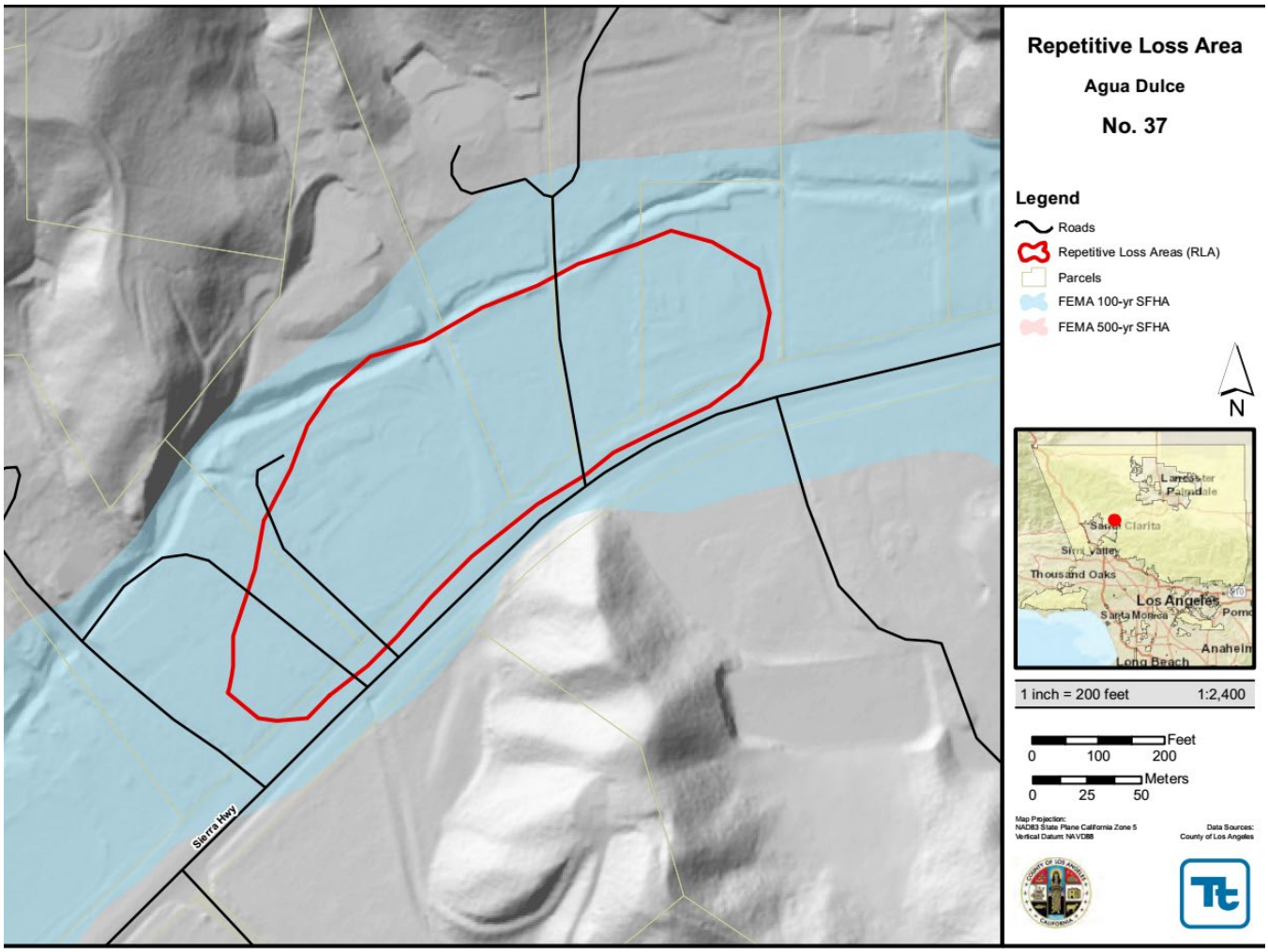



**Figure 7-1.** Agua Dulce Repetitive Loss Area

# 8. ALTADENA A REPETITIVE LOSS AREA

## 8.1 PROBLEM STATEMENT

The Altadena A Repetitive Loss Area is located in the San Gabriel Mountains, east of Burbank near Altadena. There is a single-property repetitive loss area on Alzada Drive. No map of this repetitive loss area is provided, due to privacy concerns. The area is located at the bottom of a hill and is possibly impacted by storm runoff from surrounding hills. There is a 2-foot-wide and 1-foot-deep dry earthen ditch running west of but outside of the property. The property is on higher ground than the bank elevations of the ditch. Repetitive flood history for this area can be associated with post-wildfire conditions.

## 8.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 8-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 8-1.** Repetitive Loss Properties in Altadena A Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0056933** | 35 | 2/91, 2/92 | $2,725 | No |
| ***Identified Flood Cause:*** Hillside drainage problem. | | | | |

## 8.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is one property included in this repetitive loss area, with a total of two insurable buildings. Table 8-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 8-2.** All Properties in Altadena A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ALT-A1** | 2 | Crawlspace | No Information | Drainage improvement<br>Elevation<br>Public education |
| **Total** | **2** | | | |

# 9. ALTADENA B REPETITIVE LOSS AREA

## 9.1 PROBLEM STATEMENT

The Altadena B Repetitive Loss Area is in the San Gabriel Mountains, east of Burbank near Altadena. There is a single-property repetitive loss area on Hollyslope Road. No map of this repetitive loss area is provided, due to privacy concerns. The target repetitive loss property for this area is adjacent to a private, unmapped channel within a private residential community. Repetitive flood history for this area can be associated with post-wildfire conditions.

## 9.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 9-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 9-1.** Repetitive Loss Properties in Altadena B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0091348** | 36 | 3/95, 2/98 | $4,321 | Yes[a] |

***Identified Flood Cause:*** Property is located near the privately constructed channel within the private hillside residential community. According to property owner who resides in the community, the channel has a concrete bottom but is not engineered. After a brush fire in 1993, hillside storm runoff in the channel destroyed a private studio in the floodplain and eroded the bank protections, which were restored and improved later. In a separate incident, the basement was flooded due to a backyard drainage deficiency, which was improved with a 6-inch berm.

a. An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. Area will be removed from RLAA once correction is processed by FEMA.

## 9.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is only one property included in this repetitive loss area. It has three insurable buildings. Table 9-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 9-2.** All Properties in Altadena B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ALT-B1** | 3 | Crawlspace | D7A | Private channel maintenance<br>Establish post-fire protocols<br>Public education |
| **Total** | **3** | | | |

# 10. CALABASAS A REPETITIVE LOSS AREA

## 10.1 PROBLEM STATEMENT

The Calabasas A Repetitive Loss Area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is a single-property repetitive loss area on Las Virgenes Canyon Road. No map of this repetitive loss area is provided, due to privacy concerns. This area is a camping ground on privately owned land, located at the bottom of a hillside area. The steep hill at the west corner, the highest point of the property, is prone to mudflow from the hill whenever it rains. The flow then runs along the private road across the camping ground between the camp housing facilities to the natural creek at the east property boundary. The owner placed sandbags in some locations to temporarily protect the housing facilities near the bottom of the hill. The owner reported that the sandbags were strategically placed to protect the housing facilities, and if the pattern of hillside runoff changes, as it did in 1996 after the brush fire, the property would again be at the risk. The subject property is not located in or near a FEMA-mapped floodplain.

## 10.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 10-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 10-1.** Repetitive Loss Properties in Calabasas A Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0072498** | 26 | 2/92, 1/95, 1/95, 2/98 | $6,436 | No |
| ***Identified Flood Cause:*** Mudflow from the hillside at the east end of the property and along the private road within the property. | | | | |

## 10.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is only one property included in this repetitive loss area. It has 12 insurable buildings. Table 10-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 10-2.** All Properties in Calabasas A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **CA-A1** | 12 | Slab | D55A | Drainage improvement<br>Drainage system maintenance<br>Public education |
| **Total** | **12** | | | |

# 11. CALABASAS B REPETITIVE LOSS AREA

## 11.1 PROBLEM STATEMENT

Figure 11-1 shows the Calabasas B Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. The flooding appears to be associated with urban drainage issues associated with runoff from streets as well as grading issues from property to property. The repetitive-loss property for this area is located at the low point of the street and flows entering the front yard can be trapped and cause damage to the house, including foundation cracks.

## 11.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 11-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 11-1.** Repetitive Loss Properties in Calabasas B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0136718** | 41 | 2/98, 12/04 | $4,105 | No |

***Identified Flood Cause:*** The subject property is adjacent to a higher neighboring property and receives runoff that can seep into the house. A former problem is that runoff from the roof enters planters in front of the house. The owner has installed pipes and drains in the planters to evacuate the water from the planters. Street level is higher than the subject property, potentially creating a condition where runoff could enter from the street. However, the owner indicated that an existing storm drain adequately captures flows from the street.

## 11.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Eighteen properties with 33 insurable buildings have been identified in this repetitive loss area. Table 11-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 11-2.** All Properties in Calabasas B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **CA-B1** | 2 | Crawlspace | D11A | Construct a berm to prevent off-site flows from entering the property. Provide grading and drainage to avoid water impoundment near the structure. Convert planter to pavement near the problem area. Continue to inspect the foundation for cracks and repair. |
| **CA-B2** | 2 | Crawlspace | D8C | Drainage system maintenance<br>Public education |
| **CA-B3** | 1 | Crawlspace | No Info | Drainage system maintenance<br>Public education |
| **CA-B4** | 1 | Crawlspace | D9B | Drainage system maintenance<br>Public education |
| **CA-B5** | 1 | Crawlspace | D9C | Drainage system maintenance<br>Public education |
| **CA-B6** | 3 | Crawlspace | D10D | Drainage system maintenance<br>Public education |
| **CA-B7** | 3 | Crawlspace | D75D | Drainage system maintenance<br>Public education |
| **CA-B8** | 2 | Crawlspace | D85C | Drainage system maintenance<br>Public education |
| **CA-B9** | 2 | Crawlspace | D11D | Drainage system maintenance<br>Public education |
| **CA-B10** | 2 | Crawlspace | D11A | Drainage system maintenance<br>Public education |
| **CA-B11** | 3 | Crawlspace | D8C | Drainage system maintenance<br>Public education |
| **CA-B12** | 2 | Crawlspace | D11D | Drainage system maintenance<br>Public education |
| **CA-B13** | 1 | Crawlspace | D10C | Drainage system maintenance<br>Public education |
| **CA-B14** | 1 | Crawlspace | D105A | Drainage system maintenance<br>Public education |
| **CA-B15** | 2 | Crawlspace | D11A | Drainage system maintenance<br>Public education |
| **CA-B16** | 1 | Crawlspace | D10B | Drainage system maintenance<br>Public education |
| **CA-B17** | 2 | Crawlspace | D11A | Drainage system maintenance<br>Public education |
| **CA-B18** | 2 | Crawlspace | D9B | Drainage system maintenance<br>Public education |
| **Total** | **33** | | | |

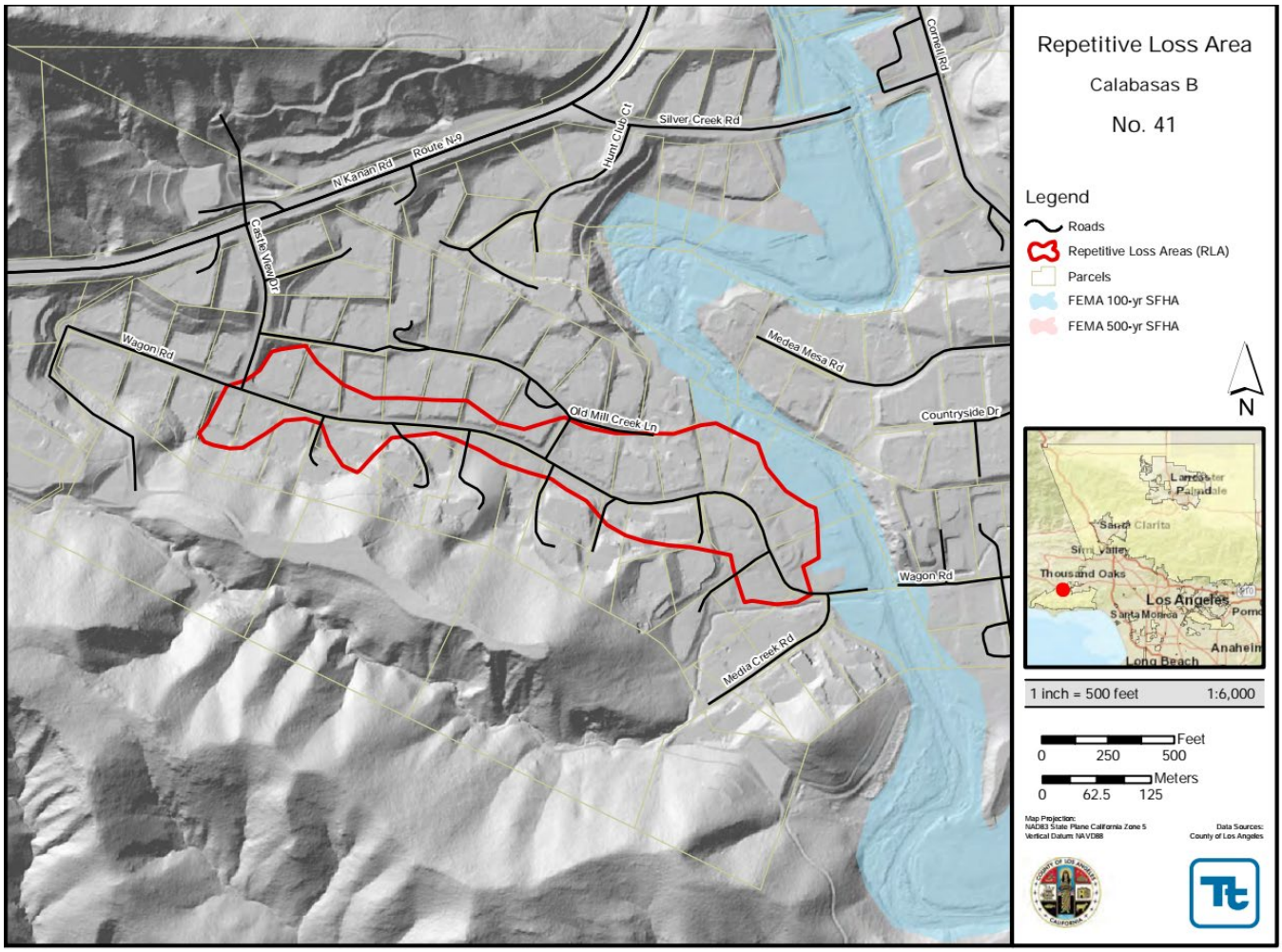



**Figure 11-1.** Calabasas B Repetitive Loss Area

# 12. COLD CREEK A REPETITIVE LOSS AREA

## 12.1 PROBLEM STATEMENT

Figure 12-1 shows the Cold Creek A Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. The single repetitive loss property is not within a FEMA-mapped floodplain, but the delineated repetitive loss area does parallel an approximate Zone A area mapped along Cold Creek. There is significant topographic relief in this area. The cause of repetitive flooding in the area is associated with the blockage or obstruction of contributory drainages to Cold Creek off the hillside areas. Drainage ways and flow paths can become blocked by debris (downed trees and shrubs, leaves, sediment, and trash) collected by overland flows. When the drainages are blocked, stormwater flows overland to the streets, where there are few if any drainage conveyances. The properties in the Cold Creek A Repetitive Loss Area are topographically subject to flooding when these situations occur due to their locations below roadways.

## 12.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 12-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 12-1.** Repetitive Loss Properties in Cold Creek A Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **#0071255** | 27 | 02/92, 01/93 | $23,983 | No |

***Identified Flood Cause:*** Is located on high ground and flooded by excessive storm runoff from surrounding hills. It was also determined from the FEMA FIRM in Figure 12-1 that the property was not in the floodplain of Cold Canyon, adjacent to the property. No flooding activity since 1992.

## 12.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with two insurable buildings have been identified in this repetitive loss area. Table 12-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 12-2.** All Properties in Cold Creek A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **CO-A1** | 1 | Crawlspace | D5A | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-A2** | 1 | Slab | D9C | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **Total** | **2** | | | |

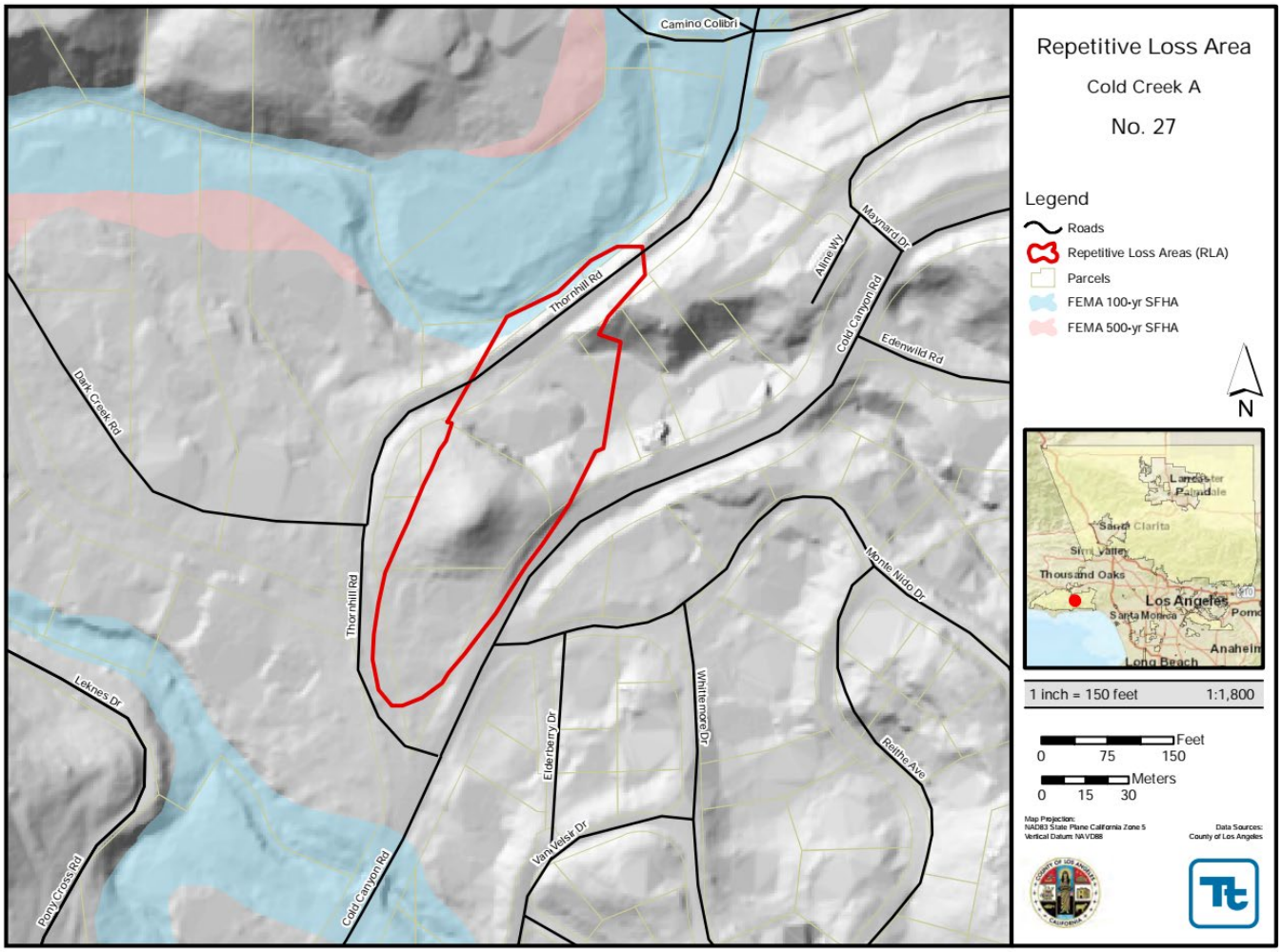



**Figure 12-1.** Cold Creek A Repetitive Loss Area

# 13. COLD CREEK B REPETITIVE LOSS AREA

## 13.1 PROBLEM STATEMENT

Figure 13-1 shows the Cold Creek B Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. The single repetitive loss property is not within a FEMA-mapped floodplain, but the delineated repetitive loss area does parallel an approximate Zone A area mapped along Cold Creek. There is significant topographic relief in this area. The cause of repetitive flooding in the area is associated with the blockage or obstruction of contributory drainages to Cold Creek off the hillside areas. Drainage ways and flow paths can become blocked by debris (downed trees and shrubs, leaves, sediment, and trash) collected by overland flows. When the drainages are blocked, stormwater flows overland to the streets, where there are few if any drainage conveyances. The properties in the Cold Creek B Repetitive Loss Area are topographically subject to flooding when these situations occur due to their locations below roadways.

## 13.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 13-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 13-1.** Repetitive Loss Properties in Cold Creek B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **#0148768** | 45 | 12/04, 2/05 | $8,062 | No |

***Identified Flood Cause:*** Property is lower than the adjacent street, where flows concentrate during a rainstorm. The property is adjacent to Cold Creek (Zone X (shaded) in FIRM); however, the owner reported that no issues were caused by creek flows. The owner reported that he has provided sufficient catch basins to handle the flows. Without proper diversion and control of runoff from the streets, future flood damage may occur.

## 13.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Seven properties with nine insurable buildings have been identified in this repetitive loss area. Table 13-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 13-2.** All Properties in Cold Creek B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **CO-B1** | 2 | Slab | D75C | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B2** | 1 | Slab | D7C | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B3** | 1 | Slab | D75B | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B4** | 1 | Slab | D45A | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B5** | 1 | Slab | D55B | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B6** | 2 | Slab | No Information | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **CO-B7** | 1 | Crawlspace | D4B | Public education<br>Local drainage improvements<br>Drainage maintenance |
| **Total** | **9** | | | |

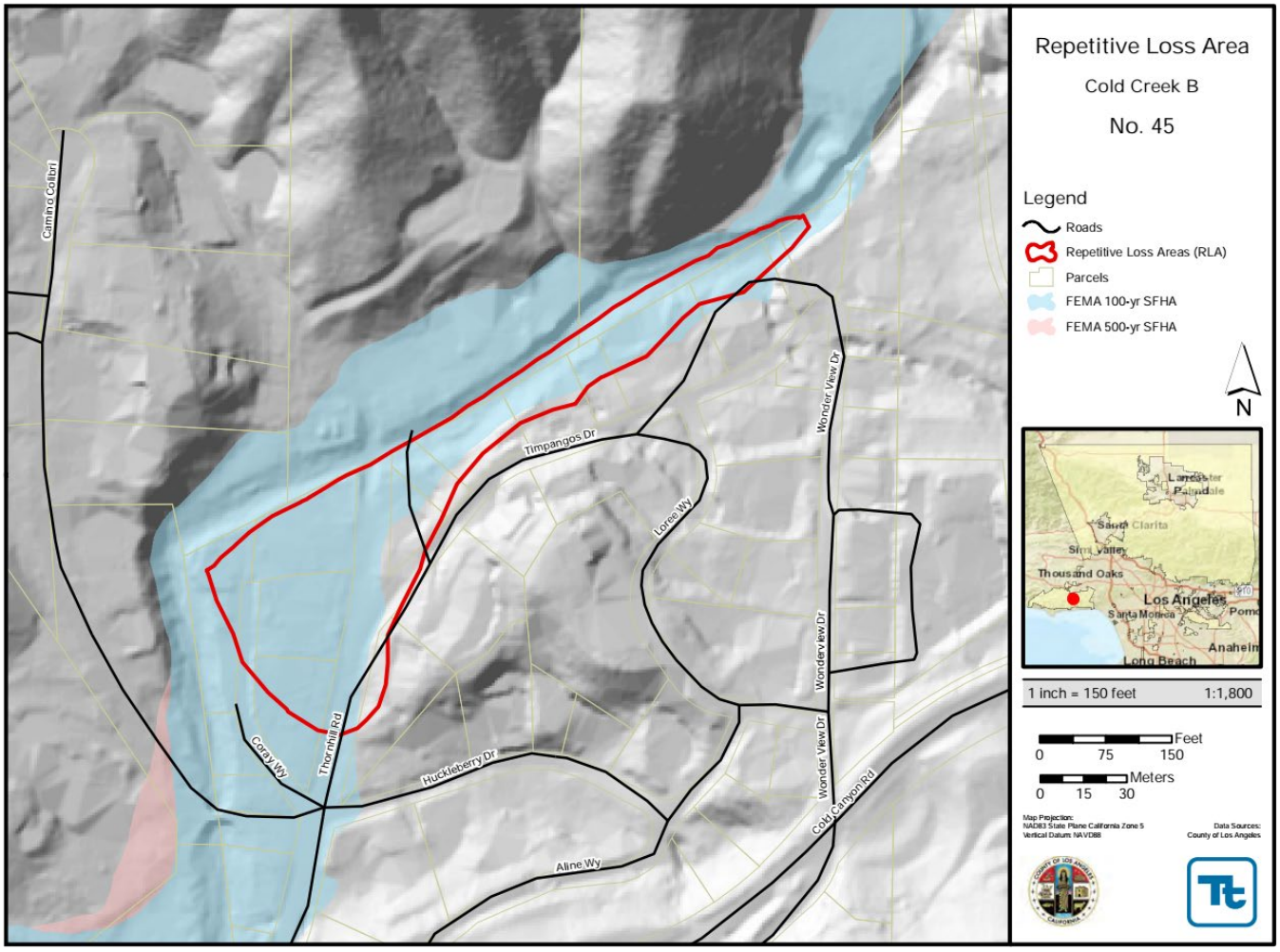



**Figure 13-1.** Cold Creek B Repetitive Loss Area

# 14. DEL SUR REPETITIVE LOSS AREA

## 14.1 PROBLEM STATEMENT

Figure 14-1 shows the Del Sur Repetitive Loss Area. This area is in the northwestern part of Los Angeles County. Flood zones are mapped on FEMA FIRMs. This repetitive-loss area is within a FEMA-designated 100-year floodplain, and the dates of loss for the claims on the property coincide with federally declared flood disasters. No other loss history suggests any flooding of this area other than from the riverine overbank flooding reflected in the FEMA FIRMs. The properties identified for this area analysis were selected due to their proximity to the stream.

## 14.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 14-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 14-1.** Repetitive Loss Properties in Del Sur Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **#0138781** | 55 | 1/05, 2/05 | $14,034 | No |

***Identified Flood Cause:*** This property is within a FEMA designated 100-year floodplain and the dates of loss for the two claims coincide with significant flood events in LA county that received federal disaster declarations (DR-1577 and DR-1585). The cause of flooding for this area is commensurate with the flood risk reflected on the FEMA FIRM for this area.

## 14.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with 10 insurable buildings have been identified in this repetitive loss area. Table 14-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 14-2.** All Properties in Del Sur Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **DS1** | 3 | Crawlspace | D8B | Elevation<br>Public education<br>Local drainage improvements<br>Drainage maintenance |
| **DS2** | 7 | Crawlspace | D75B | Elevation<br>Public education<br>Local drainage improvements<br>Drainage maintenance |
| **Total** | **10** | | | |

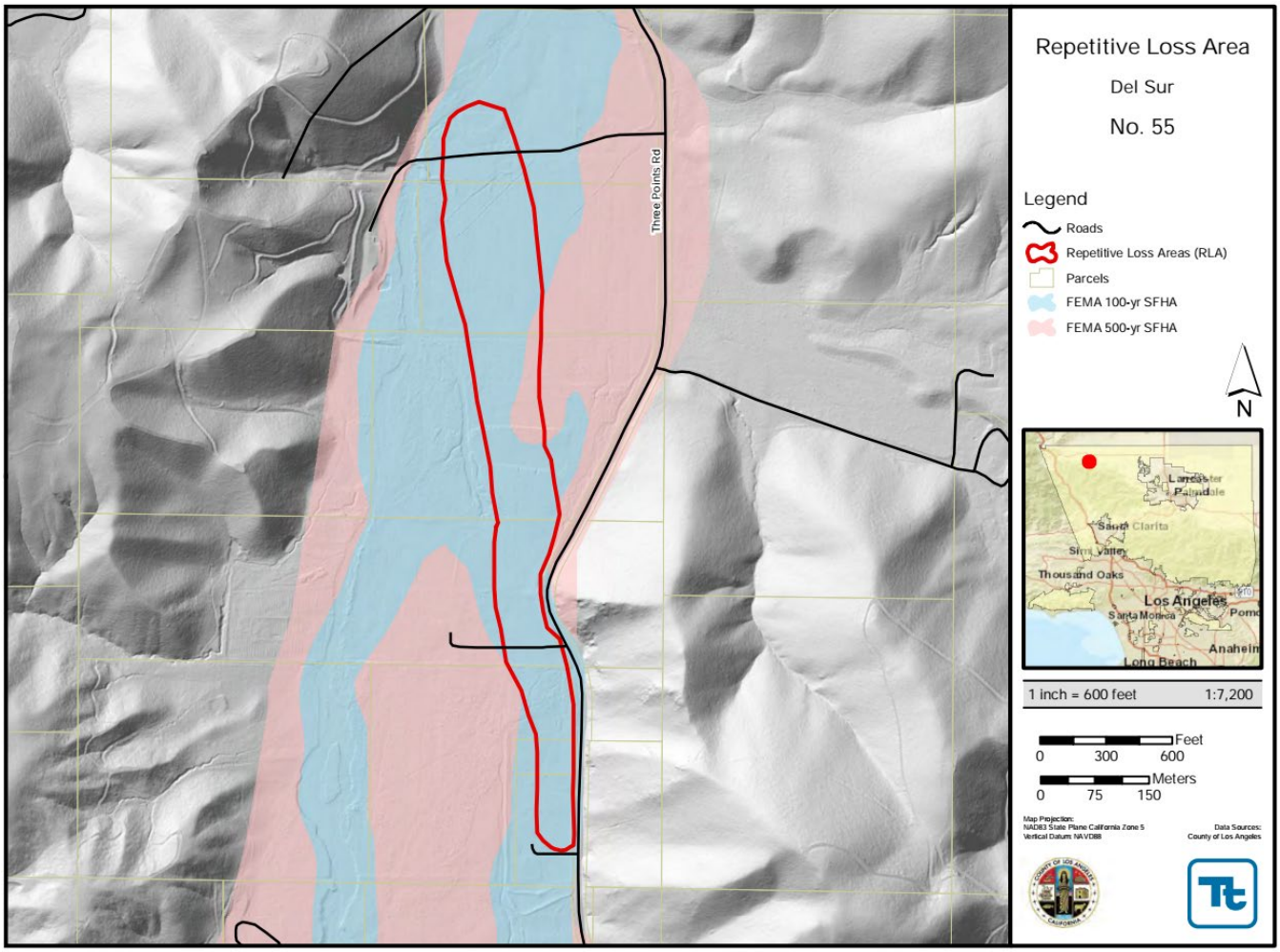



**Figure 14-1.** Del Sur Repetitive Loss Area

# 15. LOWER TOPANGA CANYON REPETITIVE LOSS AREA

## 15.1 PROBLEM STATEMENT

The Lower Topanga Canyon Repetitive Loss Area is shown in Figure 15-1. This area is in the Topanga Canyon area of Los Angeles County, about 26 miles northwest of downtown Los Angeles. All of the areas along the lower reach of the Topanga Canyon channel (sometimes referred to as the Rodeo Grounds area) were frequently inundated by Topanga Canyon flood flows. These properties are within the lower reach of Topanga Canyon, with ground elevation similar to the channel invert (i.e. lowest elevation of the channel). This information was derived from analysis of the topographic data as described in Chapter 2. Rodeo Grounds Road is higher than the invert; however, the berm is not sufficient to confine the floodwater and the Rodeo Grounds low-lying areas have been subject to severe flood damage. Previous insurance claims were filed by residents who leased the properties.

## 15.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 15-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

**Table 15-1.** Repetitive Loss Properties in Lower Topanga Canyon Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0014900** | 19 | 3/78, 2/80 | $9,374 | Yes[a] |
| ***Identified Flood Cause:*** Property in the channel and in Flood Zone AE of Lower Topanga Canyon | | | | |
| **0017941** | 20 | 1/78, 2/80, 1/83 | $11,180 | Yes[a] |
| ***Identified Flood Cause:*** Property in the channel and in Flood Zone AE of Lower Topanga Canyon | | | | |
| **0017942** | 21 | 1/78, 1/80, 2/80, 1/83, 2/92, 1/95 | $7,744 | Yes[a] |
| ***Identified Flood Cause:*** Property in the channel and in Flood Zone AE of Lower Topanga Canyon | | | | |
| **0028440** | 22 | 1/78, 3/78 | $8,806 | Yes[a] |
| ***Identified Flood Cause:*** Property in the channel and in Flood Zone AE of Lower Topanga Canyon | | | | |
| **0017940** | 23 | 1/78, 3/78, 2/80 | $3,999 | Yes[a] |
| ***Identified Flood Cause:*** Property in the channel and in Flood Zone AE of Lower Topanga Canyon | | | | |

a. The secondary analysis for this area determined that there are no longer structures on any of the properties. The County will need to submit new AW-501s for this area.

## 15.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

The identified five repetitive loss properties are the only properties in this repetitive loss area. The secondary analysis for this area determined that there are no longer structures on any of the properties. The County will need to submit new AW-501s for this area. Until these corrections can be made, this area will remain in this RLAA, however no additional properties are identified.

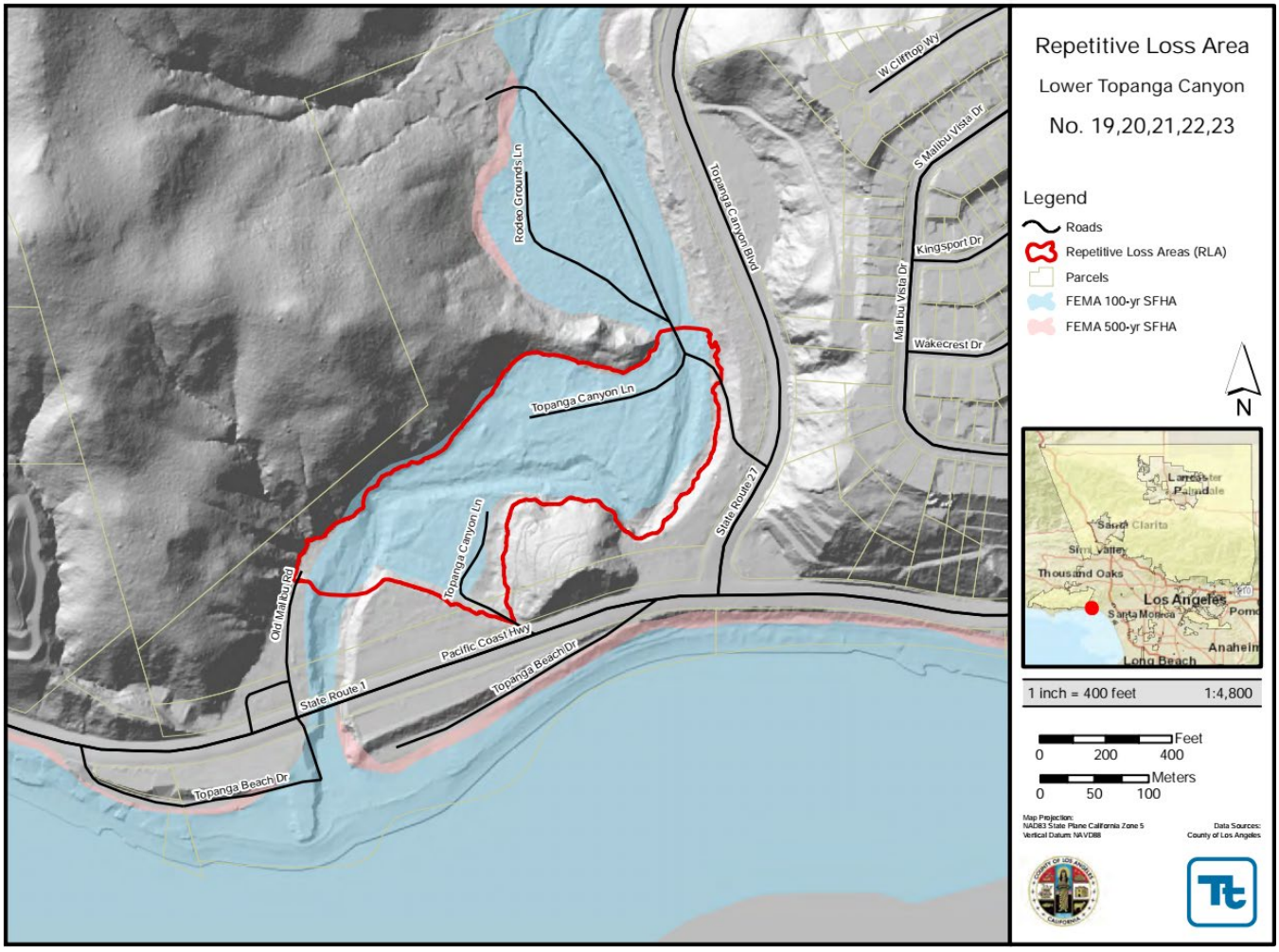



**Figure 15-1.** Lower Topanga Canyon Repetitive Loss Area

# 16. MALIBOU LAKE REPETITIVE LOSS AREA

## 16.1 PROBLEM STATEMENT

Figure 16-1 shows the Malibou Lake repetitive loss area. This area includes 19 repetitive loss properties, one of which has been mitigated, one of which was destroyed, and 17 of which are unmitigated. Malibou Lake is a privately owned and operated reservoir in the southwest area of Los Angeles County near the Ventura County/Los Angeles County line. The contributing watershed starts in Ventura Hidden Valley in Ventura County, approximately 10 miles northwest of Malibou Lake. Stormwater runoff enters the ungated Lake Sherwood and flows through Potrero Valley Creek, Westlake Lake, and Triunfo Canyon Creek before emptying into Malibou Lake. Westlake Lake is 4.7 miles northwest of Malibou Lake and is in both Ventura and Los Angeles Counties. Malibou Lake also receives runoff from Medea Creek, a major tributary north of the lake. The total drainage area at the spillway of Malibou Lake is 64 square miles.

The lake has a surface area of approximately 20 acres at spillway elevation. The contributory watershed covers portions of Ventura County and Los Angeles County and crosses the boundaries of three city: Thousand Oaks, Agoura Hills, and Westlake Village.

Most of the repetitive loss properties in this area are damaged by rising water of Malibou Lake during flood events. Malibou Lake lies at the confluence of Triunfo Canyon and Medea Creek. The terrain in the area around the lake is steep and rocky, causing rainwater to concentrate at the lake quickly. In addition, the watershed is highly urbanized, so its runoff is significant. The storage below the spillway is ineffective for peak flow attenuation during normal times since the water elevation is maintained at the spillway elevation at all times. During flood events, the lake is partially filled with sediments, reducing its recreational functions.

## 16.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 16-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

## 16.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Fifty-five properties with 57 insurable buildings have been identified in this repetitive loss area. Table 16-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 16-1.** Repetitive Loss Properties in Malibou Lake Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0001165** | 46 | 2/98, 1/01, 3/01, 2/03, 2/04, 1/05, 2/05, 1/08, 1/10 | $11,674 | No |
| **0012820** | 46 | 2/92; 2/93; 1/95; 2/98; 3/01; 12/04; 1/05; 2/17 | $38,993 | No |
| **0028444** | 46 | 3/78; 2/80; 1/83; 3/83; 2/92; 1/95; 2/98 | $13,414 | No |

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0028487** | 46 | 3/78; 2/80 | $9,398 | No |
| **0035727** | 46 | 2/80; 1/83; 3/83; 2/92; 1/95; 2/98 | $25,272 | No |
| **0039962** | 46 | 2/80; 2/92; 3/95; 2/98 | $2,859 | No |
| **0040087** | 46 | 2/80; 3/83; 2/92 | $20,926 | No |
| **0046576** | 46 | 2/80; 3/83; 2/92; 2/93; 1/95; 3/95; 2/98; | $6,716 | No |
| **0047197** | 46 | 2/80; 3/83; 2/92 | $5,538 | No |
| **0049496** | 46 | 3/83; 2/92; 1/95; 2/98 | $9,792 | No |
| **0052974** | 46 | 2/80; 1/83; 2/92; 1/95; 3/95; 2/98; 1/05; 2/17 | $14,207 | No |
| **0057971** | 46 | 3/83; 2/92; 1/95 | $9,150 | Destroyed |
| **0071413** | 46 | 2/92; 1/95; 3/95 | $16,264 | Yes[a] |
| **0071417** | 46 | 1/83; 2/92; 1/95; 2/98; 2/01; 1/05 | $2,649 | No |
| **0072406** | 46 | 2/93; 1/95 | $4,391 | No |
| **0073653** | 46 | 1/92; 1/95 | $65,231 | No |
| **0091232** | 46 | 2/98; 1/05 | $14,607 | No |
| **0093872** | 46 | 2/80; 1/95; 2/98 | $4,288 | No |
| **0137792** | 46 | 3/01; 1/05 | $1,557 | No |

a. An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. Area will be removed from RLAA once correction is processed by FEMA.

**Table 16-2.** All Properties in Malibou Lake Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ML1** | 1 | Crawlspace | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML2** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML3** | 1 | Slab | D75B | Elevation<br>Flood-proofing<br>Floodwall<br>Public education |
| **ML4** | 1 | Slab | D75B | All structures removed |
| **ML5** | 1 | slab | D75B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML6** | 1 | Slab | D75B | Elevation,<br>Floodwall<br>Flood-proofing<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ML7** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML8** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML9** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML10** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML11** | 1 | Slab | D75B | Public Education |
| **ML12** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML13** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML14** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML15** | 1 | Slab | D75B | Elevation<br>Acquisition<br>Public education |
| **ML16** | 1 | Slab | D75B | Confine upstream inflow<br>Upsize the pipe opening<br>Improve storm drain<br>Add a truss-rack at the inlet<br>Public education |
| **ML17** | 1 | Slab | D75B | Elevation<br>Acquisition<br>Public education |
| **ML18** | 1 | Slab | D75B | Install perimeter diversion ditches, walls, and berms to prevent street runoff entering the property<br>Raise and pave planting areas with ditches to drain, Build a cutoff wall to keep storm runoff from street flows away from the structure.<br>Provide a ditch crossing the driveway to divert flows away from the structure<br>Build cutoff wall to prevent seepage<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ML19** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Public education |
| **ML20** | 1 | Slab | D75B | Maintain drainage flow away from property<br>Public education |
| **ML21** | 1 | Slab | D75B | Maintain drainage flow away from property<br>Public education |
| **ML22** | 1 | Slab | D75B | Flood-proofing of the garage<br>Public education |
| **ML23** | 1 | Slab | D75B | Flood-proofing<br>Public education |
| **ML24** | 1 | Slab | D75B | Flood-proofing<br>Public education |
| **ML25** | 1 | Slab | D75B | Flood-proofing<br>Public education |
| **ML26** | 1 | Slab | D75B | Public education for whole property<br>Flood-proofing for the boat house<br>For the main house:<br>Flood-proofing<br>Abandon lowest floor<br>Elevation<br>Acquisition |
| **ML27** | 1 | Slab | D75B | Flood-proofing<br>Public education |
| **ML28** | 1 | Slab | D75B | Flood-proofing<br>Public Education |
| **ML29** | 1 | Slab | D75B | Flood-proofing<br>Public Education |
| **ML30** | 1 | Crawlspace | D75B | Flood-proofing<br>Public Education |
| **ML31** | 1 | Crawlspace | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Flood-proofing<br>Floodwall<br>Public education |
| **ML32** | 1 | Slab | D75B | Elevation, acquisition<br>Flood-proofing<br>Public education |
| **ML33** | 1 | Slab | D75B | Flood-proofing<br>Floodwall<br>Public education |
| **ML34** | 1 | Slab | D75B | Floodwall<br>Flood-proofing<br>Public Education |
| **ML35** | 1 | Slab | D6B | Temporary barriers to protect doors, divert water around home, decrease water coming in from street/driveway<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ML36** | 1 | Slab | D75B | Mitigation measures for main structure:<br>Acquisition<br>Flood-proofing<br>Floodwall<br>Public education |
| **ML37** | 1 | Slab | D75B | Flood-proof basement garage<br>Floodwall<br>Public education |
| **ML38** | 2 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public Education |
| **ML39** | 1 | Slab | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML40** | 1 | Crawlspace | D6A | Elevation<br>Acquisition<br>Floodwall<br>Public Education |
| **ML41** | 1 | Slab | D75B | Elevation<br>Acquisition<br>Floodwall<br>Public Education |
| **ML42** | 1 | Slab | D75B | Elevation<br>Acquisition<br>Floodwall<br>Public education |
| **ML43** | 1 | Slab | D75B | Flood-proof basement garage<br>Floodwall<br>Public education |
| **ML44** | 1 | Crawlspace | D75B | Flood-proofing,<br>Temporary barriers (sandbags and such other items)<br>Public education |
| **ML45** | 1 | Slab | D75B | Public Education |
| **ML46** | 1 | Slab/Crawlspace | D75B | Public Education |
| **ML47** | 1 | Slab | D75B | Flood-proofing<br>Public education |
| **ML48** | 1 | Slab | D75B | Elevation<br>Acquisition<br>Floodwall<br>Flood-proofing<br>Public education |
| **ML49** | 1 | Crawlspace | D75B | Floodwall<br>Flood-proofing<br>Public Education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ML50** | 1 | Crawlspace | e | Flood-proofing<br>Public education |
| **ML51** | 2 | Crawlspace | D75B | Abandon lowest floor or convert to parking and storage<br>Elevate lowest floor to above base flood elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **ML52** | 1 | Crawlspace | D75B | Public education |
| **ML53** | 1 | Crawlspace | D75B | Public education |
| **ML54** | 1 | Slab | D75B | Public education |
| **ML55** | 1 | Crawlspace | D75B | Elevation<br>Acquisition<br>Floodwall<br>Flood-proofing<br>Public education |
| **Total** | **57** | | | |

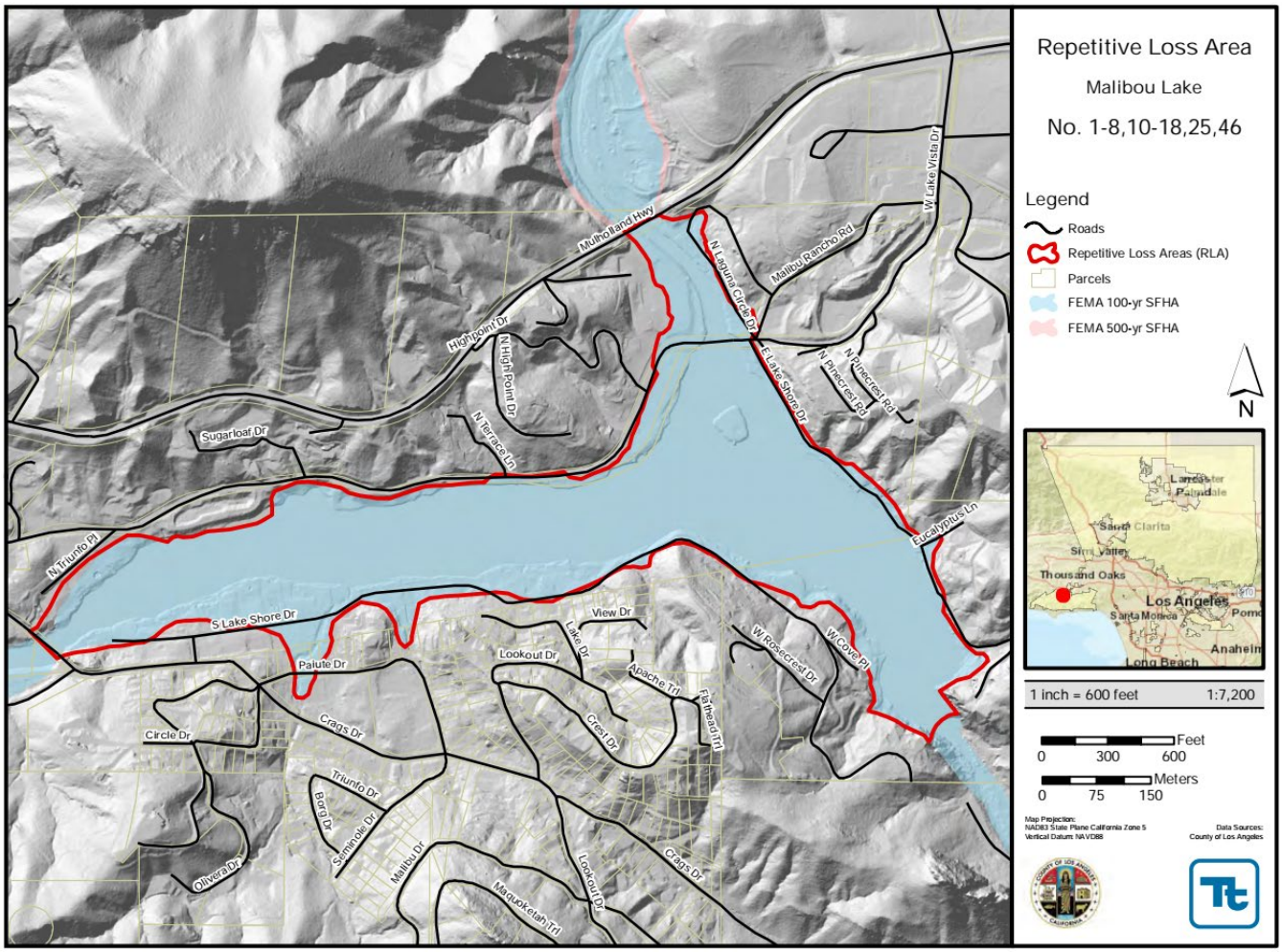



**Figure 16-1.** Malibou Lake Repetitive Loss Area

# 17. MALIBU REPETITIVE LOSS AREA

## 17.1 PROBLEM STATEMENT

Figure 17-1 shows the Malibu Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is one repetitive loss property in this area. The property is located at the lowest point of the street. The first floor of the house was built lower than the street level, and street runoff can enter the house through the driveway. An owner of this property built a 6-inch berm in front of the driveway to divert the water. This, however, may not have relieved the flood problem associated with major floods. The other properties in this area have similar circumstances, with the first floor of the house built below the street within a similar elevation contour. There is no mapped FEMA flood zone within this area.

## 17.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 17-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 17-1.** Repetitive Loss Properties in Malibu Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0070079** | 28 | 2/92, 1/95, 3/98, 3/00 | $5,524 | Destroyed |
| ***Identified Flood Cause:*** House is located at the low point of the street. | | | | |

## 17.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Seven properties with 10 insurable buildings have been identified in this repetitive loss area. Table 17-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 17-2.** All Properties in Malibu Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **MAL1** | 2 | Slab | No Information | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL2** | 1 | Slab | No Information | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL3** | 2 | Slab | No Information | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL4** | 1 | Crawlspace | No Information | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL5** | 1 | Crawlspace | D10A | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL6** | 1 | Slab | D85A | Diversion<br>Berm<br>Street grading<br>Public education |
| **MAL7** | 2 | Basement | D10D | Diversion<br>Berm<br>Street grading<br>Public education |
| **Total** | **10** | | | |

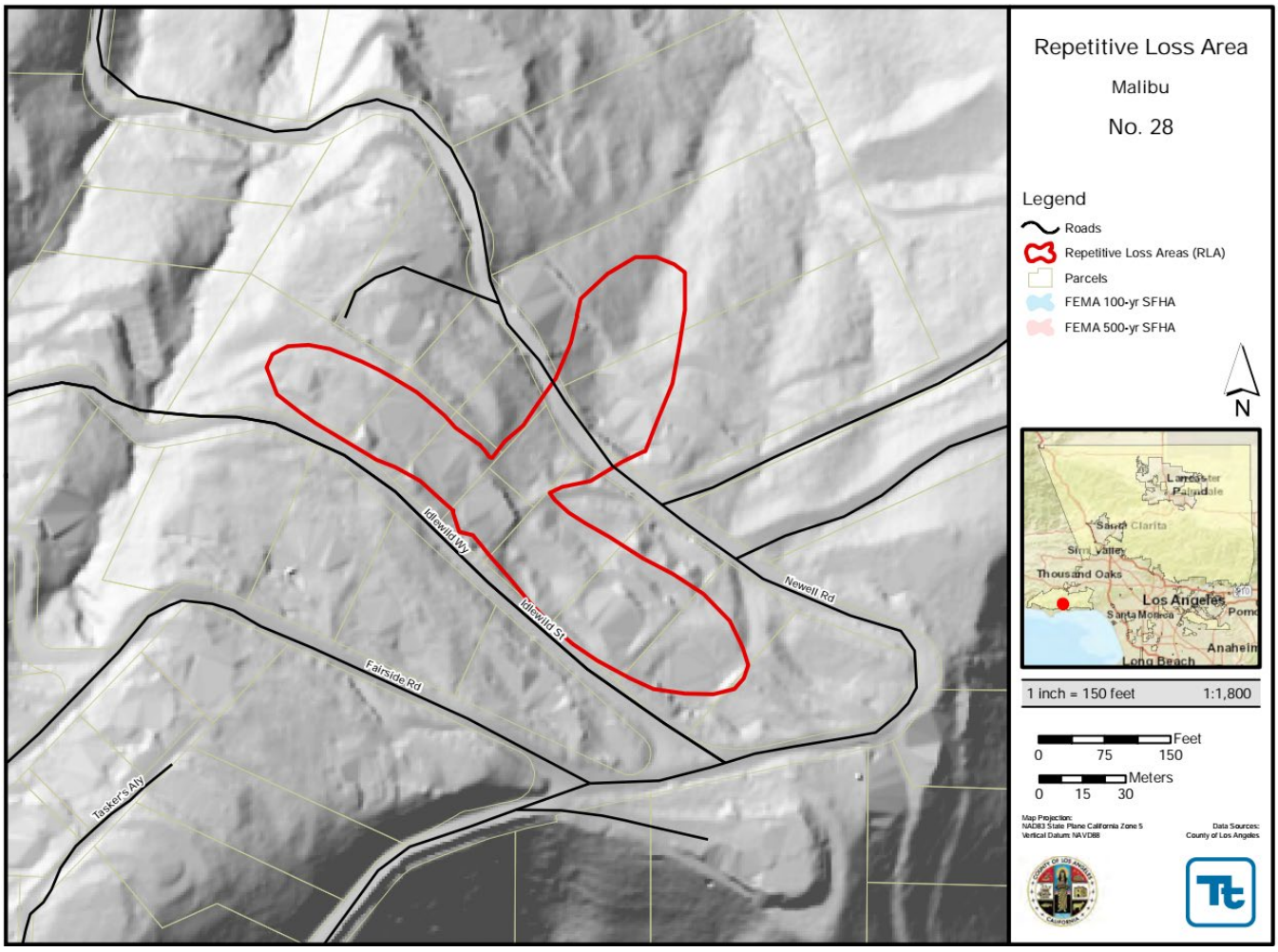



**Figure 17-1.** Malibu Repetitive Loss Area

# 18. QUARTZ HILL A REPETITIVE LOSS AREA

## 18.1 PROBLEM STATEMENT

The Quartz Hill A Repetitive Loss Area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square-mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale. Flood studies of the Quartz Hill area show that the identified repetitive-loss property is located within a FEMA Zone X, an area of minimal flooding. The repetitive flooding of this area is due to the overflow runoff from a detention basin, which has now been relocated southeast of the identified repetitive-loss property. This property is also possibly subject to sheet-flow along the Antelope Valley Drainage Corridor No. 9, (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991). According to the repetitive-loss property owner, the property was flooded when the retention basin, located a couple of blocks to the south, could not hold the stormwater, and the gate was forced to open. The overland runoff entered his property across empty lots, causing flooding at the property. The basin has been replaced by a golf course and relocated one half mile to the northwest, further downstream from the property, which eliminated further flooding problems. This is substantiated by the fact that there has been no subsequent flood damage to the property since the relocation of the retention basin. This is considered to be an isolated event, and no other properties were determined to be impacted. The County has submitted an AW-501 for this property. This property will be shown as "mitigated," and the area will be removed from obligation for annual repetitive loss mailing under the County's CRS program.

## 18.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 18-1 lists the FEMA-designated repetitive loss property within this repetitive loss area; which is being listed as "mitigated." No other properties are identified for this area.

**Table 18-1.** Repetitive Loss Properties in Quartz Hill A Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0057385** | 38 | 1/92, 2/92, 12/92 | $15,228 | Yes[a] |
| ***Identified Flood Cause:*** Overflow from detention basin, which has been relocated. Property no longer subject to repetitive flooding. | | | | |

a. An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. Area will be removed from RLAA once correction is processed by FEMA.

## 18.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is only one property included in this repetitive loss area. It has three insurable buildings. Table 18-2 provides general information for the property. The property is listed as mitigated, so no new mitigation measures are recommended.

**Table 18-2.** All Properties in Quartz Hill A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **QH-A1** | 3 | Slab | D6C | N/A |
| **Total** | **3** | | | |

# 19. QUARTZ HILL B REPETITIVE LOSS AREA

## 19.1 PROBLEM STATEMENT

Figure 19-1 shows the Quartz Hill B Repetitive Loss Area. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square-mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale.

None of the properties in this area are located within a FEMA-identified special flood hazard area. The flooding source for this repetitive-loss area is street runoff that breaks out from Antelope Valley Drainage Corridor No. 7 (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991) along 50th and 52nd Streets. The other properties in this area are at ground elevations similar to that of the identified repetitive loss property and have lowest floors with similar elevations as well.

## 19.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 19-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 19-1.** Repetitive Loss Properties in Quartz Hill B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0091087** | 39 | 2/92, 12/97 | $2,783 | No |

***Identified Flood Cause:*** Property is located in Antelope Drainage Corridor. Sheet flow from Antelope Valley Drainage Corridor No. 7 flooded the property, displacing retaining walls. The property currently has a private earthen ditch and small berms along it to route the water through the property boundaries.

## 19.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Twelve properties with 26 insurable buildings have been identified in this repetitive loss area. Table 19-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 19-2.** All Properties in Quartz Hill B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **QH-B1** | 2 | Crawlspace | D5C | Improve private ditch<br>Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B2** | 1 | Crawlspace | D65C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B3** | 1 | Crawlspace | D55B | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B4** | 4 | Crawlspace | D6B | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B5** | 1 | Crawlspace | D75D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B6** | 3 | Crawlspace | D65D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B7** | 5 | Crawlspace | D55C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B8** | 2 | Crawlspace | D8D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B9** | 3 | Crawlspace | D45C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B10** | 2 | Crawlspace | D75A | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B11** | 1 | Slab | D65D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-B12** | 1 | Crawlspace | D55C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **Total** | **26** | | | |

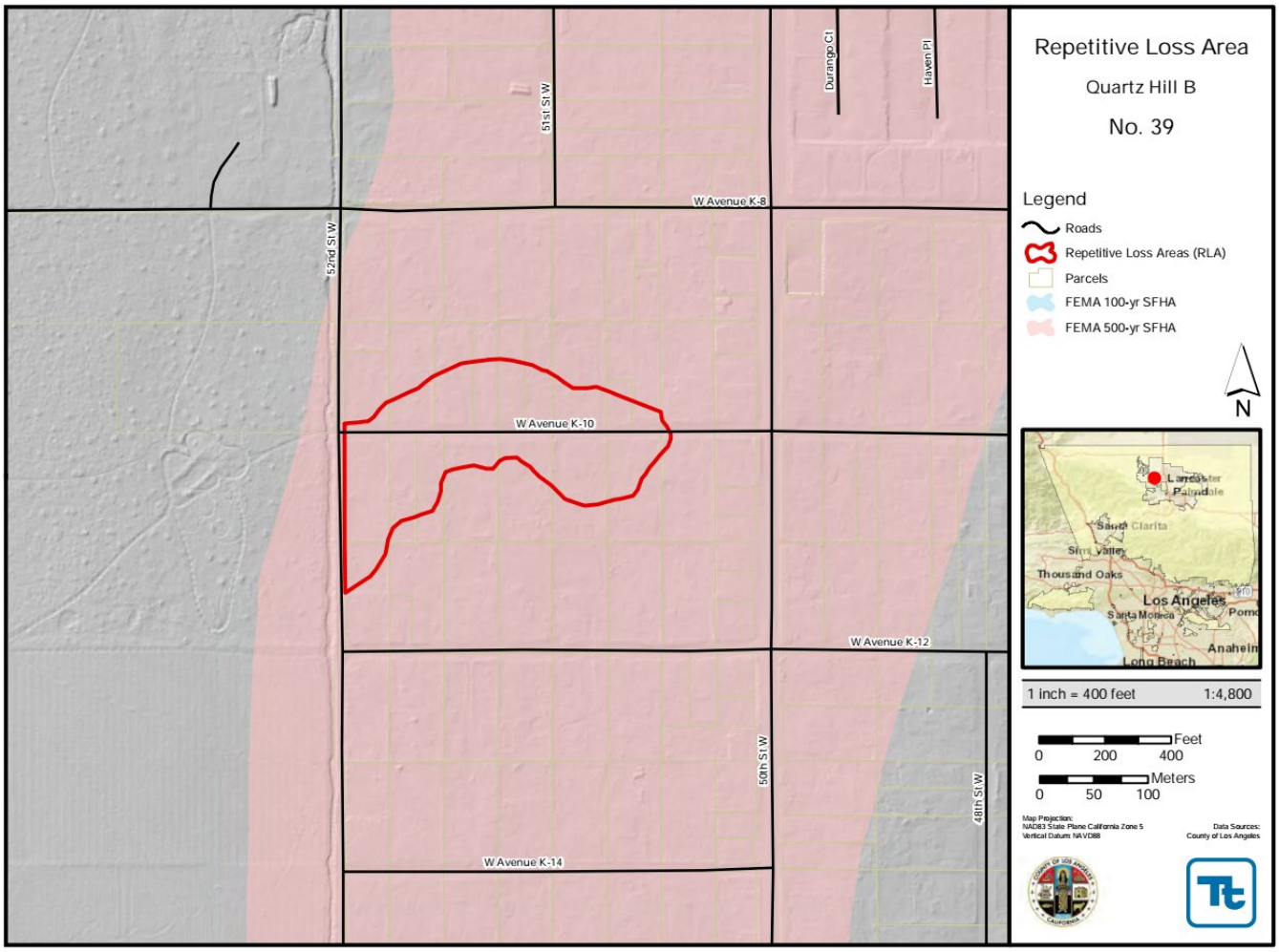



**Figure 19-1.** Quartz Hill B Repetitive Loss Area

# 20. QUARTZ HILL C REPETITIVE LOSS AREA

## 20.1 PROBLEM STATEMENT

Figure 20-1 shows the Quartz Hill C Repetitive Loss Area. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square-mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale.

None of the properties in this area are located within a FEMA-identified special flood hazard area. The repetitive-loss area is within an alluvial fan in Antelope Valley Drainage Corridor No. 7 (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991) which contributes flows to the property via surrounding streets. This property is located at the low point of the street where flows can concentrate and enter the property. The other properties identified within this area have a topographic relationship with the identified repetitive loss property.

## 20.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 20-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 20-1.** Repetitive Loss Properties in Quartz Hill C Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0131222** | 40 | 2/04, 10/04, 12/04, 1/05, 2/05 | $6,186 | No |

***Identified Flood Cause:*** The subject property is located within Flood Hazard Zone X (shaded) and is located in Antelope Drainage Corridor 7. The property is subject to significant flooding. The corridor flows may be conveyed to this property through streets and low lying areas and trapped at the property (which is lower than the streets). The first floor is also lower than the streets and has been damaged frequently by historical floods. The owner has constructed berms at the entry gate and prepared a pump pit. Without a comprehensive and reliable berm and on-site pump system, this property may continue to experience flood damage and submit future claims. In addition, the interior household flows are being discharged to the side yard, but should be disposed via a sanitary sewer or County-approved drywell.

## 20.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Twelve properties with 26 insurable buildings have been identified in this repetitive loss area. Table 20-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 20-2.** All Properties in Quartz Hill C Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **QH-C1** | 2 | Crawlspace | D35B | Stabilize the entry with rock or concrete blocks under the dirt.<br>Install a permanent automatic control pump so that it activates if water reaches a predetermined level of 1 or 2 inches.<br>Complete and raise the 1' high side wall<br>Install a dry well with dimensions of 2' or 3' diameter, 10' or 15' depth to receive discharge. Connect the washer and bath flow to the dry well. |
| **QH-C2** | 2 | Crawlspace | D5A | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C3** | 3 | Crawlspace | D6D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C4** | 3 | Crawlspace | D7B | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C5** | 2 | Crawlspace | D4B | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C6** | 3 | Crawlspace | D65D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C7** | 3 | Crawlspace | D6C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C8** | 2 | Crawlspace | D75D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C9** | 1 | Crawlspace | D5B | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C10** | 2 | Crawlspace | C5C | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C11** | 1 | Crawlspace | D65D | Construct an area-wide storm drain and flood retention system<br>Public education |
| **QH-C12** | 2 | Crawlspace | D8A | Construct an area-wide storm drain and flood retention system<br>Public education |
| **Total** | **26** | | | |

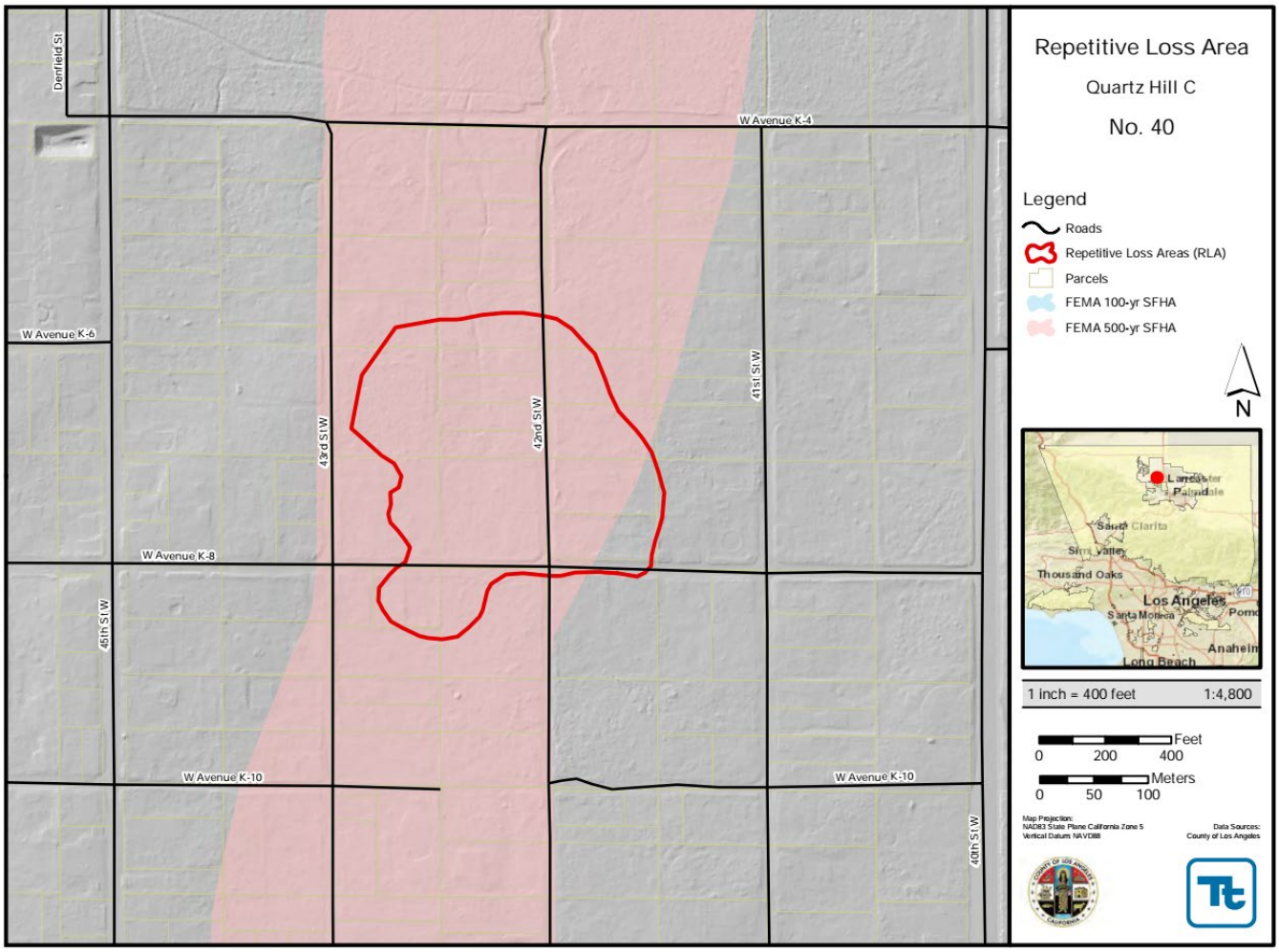



**Figure 20-1.** Quartz Hill C Repetitive Loss Area

# 21. ROOSEVELT REPETITIVE LOSS AREA

## 21.1 PROBLEM STATEMENT

Figure 21-1 shows the Roosevelt Repetitive Loss Area. Flood zones are mapped on FEMA FIRMs. This area is within the floodplain of Little Red Rock Wash in Lancaster. Lancaster is approximately 70 miles north of the downtown Los Angeles in Southern California's Antelope Valley. It is separated from the Los Angeles Basin by the San Gabriel Mountain Range to the south and from Bakersfield and the San Joaquin Valley by the Tehachapi Mountain Range to the north. Lancaster's elevation is 2,500 feet above sea level on a high, flat valley surrounded by mountain ranges. The subject property lies below adjacent grade and receives runoff from the higher adjacent grade during rain events.

## 21.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 21-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 21-1.** Repetitive Loss Properties in Roosevelt Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0137354** | 42 | 1/05, 2/05 | $17,148 | No |

***Identified Flood Cause:*** Property is located in FEMA Flood Hazard Zone A and in the floodplain of Little Red Rock Wash. The existing lot is lower than the adjacent grade and may receive runoff from adjacent properties during rain events.

## 21.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Three properties with seven insurable buildings have been identified in this repetitive loss area. Table 21-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 21-2.** All Properties in Roosevelt Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ROO1** | 4 | Slab | D65C | Establish drainage flow paths around structure<br>Elevation<br>Drainage system maintenance<br>Public education |
| **ROO2** | 2 | Crawlspace | DX | Establish drainage flow paths around structure<br>Elevation<br>Drainage system maintenance<br>Public education |
| **ROO3** | 1 | Crawlspace | D6A | Establish drainage flow paths around structure<br>Elevation<br>Drainage system maintenance<br>Public education |
| **Total** | 7 | | | |

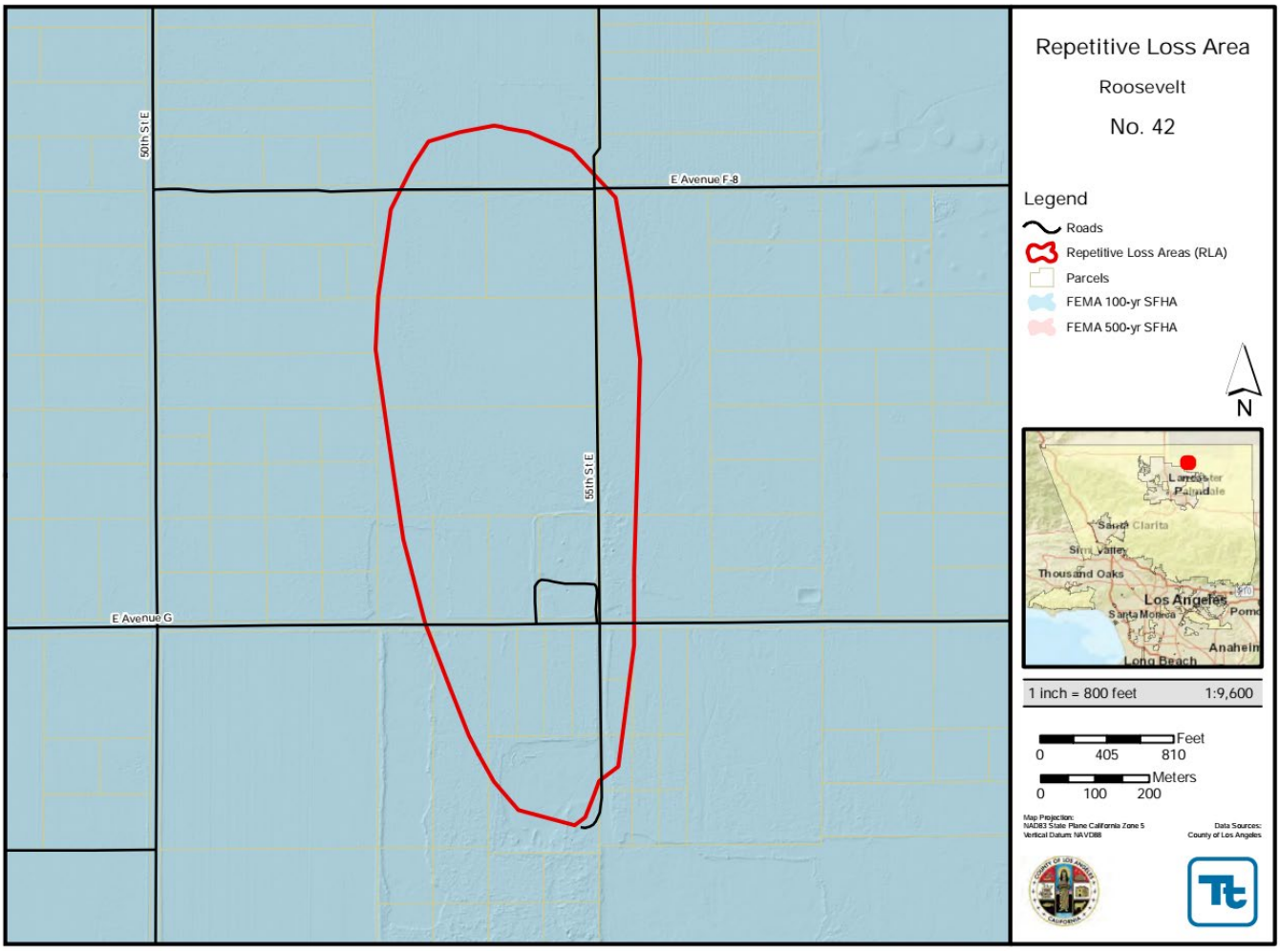



**Figure 21-1.** Roosevelt Repetitive Loss Area

# 22. ROWLAND HEIGHTS REPETITIVE LOSS AREA

## 22.1 PROBLEM STATEMENT

The Rowland Heights Repetitive Loss Area is in Rowland Heights—about 9 square miles of unincorporated Los Angeles County near where Los Angeles County, Orange County and San Bernardino County meet. The elevation is 540 feet above sea level. It is loosely bounded by the Puente Hills to the south and San Jose Hills to the north-northeast. There is a single-property repetitive loss area on Robert Road. No map is provided due to privacy concerns. The area is approximately 10 miles north of Anaheim and 34 miles east-southeast of Los Angeles. Flood studies of the Rowland Heights area show that this repetitive-loss area is located within FEMA Flood Hazard Zone X, an area of minimal flooding. The repetitive-loss area is a single dwelling within a hillside development generally situated high above the floodplain. The possible flooding source is storm and irrigation runoff from the adjoining neighboring property to the east, which is much higher than the subject property. The property may receive significant excess runoff from the elevated neighboring property, especially during large storms. There is also a possibility of slope erosion due to the high and steep nature of the slope. The flooding problem seems to have been partially fixed with a small toe wall. However, a more comprehensive wall and drain system will be required to prevent future claims. This repetitive flooding problem is considered to be localized and isolated to the identified repetitive loss property. The fact that no subsequent claims have been filed in the last 10 years suggests that the problem has been rectified.

## 22.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 22-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 22-1.** Repetitive Loss Properties in Rowland Heights Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0138651** | 44 | 3/01, 2/05 | $9,734 | No |

***Identified Flood Cause:*** The property is significantly lower in elevation than the neighboring property. Without insurance records to confirm, it seems that flows from the neighboring property to the side yard can be sufficient to cause damage. Additionally, the slope may be eroded and contribute debris. Street flows may tend to collect in front of the property before moving down the steep street. The finished floor elevation, however, seems to be high enough to prevent damage by street flow.

## 22.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

One property with one insurable building has been identified in this repetitive loss area. Table 22-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 22-2.** All Properties in Rowland Heights Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **ROW1** | 1 | Slab | D75B | Extend existing side wall and provide ditch to convey flows from the slope<br>Construct terraced wall to avoid slope failure (Construction will require neighbor's consent)<br>Public education |
| **Total** | **1** | | | |

# 23. TOPANGA CANYON A REPETITIVE LOSS AREA

## 23.1 PROBLEM STATEMENT

The Topanga Canyon A Repetitive Loss Area is near Garapito Creek, approximately 550 feet upstream of its confluence with Topanga Canyon. Topanga Canyon is located in the Santa Monica Mountains in southwest Los Angeles County. There is a single-property repetitive loss area near Garapito Creek, upstream of its confluence with Topanga Canyon. No map of this repetitive loss area is provided, due to privacy concerns. The studies of Garapito Creek show Flood Hazard Zones A and AE, high-risk flood zones near this repetitive-loss area. The property is on the bank of Garapito Creek and is being accessed by a private bridge from the street. The ground elevation of the house seems to be lower than the street, and the front door and wall were built on the bank slope. The problem is associated with limited creek capacity and backwater effect caused by the small bridge. The property, however, is subject to much greater risk due to high flood discharges estimated for the 1 percent annual chance (100-year) flood and the Los Angeles County capital flood (flooding produced by a 50-year frequency storm falling on a saturated watershed). The elevation for the lowest point of the house is about 920 feet, while the FEMA FIRM shows that the 100-year water surface elevation of Garapito Creek at the location is approximately 926 feet. The creek is moderately vegetated, which may also contribute to the high water.

## 23.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 23-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 23-1.** Repetitive Loss Properties in Repetitive Topanga Canyon A Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0028394** | 30 | 3/78, 2/80, 3/83, 2/92, 1/93 | $9,247 | No |

***Identified Flood Cause:*** The subject property is on the channel bank and partially in Garapito Creek. The problem is associated with limited creek capacity and a backwater effect caused by the small bridge

## 23.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is one property included in this repetitive loss area. It has one insurable building. Table 23-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 23-2.** All Properties in Topanga Canyon A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-A1** | 1 | Slab | D45C | Acquisition<br>Elevation<br>Convert flood-prone living space and replace with new story<br>Public education |
| **Total** | **1** | | | |

# 24. TOPANGA CANYON B REPETITIVE LOSS AREA

## 24.1 PROBLEM STATEMENT

Figure 24-1 shows the Topanga Canyon B Repetitive Loss Area. This area is in the vicinity of Topanga Canyon, approximately 600 feet upstream of the Old Topanga Canyon confluence, within the Santa Monica Mountains in southwestern Los Angeles County. This repetitive-loss area is subject to flooding from Topanga Canyon, which is commensurate with the flood risk reflected on the FIRM.

## 24.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 24-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 24-1.** Repetitive Loss Properties in Topanga Canyon B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0012818** | 34 | 1/80, 2/80, 3/91, 2/92, 1/95 | $7,872 | No |

***Identified Flood Cause:*** Property in the channel and FEMA Flood Zone AE of Topanga Canyon. The elevation for the lowest point of the house is about 770 feet and is higher than the channel invert of Topanga Canyon (765 feet) by only 5 feet. Based on the FEMA FIRM, the water surface elevation of the area is 772 feet, which could cause flooding of the house.

## 24.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with five insurable buildings have been identified in this repetitive loss area. Table 24-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 24-2.** All Properties in Topanga Canyon B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-B1** | 1 | Slab | D75B | Acquisition<br>Elevation<br>Convert flood-prone living space and replace with new story<br>Public education |
| **TOP-B2** | 4 | Crawlspace | D45B | Acquisition<br>Elevation<br>Convert flood-prone living space and replace with new story<br>Public education |
| **Total** | **5** | | | |

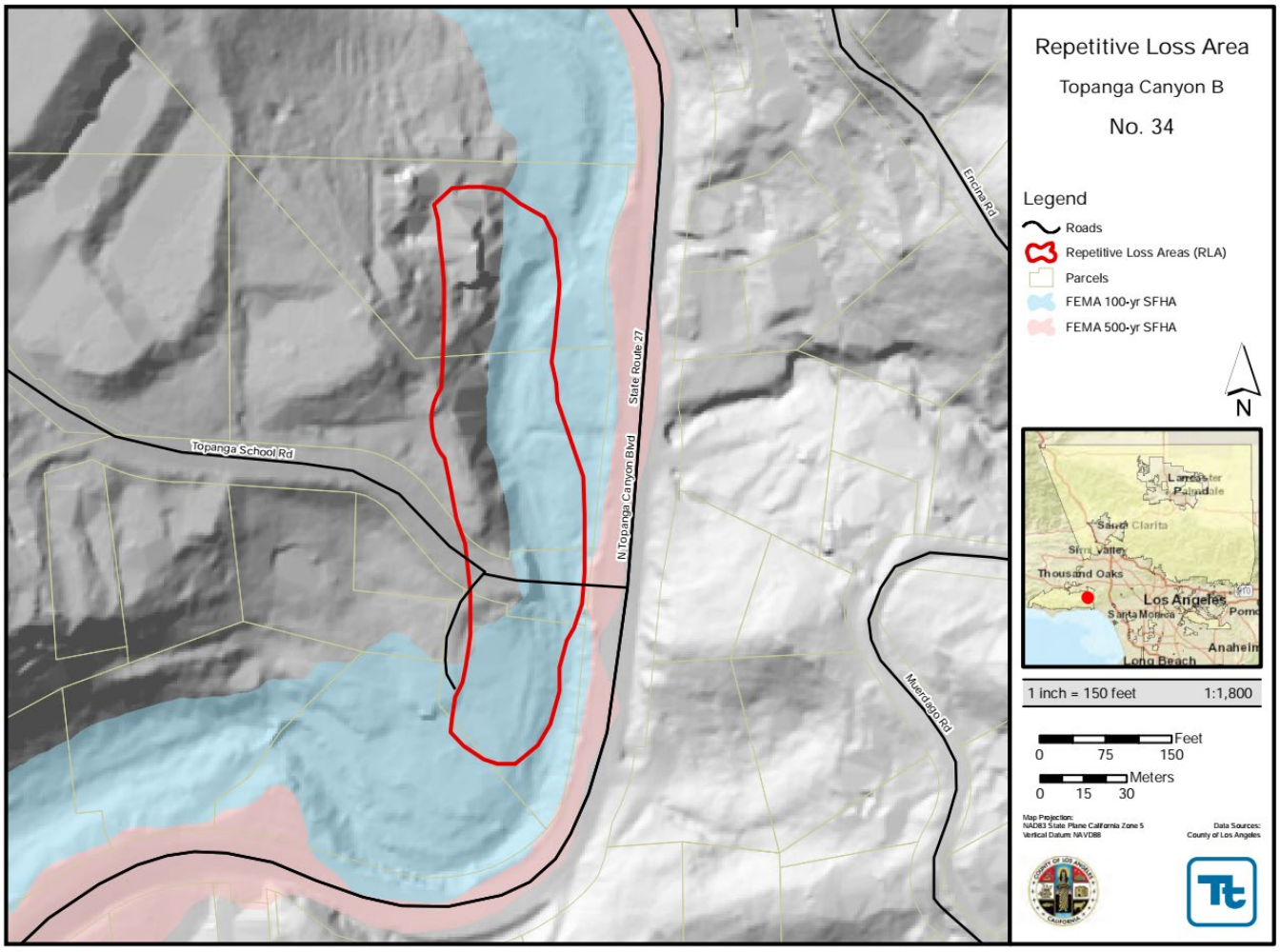



**Figure 24-1.** Topanga Canyon B Repetitive Loss Area

# 25. TOPANGA CANYON C REPETITIVE LOSS AREA

## 25.1 PROBLEM STATEMENT

The Topanga Canyon C Repetitive Loss Area is in the vicinity of Calabasas in southwestern Los Angeles County. The identified repetitive-loss property is newer construction and is located on a knoll of an area with a lot of topographic relief. Flooding at this property appears to be associated with drainage from a surrounding hillside. The repetitive flooding problem is considered to be isolated to the identified repetitive loss property. The fact that no claims have been filed in the last 10 years suggests that the problem has been rectified.

## 25.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 25-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 25-1.** Repetitive Loss Properties in Topanga Canyon C Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0111971** | 48 | 2/98, 3/01 | $11,698 | No |
| ***Identified Flood Cause:*** Localized flooding associated with hillside drainage. | | | | |

## 25.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is only one property included in this repetitive loss area. It has one insurable building. Table 25-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 25-2.** All Properties in Topanga Canyon C Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-C1** | 1 | Crawlspace | No Information | Establish drainage flow paths around structure<br>Drainage system maintenance<br>Floodwall<br>Public education |
| **Total** | **1** | | | |

# 26. TOPANGA CANYON D REPETITIVE LOSS AREA

## 26.1 PROBLEM STATEMENT

Figure 26-1 shows the Topanga Canyon D Repetitive Loss Area. This area is in Topanga within the Santa Monica Mountains in southwestern Los Angeles County. The identified repetitive loss property for this area is not located in a FEMA-mapped flood zone and the source of repetitive flood risk appears to be localized. The dates of loss correspond to storm events that occurred in early 2005. The property is located in a cul-de-sac. There is a gradient slope in this vicinity with properties above the identified repetitive-loss property as well as below it. The cause of flooding is most likely drainage flows from the uphill neighbor. The other property within this area is at ground elevation similar to that of the identified repetitive loss property and has its lowest floor with similar elevation as well.

## 26.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 26-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 26-1.** Repetitive Loss Properties in Topanga Canyon D Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0137970** | 49 | 1/05, 2/05 | $10,822 | No |
| ***Identified Flood Cause:*** Localized drainage issue associated with interior drainage from private property | | | | |

## 26.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Two properties with two insurable buildings have been identified in this repetitive loss area. Table 26-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 26-2.** All Properties in Topanga Canyon D Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-D1** | 1 | Slab | D10B | Create/maintain flow paths to public storm drains<br>Drainage system maintenance<br>Public education |
| **TOP-D2** | 1 | Slab | D95B | Create/maintain flow paths to public storm drains<br>Drainage system maintenance<br>Public education |
| **Total** | **2** | | | |

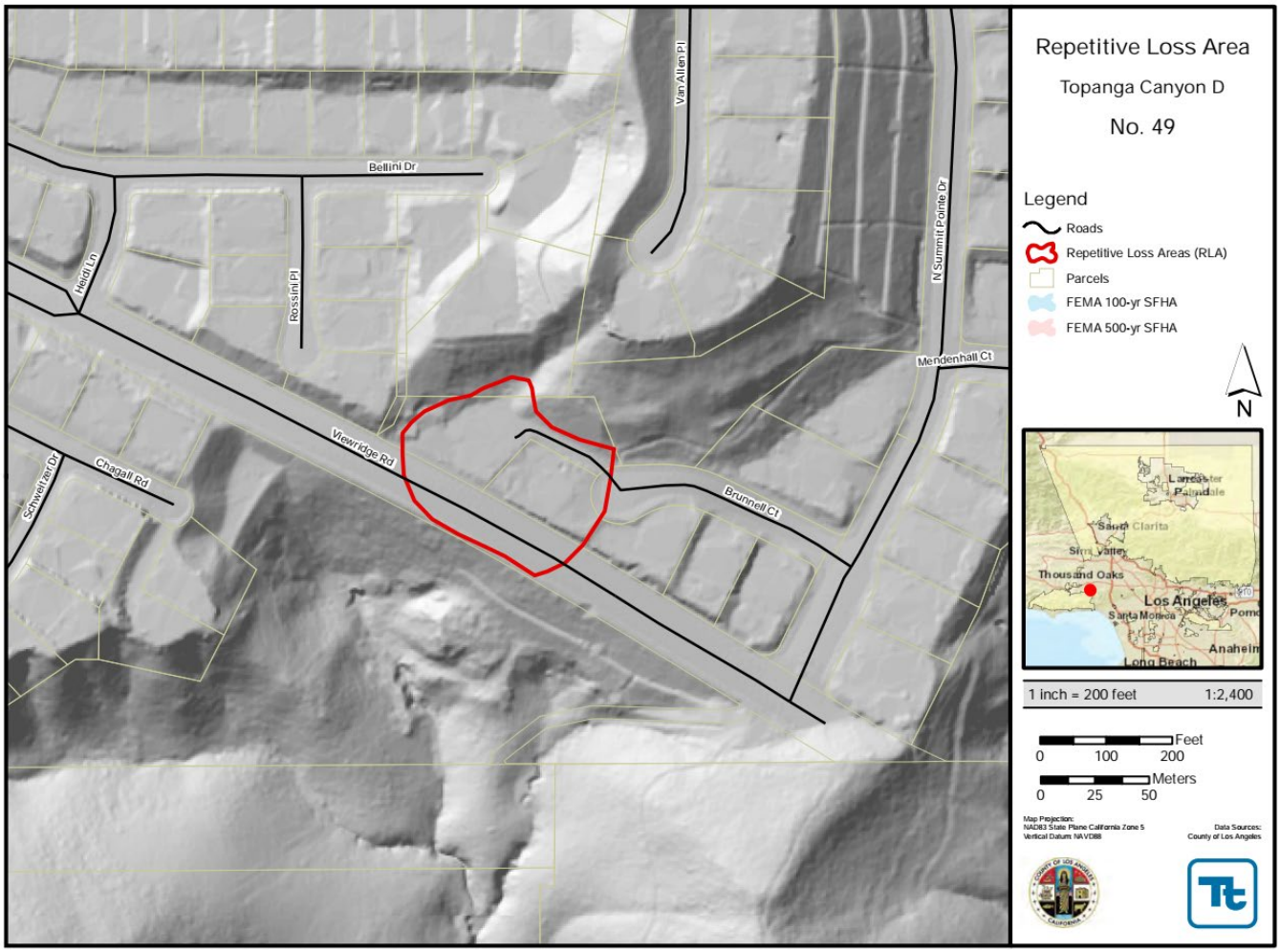



**Figure 26-1.** Topanga Canyon D Repetitive Loss Area

# 27. TOPANGA CANYON E REPETITIVE LOSS AREA

## 27.1 PROBLEM STATEMENT

Figure 27-1 shows the Topanga Canyon E Repetitive Loss Area. This area is in the Santa Monica Mountains, in the southwestern area of Los Angeles County and the southeastern area of Ventura County. The identified repetitive loss property for this area is in the vicinity of Calabasas. The property backs up to steep terrain of the Santa Monica Mountains. The two events in 1995 and 2005 were 5-year and 13-year flood events, respectively, based on historical data. A 5-year flood event is a projected flood event that has a 20 percent chance of occurring in a given year; a 13-year flood event is a projected flood with a 7.7 percent chance of occurring in a given year. Based on topography, the flooding problem appears to be associated with runoff from the surrounding hillside. This problem could be exacerbated by wildfire events within the region.

## 27.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 27-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 27-1.** Repetitive Loss Properties in Topanga Canyon E Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0138321** | 50 | 3/95, 1/05 | $28,727 | No |

***Identified Flood Cause:*** Hillside drainage.

## 27.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Four properties with five insurable buildings have been identified in this repetitive loss area. Table 27-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 27-2.** All Properties in Topanga Canyon E Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-E1** | 2 | Crawlspace | D75D | Establish/maintain flow paths around structure to improved drainage system<br>Hillside retaining wall<br>Public education |
| **TOP-E2** | 1 | Slab | D75C | Establish/maintain flow paths around structure to improved drainage system<br>Hillside retaining wall<br>Public education |
| **TOP-E3** | 1 | Crawlspace | D2B | Establish/maintain flow paths around structure to improved drainage system<br>Hillside retaining wall<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TOP-E4** | 1 | Slab | D75D | Establish/maintain flow paths around structure to improved drainage system<br>Hillside retaining wall<br>Public education |
| **Total** | **5** | | | |

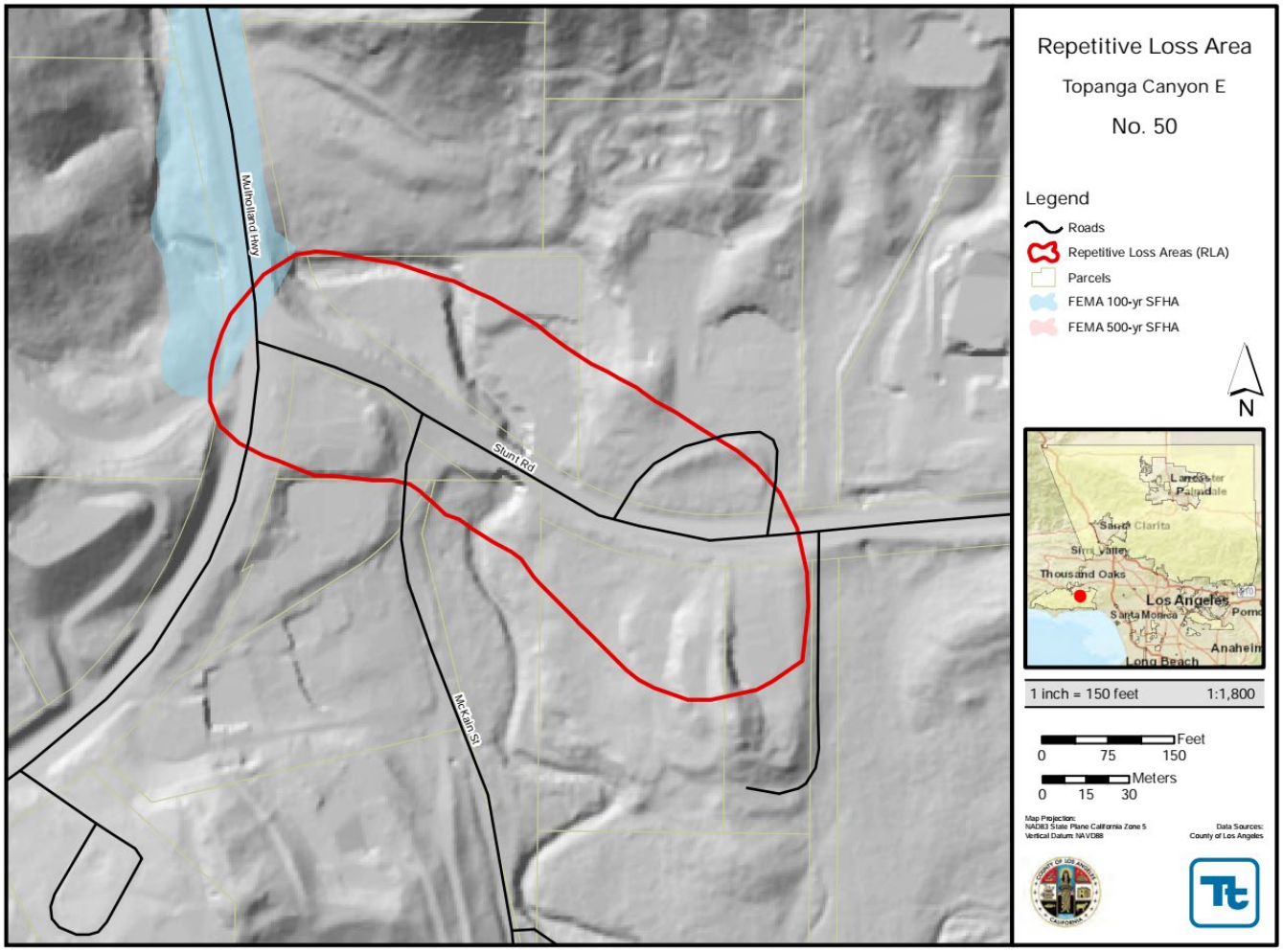



**Figure 27-1.** Topanga Canyon E Repetitive Loss Area

# 28. TRIUNFO CANYON A REPETITIVE LOSS AREA

## 28.1 PROBLEM STATEMENT

The Triunfo Canyon A Repetitive Loss Area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is a single-property repetitive loss area on Lobo Canyon Road. No map of this repetitive loss area is provided, due to privacy concerns. This is an offsite drainage problem isolated to the single property. The property is located in the floodplain and FEMA Flood Hazard Zone AE. In the past, small private bridges and culverts in the creek running behind the house clogged with debris, causing water to overflow and run along Lobo Canyon Road in front of the subject property.

## 28.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 28-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 28-1.** Repetitive Loss Properties in Triunfo Canyon A Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0095737** | 24 | 1/95, 2/98 | $23,454 | No |

***Identified Flood Cause:*** Property is in FEMA Flood Zone AE of Lobo Canyon (behind the house). Past clogging of small private bridges and culverts in the creek caused water to overflow onto the street and flood the property. No losses reported since 1998. The structure's windows are boarded up and it is assumed to be vacant.

## 28.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is one property included in this repetitive loss area. It has two insurable buildings. Table 28-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 28-2.** All Properties in Triunfo Canyon A Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TRI-A1** | 2 | Slab | No Information | Acquisition<br>Elevation<br>Berm<br>Floodwall<br>Public education |
| **Total** | **2** | | | |

# 29. TRIUNFO CANYON B REPETITIVE LOSS AREA

## 29.1 PROBLEM STATEMENT

The Triunfo Canyon B Repetitive Loss Area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is a single-property repetitive loss area on Hidden Highland Road. No map of this repetitive loss area is provided, due to privacy concerns. The repetitive loss property is at the base of a hillside and receives runoff from the adjacent hills. Based on topography, the property is subject to runoff from the hillside behind the property.

## 29.2 IDENTIFIED REPETITIVE LOSS PROPERTY

Table 29-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

**Table 29-1.** Repetitive Loss Properties in Triunfo Canyon B Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **0137793** | 43 | 2/98, 1/05 | $13,473 | No |
| ***Identified Flood Cause:*** Based on topography, the property is subject to runoff from the hillside behind the property. | | | | |

## 29.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

There is one property included in this repetitive loss area. The property currently has two insurable buildings, which were constructed to current flood damage prevention requirements. Table 29-2 provides general information for the property, but no mitigation measures are identified for the new structures.

**Table 29-2.** All Properties in Triunfo Canyon B Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **TRI-B1** | 2 | Slab | No Information | N/A |
| **Total** | **2** | | | |

# 30. UPPER TOPANGA CANYON REPETITIVE LOSS AREA

## 30.1 PROBLEM STATEMENT

Figure 30-1 shows the Upper Topanga Canyon Repetitive Loss Area. This repetitive-loss area is in the Topanga Canyon area in the Santa Monica Mountains in southwest Los Angles County, 26 miles northwest of downtown Los Angeles. All properties in the repetitive loss area are in or immediately adjacent to the FEMA-mapped 1 percent annual chance (100-year) floodplain for Topanga Canyon. Topanga Canyon's contributing watershed is the second largest watershed in the Santa Monica Mountains. Sources of flooding in the Topanga Canyon area consist of storm runoff in Topanga Creek and associated storm drainage facilities. Based on historical information and FEMA's Flood Insurance Study, flooding occurs from 5-year or greater flood events. A 5-year flood event is a projected flood event that has a 20 percent chance of occurring each year. Because most of the repetitive loss properties are located within the low-lying floodplain areas immediately adjacent to the low-flow channels, it is expected that without mitigation, these properties will continue to be subject to future floods.

## 30.2 IDENTIFIED REPETITIVE LOSS PROPERTIES

Table 30-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

**Table 30-1.** Repetitive Loss Properties in Upper Topanga Canyon Repetitive Loss Area

| FEMA RL # | RL Map # | Flood Dates of Previous Claims | Average Claim Paid | Mitigated? |
|---|---|---|---|---|
| **#0074656** | 29 | 1/95, 3/95 | $6,972 | No |
| ***Identified Flood Cause:*** Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval flood event in 1995. No reported damage since. | | | | |
| **#0074334** | 31 | 2/92, 1/95 | $11,451 | No |
| ***Identified Flood Cause:*** Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval flood event in 1995. No reported damage since. | | | | |
| **#0074553** | 32 | 1/95, 3/95 | $10,276 | No |
| ***Identified Flood Cause:*** In 1983 & 1993, the water from the natural creek tributary east of the house overtopped Old Topanga Canyon Road and poured into the house. The owner reported no more problems with the tributary flooding. The property is still subject to flooding from Old Topanga Canyon channel (Zone AE). The property is in Zone AE, which has significant risk from a 1 percent annual chance (100-year) flood. The tributary flow may continue to overtop the street if the culvert inlet becomes obstructed by debris from the upstream reach. | | | | |
| **#0076269** | 33 | 1/95, 3/95 | $29,354 | No |
| ***Identified Flood Cause:*** Property No. 33 was not mapped by FEMA, but was confirmed by field investigation to be subject to a high risk from Red Rock Canyon flooding. The property is on the opposite bank from Red Rock Road and is accessed by a pedestrian bridge crossing the creek. The creek is very shallow, without the capacity to carry the estimated 810 cubic feet per second of the 1 percent annual chance (100-year) flood discharge, and the bridge has a very low clearance, which can cause further flow blockage and higher backwater. | | | | |
| **#0074498** | 47 | 1/95, 3/95 | $9,692 | No |
| ***Identified Flood Cause:*** Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by 5-year return interval flood event in 1995. No reported damage since. | | | | |

## 30.3 PROPERTIES INCLUDED IN REPETITIVE LOSS AREA

Fifty-six properties with 91 insurable buildings have been identified in this repetitive loss area. Table 30-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

**Table 30-2.** All Properties in Upper Topanga Canyon Repetitive Loss Area

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **UTC1** | 1 | Crawlspace | D65B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC2** | 1 | Slab | D45A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC3** | 2 | Slab | D3A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC4** | 1 | Slab | D75A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC5** | 2 | Slab | No Info | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC6** | 1 | Slab | D75D | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC7** | 1 | Crawlspace | D65B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC8** | 2 | Crawlspace | D7C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC9** | 2 | Crawlspace | D65C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC10** | 2 | Crawlspace | No Info | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **UTC11** | 1 | Crawlspace | D45A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC12** | 1 | Crawlspace | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC13** | 1 | Slab | D6B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC14** | 2 | Crawlspace | D55C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC15** | 1 | Crawlspace | D45C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC16** | 3 | Crawlspace | D45A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC17** | 1 | Crawlspace | D6A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC18** | 2 | Crawlspace | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC19** | 2 | Crawlspace | D6B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC20** | 1 | Slab | D5B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC21** | 1 | Crawlspace | D75B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC22** | 1 | Crawlspace | D65 | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **UTC23** | 1 | Crawlspace | D6C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC24** | 1 | Crawlspace | D55C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC25** | 2 | Crawlspace | CX | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC26** | 1 | Crawlspace | CX | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC27** | 1 | Crawlspace | D6A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC28** | 1 | Slab | D4C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC29** | 2 | Slab | D45B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC30** | 3 | Crawlspace | DX | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC31** | 2 | Crawlspace | D55B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC32** | 2 | Slab | D65C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC33** | 2 | Crawlspace | D7D | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC34** | 3 | Crawlspace | D5B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **UTC35** | 1 | Crawlspace | D6D | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC36** | 2 | Crawlspace | D55A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC37** | 1 | Slab | D8C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC38** | 1 | Slab | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC39** | 2 | Crawlspace | D65C | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC40** | 2 | Crawlspace | D65A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC41** | 3 | Crawlspace | D8A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC42** | 1 | Slab | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC43** | 2 | Crawlspace | D7A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC44** | 1 | Crawlspace | D6A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC45** | 2 | Crawlspace | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC46** | 1 | Slab | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |

| Property ID | Number of Insurable Buildings | Building Description | | Probable Mitigation Measures |
|---|---|---|---|---|
| | | Foundation | Condition | |
| **UTC47** | 3 | Slab | No Information | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC48** | 1 | Crawlspace | D7B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC49** | 1 | Slab | D7A | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC50** | 2 | Slab | D75B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC51** | 3 | Crawlspace | No Information | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC52** | 3 | Slab | D65B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC53** | 1 | Crawlspace | D5B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC54** | 2 | Slab | D95B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC55** | 2 | Crawlspace | D5B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **UTC56** | 1 | No Information | D55B | Elevation<br>Acquisition<br>Flood-proofing<br>Public education |
| **Total** | **91** | | | |

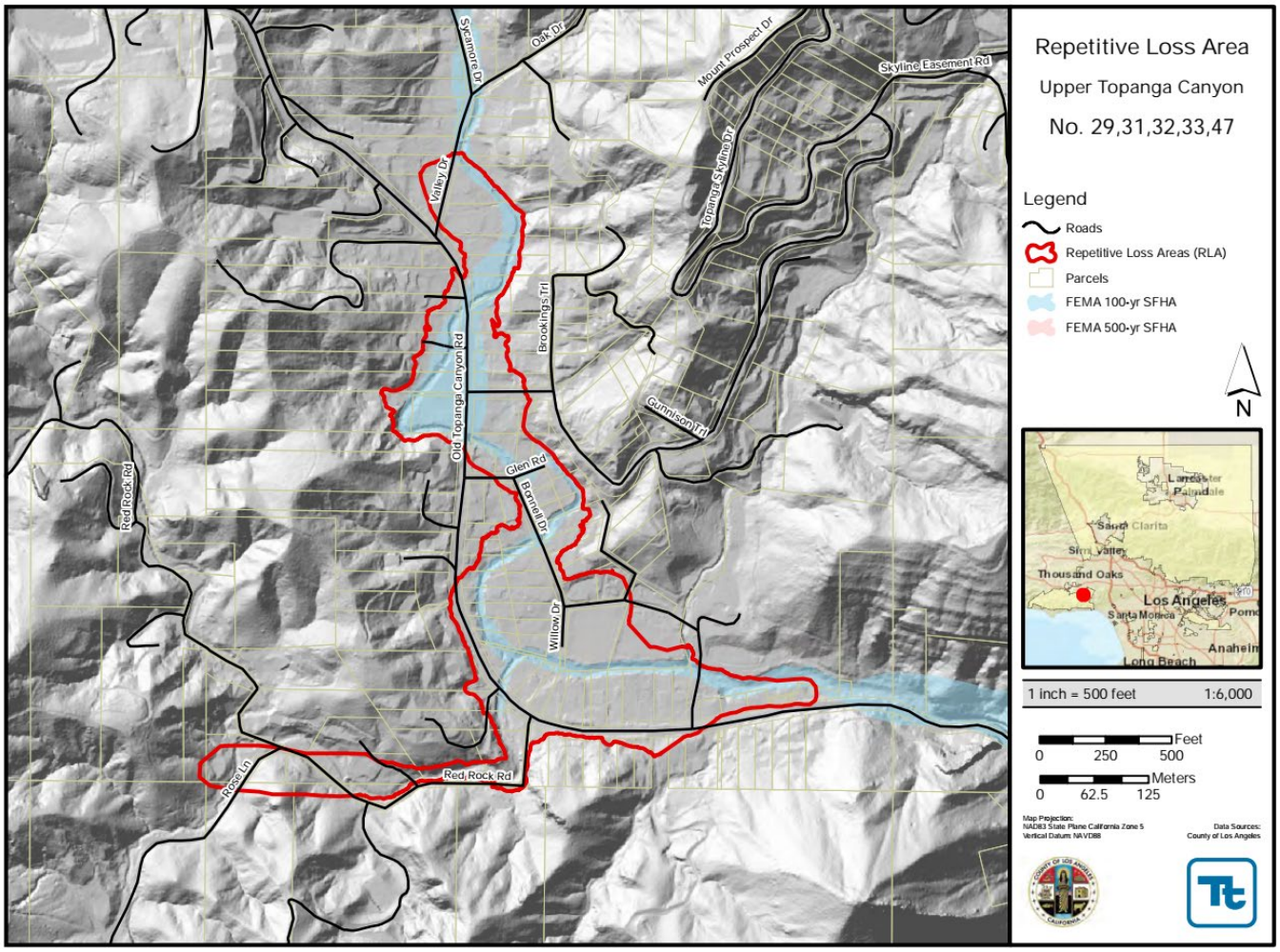



**Figure 30-1.** Upper Topanga Canyon Repetitive Loss Area

# PART 3—REPETITIVE LOSS AREA ACTION PLAN

# 31. REPETITIVE LOSS AREA ACTION PLAN

## 31.1 MITIGATION ACTIONS

This Los Angeles County Repetitive Loss Area Analysis was created in conjunction with the development of the *2020 Los Angeles County Comprehensive Floodplain Management Plan*. The floodplain management plan identified and prioritized an action plan that will have direct relevance to this RLAA. This action plan has been adapted to apply to the RLAA and is shown in Table 31-1. The following information is presented for each action plan item:

- Action item **number** and **description**
- **Lead agency** responsible for implementing the action item
- **Support agencies** expected to participate in the implementation
- Agencies or programs that may be able to provide **funding** to implement the action item
- An estimated **cost** range (see Section 31.2 for definition of high, medium and low cost ratings)
- A statement of **timing** for implementing the action item:
    - Ongoing—This action already occurs and will continue
    - Short term—This action would be implemented within five years
    - Long term— This action would be implemented after five years
- A list of the **repetitive loss areas that would be affected** by the action item
- Indication of whether the action item was **included in the previous RLAA** and, if so, its number in that previous document.

**Table 31-1.** Action Plan—Flood Mitigation Initiatives

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **1—Promote awareness of flood hazards to residents in flood hazard areas.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Building and Safety Division, Community Government Relations Group, Disaster Services Group)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; County Regional Planning Department | Low | Ongoing | All | Yes-1 |
| **2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Community Government Relations Group, Building and Safety Division, Land Development Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-2 |
| **3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Los Angeles County Chief Executive Office/ Office of Emergency Management (CEO OEM), Public Works (Disaster Services Group)<br>***Funding Source:*** Public Works; CEO OEM | Low | Ongoing | Agua Dulce, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lower Topanga Canyon, Malibou Lake, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Triunfo Canyon A, Upper Topanga Canyon | Yes-3 |
| **4—Investigate repetitive loss properties identified by FEMA and update the list of repetitive loss properties and high-risk properties. Conduct the following flood control activities for these properties:**<br>• **Annually notify owners regarding local flood hazards and proper protection activities**<br>• **Provide technical advice regarding flood protection and flood preparedness**<br>• **Distribute a revised questionnaire to new repetitive loss properties.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-4 |
| **5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials.**<br>***Lead Agency:*** Fire Department, Public Works (Administrative Services Division, Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Community Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; Fire Department; Public Works | Low | Ongoing | All | Yes-5 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **6—Provide public education about maintaining the stormwater system free of debris.**<br>***Lead Agency:*** Public Works (Stormwater Quality Division)<br>***Support Agencies:*** Public Works (Community Government Relations Group, Stormwater Engineering Division, Stormwater Maintenance Division, Stormwater Planning Division, Road Maintenance Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-6 |
| **7—Continue to maintain/ enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Maintenance Division, Stormwater Planning Division, Transportation Planning and Programs Division, Community Government Relations Group)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-7 |
| **8—Implement the Program for Public Information protocol identified in the FMP and include appropriate messaging for compliance with the Americans with Disabilities Act.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Community Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Low | Ongoing | All | Yes-8 |
| **9—Provide emergency preparedness and flood protection information to the general public.**<br>***Lead Agency:*** CEO OEM<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works; USC Sea Grant | Low | Ongoing | All | Yes-9 |
| **10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.**<br>***Lead Agency:*** CEO OEM, Public Works (Disaster Services Group)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community Government Relations Group)<br>***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works | Low | Ongoing | All | Yes-10 |
| **11—Develop and maintain a list of priority maintenance-related problem sites.**<br>***Lead Agency:*** Public Works (Stormwater Maintenance Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Road Maintenance Division)<br>***Funding Source:*** Public Works | Low | Ongoing | Agua Dulce, Altadena B, Calabasas A, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Roosevelt, Topanga Canyon C, Topanga Canyon D | Yes-11 |
| **12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood issue sites.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Road Maintenance Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-12 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management.**<br>***Lead Agency:*** Public Works (Stormwater Maintenance Division)<br>***Support Agencies:*** Public Works (Stormwater Planning Division, Stormwater Engineering Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-13 |
| **14—Evaluate storm drain, open channel, and flood retention basin facilities for future improvements.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division)<br>***Support Agencies:*** Public Works (Design Division, Stormwater Maintenance Division, Stormwater Engineering Division, Stormwater Quality Division), Stakeholders<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-14 |
| **15—Pursue appropriate flood hazard mitigation grant funding.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division)<br>***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Disaster Services Group, Stormwater Planning Division), CEO OEM<br>***Funding Source:*** Public Works; CEO OEM | Low | Ongoing | All | Yes-15 |
| **16—Consider the conversion of high-risk properties into open space.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Stormwater Quality Division) Regional Planning Department, Parks and Recreation<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department; County Parks and Recreation | High | Ongoing | All | Yes-16 |
| **17—Refine the plan check system to track properties in the flood zone and address drainage.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division)<br>***Funding Source:*** Public Works | Low | Ongoing | Agua Dulce, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lower Topanga Canyon, Malibou Lake, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Triunfo Canyon A, Upper Topanga Canyon | Yes-17 |
| **18—Flag repetitive loss properties in the plan, and check database for review and approval of building permit applications.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-18 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Chief Information Office)<br>***Funding Source:*** Public Works | Low | Ongoing | Agua Dulce, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lower Topanga Canyon, Malibou Lake, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Triunfo Canyon A, Upper Topanga Canyon | Yes-19 |
| **20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Engineering Division), Stakeholders<br>***Funding Source:*** FEMA, U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department | Low | Ongoing | All | Yes-20 |
| **21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains.**<br>***Lead Agency:*** Public Works (Stormwater Planning Division, Stormwater Quality Division)<br>***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Stormwater Engineering Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works | High/ Medium | Long term | Agua Dulce, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lower Topanga Canyon, Malibou Lake, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Triunfo Canyon A, Upper Topanga Canyon | Yes-21 |
| **22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits.**<br>***Lead Agency:*** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division)<br>***Support Agencies:*** Regional Planning Department, Public Works (Environmental Programs Division, Stormwater Quality Division, Stormwater Planning Division, Stormwater Engineering Division, Project Management Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; Public Works | Low | Ongoing | All | Yes-22 |
| **23—Maintain the Operational Area Emergency Response Plan.**<br>***Lead Agency:*** CEO OEM<br>***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Engineering Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM | Low | Ongoing | All | Yes-23 |
| **24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution.**<br>***Lead Agency:*** Public Works (Building and Safety Division, Design Division, Land Development Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Quality Division, Stormwater Planning Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-24 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development.**<br>***Lead Agency:*** Regional Planning Department<br>***Support Agencies:*** Public Works (Stormwater Engineering Division, Transportation Planning and Programs Division, Land Development Division)<br>***Funding Source:*** Public Works; County Regional Planning Department | Low | Ongoing | All | Yes-25 |
| **26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Transportation Planning and Programs Division)<br>***Funding Source:*** FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; Public Works; CEO OEM; County Regional Planning Department; County Parks and Recreation | Low | Ongoing | All | Yes-26 |
| **27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan.**<br>***Lead Agency:*** Regional Planning Department<br>***Support Agencies:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** County Regional Planning Department; Public Works | Low | Short term | All | Yes-27 |
| **28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division, Stormwater Maintenance Division), Regional Planning Department<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-28 |
| **29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; USC Sea Grant | Low | Long term | All | Yes-29 |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **30—Identify flood-warning systems for properties where such systems can be beneficially employed.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** CEO OEM, Sheriff's Department, Public Works (Stormwater Maintenance Division, Disaster Services Group)<br>***Funding Source:*** FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; Public Works; CEO OEM | Low | Ongoing | All | Yes-30 |
| **31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** CEO OEM, Public Works (Disaster Services Group)<br>***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM | Medium/ Low | Long term | All | Yes-31 |
| **32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties.**<br>***Lead Agency:*** Public Works (Building and Safety Division, Land Development Division)<br>***Support Agencies:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-32 |
| **33—Conduct an evaluation of FEMA-designated flood zones and revise/ update them to reflect current conditions.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Medium/ Low | Ongoing | Agua Dulce, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lower Topanga Canyon, Malibou Lake, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Triunfo Canyon A, Upper Topanga Canyon | Yes-33 |
| **34—Continue to maintain and update the Hazus model constructed to support the development of the FMP, in order to make flood risk information available to property owners.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Funding Source:*** FEMA; Cal EMA; Public Works | Low | Ongoing | All | Yes-34 |
| **35—Continue County coordination with other agencies and stakeholders on issues of flood control.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division)<br>***Funding Source:*** Public Works | Low | Ongoing | All | Yes-35 |
| **36—Continue to identify and assess drainage needs.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division)<br>***Support Agencies:*** Public Works (Stormwater Maintenance Division)<br>***Funding Source:*** Public Works | Medium/ Low | Ongoing | All | No |

| Action, Responsible Agencies and Potential Funding[a] | Estimated Project Cost | Timeline | Affected Repetitive-Loss Area | In Previous Plan? Action # |
|---|---|---|---|---|
| **37—Once FEMA establishes its Building Resilient Infrastructure and Communities (BRIC) program, consider updating this plan accordingly to meet the BRIC program guidelines.**<br>***Lead Agency:*** Public Works (Stormwater Engineering Division)<br>***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Planning Division, Stormwater Maintenance Division)<br>***Funding Source:*** Public Works; FEMA | Low | Long Term | All | No |

## 31.2 BENEFIT/COST ANALYSIS

The action plan is prioritized according to a benefit/cost analysis of the proposed projects (CRS Step 8). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under various grant programs. A less formal approach was used because some projects may not be implemented for some time, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases). Costs are estimated to be greater than $5 million.
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years. Costs are estimated to be between $500,000 and $5 million.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program. Costs are estimated to be less than $500,000.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, Los Angeles County may seek financial assistance under the Hazard Mitigation Grant Program or Hazard Mitigation Assistance programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, Los Angeles County reserves the right to define "benefits" according to parameters that meet floodplain management goals and objectives.

## 31.3 ACTION PLAN PRIORITIZATION

Table 31-2 lists the priority of each action item assigned by the planning team, using the same parameters used in selecting the action items. A qualitative benefit-cost review was performed for each action item. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for a grant program. High priority projects can be completed in the short term (1 to 5 years). The key factors for high priority projects are that they have funding secured and can be completed in the short term.
- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured. The key factors for medium priority projects are that they are eligible for funding, but do not yet have funding secured, and they can be completed within the short term.
- **Low Priority**—A project that will mitigate the risk of the flood hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for FEMA grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for grant funding from other programs. Low priority projects are "blue-sky" projects. How they will be financed is unknown, and they can be completed over a long term.

**Table 31-2.** Prioritization of Mitigation Actions

| # of FMP Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is Project Grant Eligible? | Can Project be Funded Under Existing Programs/ Budgets? | Priority (High, Medium, Low) |
|---|---|---|---|---|---|---|
| 1—Promote awareness of flood hazards to residents in flood hazard areas. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 3— Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. | | | | | | |
| 2 | High | Low | Yes | No | Maybe | High |
| 4—Investigate repetitive loss properties identified by FEMA and update the list of repetitive loss properties and high-risk properties. Conduct the following flood control activities for these properties:<br>• Annually notify owners regarding local flood hazards and proper protection activities<br>• Provide technical advice regarding flood protection and flood preparedness<br>• Distribute a revised questionnaire to new repetitive loss properties. | | | | | | |
| 4 | High | Low | Yes | No | Yes | High |
| 5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. | | | | | | |
| 3 | High | Low | Yes | Yes | Yes | High |
| 6—Provide public education about maintaining the stormwater system free of debris. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. | | | | | | |
| 6 | Medium | Low | Yes | No | Yes | High |
| 8—Implement the Program for Public Information protocol identified in the FMP and include appropriate messaging for compliance with the Americans with Disabilities Act. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Maybe | High |

| # of FMP Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is Project Grant Eligible? | Can Project be Funded Under Existing Programs/ Budgets? | Priority (High, Medium, Low) |
|---|---|---|---|---|---|---|
| 9—Provide emergency preparedness and flood protection information to the general public. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 11—Develop and maintain a list of priority maintenance-related problem sites. | | | | | | |
| 2 | Low | Low | Yes | No | Yes | High |
| 12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |
| 14—Evaluate storm drain, open channel, and flood retention basin facilities for future improvements. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 15—Pursue appropriate flood hazard mitigation grant funding. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |
| 16—Consider the conversion of high-risk properties into open space. | | | | | | |
| 3 | High | High | Yes | Yes | No | Medium |
| 17—Refine the plan check system to track properties in the flood zone and address drainage. | | | | | | |
| 4 | Medium | Low | Yes | No | Maybe | Medium |
| 18—Flag repetitive loss properties in the plan, and check database for review and approval of building permit applications. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. | | | | | | |
| 3 | Medium | Low | Yes | No | Maybe | High |
| 20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects. | | | | | | |
| 3 | Low | Low | Yes | Yes | Yes | High |
| 21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. | | | | | | |
| 5 | Medium | High/ Medium | No | Yes | No | Medium |
| 22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 23—Maintain the Operational Area Emergency Response Plan. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Yes | High |
| 24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. | | | | | | |
| 4 | Medium | Low | Yes | No | Yes | High |
| 25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. | | | | | | |
| 2 | Medium | Low | Yes | No | Yes | High |
| 26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. | | | | | | |
| 3 | High | Low | Yes | Yes | Yes | High |
| 27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | High |

| # of FMP Objectives Met | Benefits | Costs | Do Benefits Equal or Exceed Costs? | Is Project Grant Eligible? | Can Project be Funded Under Existing Programs/ Budgets? | Priority (High, Medium, Low) |
|---|---|---|---|---|---|---|
| 28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. | | | | | | |
| 6 | Medium | Low | Yes | No | Yes | High |
| 29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. | | | | | | |
| 4 | Medium | Low | Yes | Yes | Maybe | High |
| 30—Identify flood-warning systems for properties where such systems can be beneficially employed. | | | | | | |
| 3 | Medium | Low | Yes | Yes | Maybe | Medium |
| 31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. | | | | | | |
| 2 | Medium | Medium/ Low | Yes | Yes | Maybe | High |
| 32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. | | | | | | |
| 3 | Medium | Low | Yes | No | Yes | High |
| 33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. | | | | | | |
| 3 | Low | Medium/ Low | No | Yes | Maybe | Medium |
| 34—Continue to maintain and update the Hazus model constructed to support the development of the FMP, in order to make flood risk information available to property owners. | | | | | | |
| 2 | Medium | Low | Yes | Yes | Maybe | High |
| 35—Continue County coordination with other agencies and stakeholders on issues of flood control. | | | | | | |
| 3 | Low | Low | Yes | No | Yes | Medium |
| 36—Continue to identify and assess drainage needs. | | | | | | |
| 3 | Medium | Medium/Low | Yes | Yes | Yes | High |
| 37—Once FEMA establishes its Building Resilient Infrastructure and Communities (BRIC) program, consider updating this plan accordingly to meet the BRIC program guidelines. | | | | | | |
| 2 | Medium | Medium | Yes | Yes | No | Medium |

## 31.4 ANNUAL EVALUATION REPORT

Los Angeles County will prepare an annual evaluation report for its area analyses. The report will include a review of each action item, including a description of what was implemented or not implemented, and recommended changes to the actions items as appropriate. The report will be made available to the media and the public and will be submitted with the annual CRS recertification.

# 32. PLAN ADOPTION

This chapter documents formal adoption of the *2020 Los Angeles County Repetitive Loss Area Analysis* by the Los Angeles County Board of Supervisors (CRS Step 9). Los Angeles County formally adopted the plan on DATE. A copy of the resolution is provided on the following pages.

Insert Adoption Resolution, 3 pages

# REFERENCES


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Los Angeles County Public Works, 2018 https://pw.lacounty.gov/strategicplan/deptOverview/

Los Angeles County Public Works, 2019 https://dpw.lacounty.gov/

Los Angeles County Repetitive Loss Area Analysis https://dpw.lacounty.gov/wmd/nfip/FMP/documents/Repetitive%20Loss%20Area%20Analysis.pdf

Low Impact Development Standards Manual https://dpw.lacounty.gov/ldd/lib/fp/Hydrology/Low%20Impact%20Development%20Standards%20Manual.pdf

Low Impact Development (LID) Requirements https://www.qcode.us/codes/inglewood/view.php?topic=10-16-10_208&frames=on

Municipal Separate Storm Sewer System (MS4) https://www.epa.gov/npdes/stormwater-discharges-municipal-sources

NFIP National Flood Insurance Program https://www.fema.gov/national-flood-insurance-program

National Incident Management System (NIMS) https://www.fema.gov/national-incident-management-system

Public Law 106-390 https://www.govinfo.gov/app/details/PLAW-106publ390

Public Law 110-325 https://www.govinfo.gov/content/pkg/PLAW-110publ325/pdf/PLAW-110publ325.pdf

Repetitive Loss Update Worksheet (AW-501) https://www.fema.gov/media-library/assets/documents/13154

RLAA Repetitive Loss Area Analysis https://silverjackets.nfrmp.us/Portals/0/doc/presentations/RLAA_Webinar.pdf

San Gabriel Valley Council of Governments, 2018 https://www.sgvcog.org/

Senate Bill 92 (SB 92, part of the 2017-18 budget package https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB92

Significant Ecological Area (SEA) http://planning.lacounty.gov/site/sea/

Technical Report of Trash Best Management Practices 2004 https://pw.lacounty.gov/wmd/BMP/TrashTechReport/TrashTechnicalReportFinal8-5-04.pdf

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# Appendix A. Generic Depth-Damage Relationships for Residential Structures

CECW-PG 10 October 2003

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements.

1. Purpose. The purpose of this memorandum is to release, and provide guidance for the use of, generic depth-damage curves for use in U.S. Army Corps of Engineers flood damage reduction studies.

2. Background. Proper planning and evaluation of flood damage reduction projects require knowledge of actual damage caused to various types of properties. The primary purpose of the Flood Damage Data Collection Program is to meet that requirement by providing Corps district offices with standardized relationships for estimating flood damage and other costs of flooding, based on actual losses from flood events. Under this program, data have been collected from major flooding that occurred in various parts of the United States from 1996 through 2001. Damage data collected are based on comprehensive accounting of losses from flood victims' records. The generic functions developed and provided in this EGM represent a substantive improvement over other generalized depth-damage functions such as the Flood Insurance Administration (FIA) Rate Reviews.

3. Results. Generic damage functions are attached for one-story homes with basement, two or more story homes with basement, and split-level homes with basement. Generic damage functions for similar structures without basements were published in 2000 and are included as enclosure 1 for ready reference.

a. Regression analysis was used to create the damage functions. While several independent variables, such as flood duration and flood warning lead-time, were examined in building the models, the models that were most efficient in explaining the percent damage to structure and contents were quadratic and cubic forms with depth as the only independent variable.

b. Content damage was modeled with the dependent variable being content damage as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of content valuations. The generic content damage models are statistically significant and their use eliminates the need to establish content-to-structure ratios through surveys.

c. While the data collected include information on all aspects of National Economic Development (NED) losses, only results and recommendations related to the structure and content damages for homes with basements are included in this EGM.

Direct costs for cleanup expenses, unpaid hours for cleanup and repair, emergency damage prevention actions, and other flood-related costs are not included in these damage functions. Information on other residential flood costs, beyond those included in these damage functions will found the summary report, discussed in paragraph 5. These costs should be developed using site-specific historical information.

4. Application. The following paragraphs provide information on the application of the generic curves within the HEC-FDA damage calculation program.

a. The economic section of HEC-FDA divides the quantification of flood damages into a direct method and an indirect method. The direct method allows the user to directly enter a stage-damage relationship for any structure. This approach is commonly used for large or unique properties such as industrial or pubic buildings. The indirect method quantifies the stage-damage relationship for a group of structures that have significant commonality. Typically damage to residential structures is calculated using the indirect method. The procedures described in the following paragraphs apply only when using the indirect method to determine the stage-damage relationship.

b. The traditional approach to quantifying damage to contents by the indirect method relies on three pieces of information: 1) structure value; 2) content-to-structure value ratio; and 3) the content depth-damage relationship. The content-to-structure value ratio and content depth-damage relationship are unique to the structure occupancy type to which a structure is assigned. The content depth-damage relationship provides the estimate of content flood damage as a percentage of content value. Thus, to calculate a content stage-damage function for an individual structure, the structure value for an individual structure is first multiplied by the content-to-structure value ratio to provide an estimate of the content value. This content value is then multiplied by each percent damage value of the content depth-damage relationship.

c. The new content depth-damage functions provided herein are different from those used by the Corps in the past in one important aspect. The new functions calculate content damage as a percent of structure value rather than content value. Using these functions within HEC-FDA requires care in specifying a content-to-structure value ratio. To understand the requirements for using the new content depth-damage functions requires a basic understanding of how HEC-FDA calculates content damage.

(1). To calculate damages by the indirect method, each structure must be assigned to a structure occupancy type. For each structure occupancy type a content-to-structure value ratio and content depth-damage relationship are defined. These data for calculating content damage within HEC-FDA is entered on the “Study Structure Occupancy Type” screen. As long as a content value is not entered for a structure in the Structure Inventory Data, HEC-FDA calculates the content stage-damage by first calculating content using the structure value multiplied by the content-to-structure value ratio.

In some instances, however, analysts develop unique estimates of content values for a structure, which are entered for the individual structure on the Structure Inventory Data screen. For each structure that has a content value entered, calculating a content value by using the content-to-structure value ratio is ignored and the user entered content value is used to calculate content damage.

(2). The new content depth-damage functions do not require this intermediate step of calculating content values. Therefore, the content-to-structure value ratio for each structure occupancy type using the new content depth-damage relationships must be set to one hundred percent (100). This forces the content depth-damage function to be multiplied by the structure value as required. Also, the "Error Associated with Content/Structure Value" on the "Study Structure Occupancy Type" screen should be left blank. This implies that the error in content-to-structure value ratio is part of the new content depth-damage relationship.

(3). Because entering a content value on the Structure Inventory Data window overrides the content-to-structure value ratio, the new content depth-damage relationships should not be used for structures that have separately entered content values.

(4). Questions concerning the use of the generic curves within the HEC-FDA model can be addressed to Dr. David Moser, Institute of Water Resources (IWR), (703) 428-8066.

5. Report. A report summarizing the data collection effort and analyses performed to derive these curves will shortly be available on the IWR website. More information may be obtained by contacting the program's principal investigator, Stuart Davis, (703) 428-7086.

6. Waiver to Policy. These curves are developed for nation-wide applicability in flood damage reduction studies. When using these curves, the requirement to develop site-specific depth-damage curves contained in ER 1105-2-100, E-19q.(2) is waived. Additionally, the requirement to develop content valuations and content-to-structure ratios based on site-specific or comparable floodplain information, ER 1005-2-100, E-19q.(1)(a), is also waived. Note these waivers currently apply only to single-family homes with and without basements for which generic curves have been published, and not other categories of flood inundation damages for which no generic curves exist. Feasibility reports must state the generic curves are being used in the flood damage analysis for residential structures with and/or without basements. Use of these curves is optional and analysts should always endeavor to use the best available information to accurately quantify the damages and benefits in inundation reduction studies.

7. Point of Contact. Administrators of the Flood Damage Data Collection Program continue to collect and analyze flood-related damages to both residential and commercial properties. The HQUSACE program monitor is Lillian Almodovar, (202) 761-4233, who can address any questions concerning the program.

FOR THE COMMANDER:

/s/

Encl

WILLIAM R. DAWSON, P.E.
Chief, Planning and Policy Division
Directorate of Civil Works

CECW-PG
SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships

DISTRIBUTION:
North Atlantic Division, ATTN: CENAD-ET-P
South Atlantic Division, ATTN: CESAD-ET-P
Great Lakes/Ohio River Division: ATTN: CELRD-E-P
Northwestern Division, ATTN: CENWD-PNP-ET-P
Pacific Ocean Division, ATTN: CEPOD-ET-E
South Pacific Division, ATTN: CESPD-ET-P
Southwestern Division, ATTN: CESWD-ET-P
Mississippi Valley Division: ATTN: CEMVD-PM

## DAMAGE FUNCTIONS FOR SINGLE FAMILY RESIDENTIAL STRUCTURES WITH BASEMENTS

### *Structure Depth-Damage*

| Table 1<br>Structure<br>One Story, With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | 0% | 0 |
| -7 | 0.7% | 1.34 |
| -6 | 0.8% | 1.06 |
| -5 | 2.4% | 0.94 |
| -4 | 5.2% | 0.91 |
| -3 | 9.0% | 0.88 |
| -2 | 13.8% | 0.85 |
| -1 | 19.4% | 0.83 |
| 0 | 25.5% | 0.85 |
| 1 | 32.0% | 0.96 |
| 2 | 38.7% | 1.14 |
| 3 | 45.5% | 1.37 |
| 4 | 52.2% | 1.63 |
| 5 | 58.6% | 1.89 |
| 6 | 64.5% | 2.14 |
| 7 | 69.8% | 2.35 |
| 8 | 74.2% | 2.52 |
| 9 | 77.7% | 2.66 |
| 10 | 80.1% | 2.77 |
| 11 | 81.1% | 2.88 |
| 12 | 81.1% | 2.88 |
| 13 | 81.1% | 2.88 |
| 14 | 81.1% | 2.88 |
| 15 | 81.1% | 2.88 |
| 16 | 81.1% | 2.88 |

| Table 2<br>Structure<br>Two or More Stories, With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | 1.7% | 2.70 |
| -7 | 1.7% | 2.70 |
| -6 | 1.9% | 2.11 |
| -5 | 2.9% | 1.80 |
| -4 | 4.7% | 1.66 |
| -3 | 7.2% | 1.56 |
| -2 | 10.2% | 1.47 |
| -1 | 13.9% | 1.37 |
| 0 | 17.9% | 1.32 |
| 1 | 22.3% | 1.35 |
| 2 | 27.0% | 1.50 |
| 3 | 31.9% | 1.75 |
| 4 | 36.9% | 2.04 |
| 5 | 41.9% | 2.34 |
| 6 | 46.9% | 2.63 |
| 7 | 51.8% | 2.89 |
| 8 | 56.4% | 3.13 |
| 9 | 60.8% | 3.38 |
| 10 | 64.8% | 3.71 |
| 11 | 68.4% | 4.22 |
| 12 | 71.4% | 5.02 |
| 13 | 73.7% | 6.19 |
| 14 | 75.4% | 7.79 |
| 15 | 76.4% | 9.84 |
| 16 | 76.4% | 12.36 |

| Table 3<br>Structure<br>Split Level, With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | | |
| -7 | | |
| -6 | 2.5% | 1.8% |
| -5 | 3.1% | 1.6% |
| -4 | 4.7% | 1.5% |
| -3 | 7.2% | 1.6% |
| -2 | 10.4% | 1.6% |
| -1 | 14.2% | 1.6% |
| 0 | 18.5% | 1.6% |
| 1 | 23.2% | 1.7% |
| 2 | 28.2% | 1.9% |
| 3 | 33.4% | 2.1% |
| 4 | 38.6% | 2.4% |
| 5 | 43.8% | 2.6% |
| 6 | 48.8% | 2.9% |
| 7 | 53.5% | 3.2% |
| 8 | 57.8% | 3.4% |
| 9 | 61.6% | 3.6% |
| 10 | 64.8% | 3.9% |
| 11 | 67.2% | 4.2% |
| 12 | 68.8% | 4.8% |
| 13 | 69.3% | 5.7% |
| 14 | 69.3% | 5.7% |
| 15 | 69.3% | 5.7% |
| 16 | 69.3% | 5.7% |

# Content Depth-Damage

| Table 4<br>Content<br>One Story, With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | 0.1% | 1.60 |
| -7 | 0.8% | 1.16 |
| -6 | 2.1% | 0.92 |
| -5 | 3.7% | 0.81 |
| -4 | 5.7% | 0.78 |
| -3 | 8.0% | 0.76 |
| -2 | 10.5% | 0.74 |
| -1 | 13.2% | 0.72 |
| 0 | 16.0% | 0.74 |
| 1 | 18.9% | 0.83 |
| 2 | 21.8% | 0.98 |
| 3 | 24.7% | 1.17 |
| 4 | 27.4% | 1.39 |
| 5 | 30.0% | 1.60 |
| 6 | 32.4% | 1.81 |
| 7 | 34.5% | 1.99 |
| 8 | 36.3% | 2.13 |
| 9 | 37.7% | 2.25 |
| 10 | 38.6% | 2.35 |
| 11 | 39.1% | 2.45 |
| 12 | 39.1% | 2.45 |
| 13 | 39.1% | 2.45 |
| 14 | 39.1% | 2.45 |
| 15 | 39.1% | 2.45 |
| 16 | 39.1% | 2.45 |

| Table 5<br>Content<br>Two or More Stories-With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | 0% | 0 |
| -7 | 1.0% | 2.27 |
| -6 | 2.3% | 1.76 |
| -5 | 3.7% | 1.49 |
| -4 | 5.2% | 1.37 |
| -3 | 6.8% | 1.29 |
| -2 | 8.4% | 1.21 |
| -1 | 10.1% | 1.13 |
| 0 | 11.9% | 1.09 |
| 1 | 13.8% | 1.11 |
| 2 | 15.7% | 1.23 |
| 3 | 17.7% | 1.43 |
| 4 | 19.8% | 1.67 |
| 5 | 22.0% | 1.92 |
| 6 | 24.3% | 2.15 |
| 7 | 26.7% | 2.36 |
| 8 | 29.1% | 2.56 |
| 9 | 31.7% | 2.76 |
| 10 | 34.4% | 3.04 |
| 11 | 37.2% | 3.46 |
| 12 | 40.0% | 4.12 |
| 13 | 43.0% | 5.08 |
| 14 | 46.1% | 6.39 |
| 15 | 49.3% | 8.08 |
| 16 | 52.6% | 10.15 |

| Table 6<br>Content<br>Split-Level-With Basement | | |
|---|---|---|
| Depth | Mean of Damage | Standard Deviation of Damage |
| -8 | 0.6% | 2.09 |
| -7 | 0.7% | 1.49 |
| -6 | 1.4% | 1.14 |
| -5 | 2.4% | 1.01 |
| -4 | 3.8% | 1.00 |
| -3 | 5.4% | 1.02 |
| -2 | 7.3% | 1.03 |
| -1 | 9.4% | 1.04 |
| 0 | 11.6% | 1.06 |
| 1 | 13.8% | 1.12 |
| 2 | 16.1% | 1.23 |
| 3 | 18.2% | 1.38 |
| 4 | 20.2% | 1.57 |
| 5 | 22.1% | 1.76 |
| 6 | 23.6% | 1.95 |
| 7 | 24.9% | 2.13 |
| 8 | 25.8% | 2.28 |
| 9 | 26.3% | 2.44 |
| 10 | 26.3% | 2.44 |
| 11 | 26.3% | 2.44 |
| 12 | 26.3% | 2.44 |
| 13 | 26.3% | 2.44 |
| 14 | 26.3% | 2.44 |
| 15 | 26.3% | 2.44 |
| 16 | 26.3% | 2.44 |

**ENCLOSURE**
**DAMAGE FUNCTIONS**
**FOR SINGLE FAMILY RESIDENTIAL**

## *STRUCTURES WITHOUT BASEMENTS*

| Structure<br>One Story, No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 2.5% | 2.7% |
| 0 | 13.4% | 2.0% |
| 1 | 23.3% | 1.6% |
| 2 | 32.1% | 1.6% |
| 3 | 40.1% | 1.8% |
| 4 | 47.1% | 1.9% |
| 5 | 53.2% | 2.0% |
| 6 | 58.6% | 2.1% |
| 7 | 63.2% | 2.2% |
| 8 | 67.2% | 2.3% |
| 9 | 70.5% | 2.4% |
| 10 | 73.2% | 2.7% |
| 11 | 75.4% | 3.0% |
| 12 | 77.2% | 3.3% |
| 13 | 78.5% | 3.7% |
| 14 | 79.5% | 4.1% |
| 15 | 80.2% | 4.5% |
| 16 | 80.7% | 4.9% |

| Structure<br>Two or More Stories-No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 3.0% | 4.1% |
| 0 | 9.3% | 3.4% |
| 1 | 15.2% | 3.0% |
| 2 | 20.9% | 2.8% |
| 3 | 26.3% | 2.9% |
| 4 | 31.4% | 3.2% |
| 5 | 36.2% | 3.4% |
| 6 | 40.7% | 3.7% |
| 7 | 44.9% | 3.9% |
| 8 | 48.8% | 4.0% |
| 9 | 52.4% | 4.1% |
| 10 | 55.7% | 4.2% |
| 11 | 58.7% | 4.2% |
| 12 | 61.4% | 4.2% |
| 13 | 63.8% | 4.2% |
| 14 | 65.9% | 4.3% |
| 15 | 67.7% | 4.6% |
| 16 | 69.2% | 5.0% |

| Structure<br>Split-Level-No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 6.4% | 2.9% |
| 0 | 7.2% | 2.1% |
| 1 | 9.4% | 1.9% |
| 2 | 12.9% | 1.9% |
| 3 | 17.4% | 2.0% |
| 4 | 22.8% | 2.2% |
| 5 | 28.9% | 2.4% |
| 6 | 35.5% | 2.7% |
| 7 | 42.3% | 3.2% |
| 8 | 49.2% | 3.8% |
| 9 | 56.1% | 4.5% |
| 10 | 62.6% | 5.3% |
| 11 | 68.6% | 6.0% |
| 12 | 73.9% | 6.7% |
| 13 | 78.4% | 7.4% |
| 14 | 81.7% | 7.9% |
| 15 | 83.8% | 8.3% |
| 16 | 84.4% | 8.7% |

| Content<br>One Story, No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 2.4% | 2.1% |
| 0 | 8.1% | 1.5% |
| 1 | 13.3% | 1.2% |
| 2 | 17.9% | 1.2% |
| 3 | 22.0% | 1.4% |
| 4 | 25.7% | 1.5% |
| 5 | 28.8% | 1.6% |
| 6 | 31.5% | 1.6% |
| 7 | 33.8% | 1.7% |
| 8 | 35.7% | 1.8% |
| 9 | 37.2% | 1.9% |
| 10 | 38.4% | 2.1% |
| 11 | 39.2% | 2.3% |
| 12 | 39.7% | 2.6% |
| 13 | 40.0% | 2.9% |
| 14 | 40.0% | 3.2% |
| 15 | 40.0% | 3.5% |
| 16 | 40.0% | 3.8% |

| Content<br>Two or More Stories-No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 1.0% | 3.5% |
| 0 | 5.0% | 2.9% |
| 1 | 8.7% | 2.6% |
| 2 | 12.2% | 2.5% |
| 3 | 15.5% | 2.5% |
| 4 | 18.5% | 2.7% |
| 5 | 21.3% | 3.0% |
| 6 | 23.9% | 3.2% |
| 7 | 26.3% | 3.3% |
| 8 | 28.4% | 3.4% |
| 9 | 30.3% | 3.5% |
| 10 | 32.0% | 3.5% |
| 11 | 33.4% | 3.5% |
| 12 | 34.7% | 3.5% |
| 13 | 35.6% | 3.5% |
| 14 | 36.4% | 3.6% |
| 15 | 36.9% | 3.8% |
| 16 | 37.2% | 4.2% |

| Content<br>Split-Level-No Basement | | |
|---|---|---|
| **Depth** | **Mean of Damage** | **Standard Deviation of Damage** |
| -2 | 0% | 0% |
| -1 | 2.2% | 2.2% |
| 0 | 2.9% | 1.5% |
| 1 | 4.7% | 1.2% |
| 2 | 7.5% | 1.3% |
| 3 | 11.1% | 1.4% |
| 4 | 15.3% | 1.5% |
| 5 | 20.1% | 1.6% |
| 6 | 25.2% | 1.8% |
| 7 | 30.5% | 2.1% |
| 8 | 35.7% | 2.5% |
| 9 | 40.9% | 3.0% |
| 10 | 45.8% | 3.5% |
| 11 | 50.2% | 4.1% |
| 12 | 54.1% | 4.6% |
| 13 | 57.2% | 5.0% |
| 14 | 59.4% | 5.4% |
| 15 | 60.5% | 5.7% |
| 16 | 60.5% | 6.0% |

# Appendix B. Federal and State Agencies, Programs and Regulations

# B. Federal and State Agencies, Programs and Regulations

Existing laws, ordinances, plans and programs at the federal and state level can support or impact flood hazard mitigation actions identified in this plan. The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

## FEDERAL

### National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1 percent annual chance (100-year) flood (or base flood) and the 500-year flood. Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a flood-prone area, participating jurisdictions must, at a minimum, ensure that the project meets the following criteria (44 CFR Part 60, Section 60.3):

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- Be constructed with materials resistant to flood damage
- Be constructed by methods and practices that minimize flood damage
- Be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Additional criteria apply depending on the availability of information about the flood hazard.

### Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 9 community would receive a 5 percent premium discount, a Class 8 community would receive a 10 percent premium discount, and so on, until reaching a 45 percent premium discount for a Class 1 community. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

## Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA replaced previous federal mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The DMA established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

## Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014

The Biggert-Waters Flood Insurance Reform Act of 2012 authorized and funded a national mapping program. It also authorized insurance premium rate increases to ensure the fiscal soundness of the NFIP by transitioning the program from subsidized rates, also known as artificially low rates, to offer full actuarial rates reflective of risk.

The Homeowner Flood Insurance Affordability Act of 2014 repealed parts of Biggert-Waters, restoring grandfathering, putting limits on certain rate increases and updating the approach to ensuring the fiscal soundness of the fund by applying an annual surcharge to all policyholders.

## Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

In some parts of the country, including the Pacific Northwest and the Sacramento-San Joaquin Delta area, court rulings have found that floodplain management measures can be in conflict with the goals of the endangered

species act. Those rulings have required FEMA and local governments to engage in a consultation process with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects.

## Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

## National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving floods and other hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across this spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

## Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (Public Law 110-325). Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals.

The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs

registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

## Public Law 8499, Flood Control and Coastal Emergencies

Federal law that gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that have been damaged by floods. Under Public Law 8499, the Corps' Chief of Engineers is authorized to undertake activities including disaster preparedness, advance measures to prevent or reduce damage when there is an imminent threat of unusual flooding, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provision of emergency water in the event of drought or contaminated source.

# STATE

## California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. County actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

## California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

## Porter-Cologne Act

The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality. The act uses National Pollutant Discharge Elimination System permits for point source discharges and waste discharge to keep people from degrading the water quality of the state. The policy states:

- The quality of all waters of the state shall be protected

- All activities and factors affecting the quality of water will be regulated in order to attain the highest water quality within reason.
- The state must be prepared to exercise its fullest power and jurisdiction in order to protect the quality of water in the state from degradation.

## AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources. The conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including (California Legislature, 2015):

- Flood hazard zones
- Maps published by FEMA, California Department of Water Resources, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, the Governor's Office of Emergency Services, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or California Department of Water Resources has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

## AB 2140: General Plans—Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires the California Office of Emergency Services to give preference for federal mitigation funding to cities and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

## AB 747: General Plans—Safety Element

This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that

fulfills the goals and objectives of this law may comply with this requirement by summarizing and incorporating by reference the other plan or document in the safety element.

In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years.

## AB 2800: Climate Change—Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

## SB 92 and New Standards for Submitting Dam Inundation Maps

On June 27, 2017, significant legislative changes related to dam safety were adopted by California through the passing of Senate Bill 92 (SB 92, part of the 2017-18 budget package). The bill requires the following changes which will affect dam owners:

- Inundation Maps
- Emergency Action Plans
- Fees and Enforcement

## SB 379: Land Use, General Plan, Safety Element

This California Senate Bill establishes provisions that require the safety element in local general plans to be reviewed and updated to address climate adaptation and resiliency strategies. The safety element must include a vulnerability assessment, adaptation goals, policies and objectives, and implementation measures. A safety element update to comply with the law is due at the time of a jurisdiction's first local hazard mitigation plan adoption after January 1, 2017, or if no such FEMA plan has been adopted, by January 1, 2022. The bill also references specific sources of useful climate information to consult, such as Cal-Adapt.

## California State Building Code

California Code of Regulations Title 24, also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and

construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

## Standardized Emergency Management System

California Code of Regulations Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The Standardized Emergency Management System is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system in order to be eligible for state funding of response-related personnel costs under California Code of Regulations Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

## California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Local hazard mitigation plans developed in response to the Disaster Mitigation Act in the State of California are to be consistent with the provisions of the approved State Hazard Mitigation Plan.

## Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

## California Civil Code 1102

Article 1102 of the California Civil Code establishes requirements for disclosure of information as part of real estate transactions. It applies to any transfer of real property or residential stock cooperative with one to four dwelling units, by sale, exchange, installment land sale contract, lease with an option to purchase, other option to purchase, or ground lease coupled with improvements. The code imposes disclosure duties on the seller, the seller's agent, or both. Provisions of this code require disclosure of information regarding the proximity of the subject property to areas of natural hazards, including flood, wildfire and earthquake.

## Local Flood Protection Planning Act

This statute provides guidance on what a flood mitigation plan should include.

## Water Code Division 5, Part 2, Chapter 4, Article 4

This code provides flood plain regulations established for public agencies within flood plain or a flood plain management plan.

## California Coastal Management Program

This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.