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2020 Floodplain Management Plan

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TETRA TECH

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City of Los Angeles 2020 Floodplain Management Plan

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PREPARED FOR

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The City of Los Angeles is committed to resilience and understands that flood risk is dynamic and warrants a focused look at managing flood risk through proactive planning. This commitment and understanding are principle drivers for development of this floodplain management plan. Members of the Steering Committee for the *City of Los Angeles Comprehensive Floodplain Management Plan*—from government, commercial, and non-profit agencies across the City—provided valuable input and assistance for development of the plan. Mr. Aaron Gross, the chairperson of the Steering Committee, was instrumental in helping to guide the Steering Committee to consensus on many milestones in the planning process. All members of the Steering Committee are to be commended for their commitment to the process. Members of the general public who completed surveys and attended public outreach events provided input were instrumental in informing the final content of this plan.

EXECUTIVE SUMMARY

WHY PLAN FOR FLOODING?

Recent history has demonstrated how the City of Los Angeles can be significantly impacted by flooding:

- On November 12, 2003, 5.6 inches of precipitation fell during a 4-hour period over the Watts area of Los Angeles and portions of the City of Carson, causing significant flooding in areas not previously considered at risk for flooding.
- National Weather Service records show a total of 37.25 inches of rain at the downtown Los Angeles Civic Center during the rainy season of 2004-2005.
- 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.
- In January 2018, a winter storm led to mudslides and debris flows that killed at least 17 people. Estimated rain and snow amounts in Southern California between January 6 and 11 ranged from 150 to 400 percent of normal.

Even though the City of Los Angeles has adopted multiple mitigation and flood control projects and plans, it is constantly seeking additional ways to mitigate flood impacts in the community. Additionally, as a participant in the federal Community Rating System, the City of Los Angeles can use an updated floodplain management plan as a key step toward significant reductions in flood insurance premiums.

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. The responsibility for 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 City of Los Angeles 2020 Floodplain Management Plan identifies 78 flood hazard mitigation actions, chosen through a facilitated process that focused on meeting these objectives.

THE COMMUNITY RATING SYSTEM

The Community Rating System (CRS) is a voluntary program within the National Flood Insurance Program (NFIP) that encourages floodplain management activities that exceed the minimum requirements of the NFIP. The CRS outlines 19 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. A Class 1 community receives a 45-percent premium discount for properties within a 100-year floodplain, and a Class 9 community receives a 5-percent discount. Discounts for classifications between those two vary in 5-percent increments. Class 10 communities are those that do not participate in the CRS; they receive no discount.

The City of Los Angeles has participated in the CRS program since 1991. The City has a Class 7 rating, so citizens who live in a 100-year floodplain can receive up to a 15-percent discount on their flood insurance; outside the 100-year floodplain they receive a 5-percent discount. This equates to an annual savings ranging from $59 to $223 per policy, for a total citywide premium savings of almost $511,000. To maintain or improve its rating, the City goes through an annual recertification and a re-verification every five years. The Floodplain Management Plan will help the City maximize its credit potential under the CRS.

PLAN DEVELOPMENT METHODOLOGY

The City of Los Angeles Floodplain Management Plan was developed in six phases:

- **Phase 1, Organize and review**—A 22-member steering committee, consisting of City staff, citizens and other stakeholders in the planning area, was assembled to oversee the development of the plan. This committee met eight times over a 10-month period to provide guidance and oversight to a 10-member planning team consisting of City 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 multi-media public involvement strategy was implemented, centered on a hazard preparedness questionnaire. A comprehensive review of existing plans and programs that can support flood hazard mitigation was completed.
- **Phase 2, Update the risk assessment**— Risk assessment is the process of measuring potential loss of life, personal injury, economic injury and property damage resulting from flood hazards. This process assesses the vulnerability of people, buildings and infrastructure to flood hazards. The risk assessment for this plan meets CRS requirements for assessing the flood hazard.
- **Phase 3, Engage the public**—The Steering Committee developed a public involvement strategy that was implemented by the planning team and included public meetings held to provide the public an opportunity to participate in the planning process. Additionally, a flood preparedness/hazard mitigation survey, a City-sponsored website dedicated to the plan, (https://eng.lacity.org/fmp-updates) and multiple media releases were deployed under the strategy.

- **Phase 4, Assemble the updated plan**—The planning team and Steering Committee assembled key information from Phases 1 and 2 into a document that meets CRS requirements for the following:
  - A description of the planning process
  - A risk assessment
  - A mitigation strategy including goals, a review of alternatives and a prioritized action plan
  - A plan maintenance section
  - Documentation of adoption.
- **Phase 5, Natural and beneficial floodplain functions plan**—The CRS provides credits for adopting plans that protect one or more natural functions within a community's floodplain. This plan includes components that strive to meet these CRS requirements. The City of Los Angeles has two documents that meet these requirements: the Los Angeles River Revitalization Master Plan (April 2007), and the Conservation Element of the City's General Plan (September 2001). Both of these plans lay out long range visions for improvements, with timelines for implementation greater than the 10-year life span specified by the CRS program. The natural and beneficial floodplain function chapter of this plan integrates these two plans into this Floodplain Management Plan so that the City can review their status every five years when the Floodplain Management Plan is updated.
- **Phase 6, Plan review**—A pre-adoption review draft of the plan will be sent for review and comment to the Insurance Services Office (ISO), the contractor for the CRS. After the ISO grants pre-adoption approval, the final adoption phase will begin. This plan includes an implementation and maintenance section that details the formal process for ensuring that the plan remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the plan's progress annually and revising it every five years. Implementation and maintenance include continued public involvement and incorporation of the recommendations of this plan into other planning mechanisms of the City, such as the general plan, capital improvement program, and hazard mitigation plan.

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 GIS and FEMA's risk assessment platform, Hazus-MH. Hazus-MH is a 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 nine types of flood hazards within the City of Los Angeles: flooding in FEMA-designated Special Flood Hazard Areas (SFHA), non-SFHA hillside areas, non-SFHA shallow flooding areas, non-SFHA urban drainage flood areas, flash flooding, non-SFHA coastal areas, geologic hazard areas, tsunami hazards and system-related failures including both dams and levees.
- There were 15 flood events in Los Angeles County (including the City of Los Angeles) that caused sufficient damage to trigger a presidential disaster declaration from 1969 through 2018. This equates to a significant flood event every 3.3 years over a period of 50 years.
- The City of Los Angeles includes over 16,000 acres of mapped floodplain for recurrence intervals up to the 500-year flood event that encompasses over 30,000 structures, most of which are residential.
- The analysis estimated $13.03 billion of building-and-contents exposure to the 100-year flood, representing 1.5 percent of the total replacement cost of the City of Los Angeles and $47.71 billion of

building and contents exposure to the 500-year flood, representing 5.4 percent of the total replacement cost value of the City of Los Angeles.

- The analysis identified 257 critical facilities exposed to floods up to the 500-year event.
- An estimated 58 percent of the people living in the census blocks that intersect the 100-year floodplain are economically disadvantaged, defined as having household incomes of $50,000 or less.
- A 100-year flood event in the City of Los Angeles could displace 8,200 people, with nearly 800 people requiring short-term shelter.
- The analysis estimates that a 100-year flood event in the City of Los Angeles could cause damage to almost 5,000 structures, totaling over $1.2 billion in property damage.
- A 100-year flood event in the City of Los Angeles could generate more than 93,000 tons of debris.

MITIGATION MISSION STATEMENT, GOALS AND OBJECTIVES

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

- Mission Statement—Through partnerships and careful planning, identify and reduce flood hazards to protect the health, safety, quality of life, environment, and economy of the City of Los Angeles.
- Goals
  1. Reduce flood risk
  2. Protect life
  3. Protect property
  4. Increase resilience of critical facilities and infrastructures
  5. Increase community awareness and public education
  6. Pursue cost-effective, environmentally sound and multi-benefit mitigation measures
  7. Coordinate with other programs that can support or enhance flood mitigation

- Objectives
  1. Provide, improve and maintain flood protection.
  2. Use the best available data, science and technologies to improve understanding of the locations and potential impacts of flood hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life and safety.
  3. Minimize the impacts of flood hazards on current and future land uses through implementation of appropriate codes, standards, and ordinances.
  4. Retrofit, purchase, and relocate structures that are in flood hazard areas, especially those known to be repetitively damaged.
  5. Maintain or enhance early warning emergency response systems, evacuation procedures, training and equipment.
  6. Increase resilience and continuity of operations of critical facilities and infrastructure.
  7. Pursue effective and efficient approaches to reducing stormwater runoff, protecting water quality and water resources.
  8. Increase public awareness of existing flood risks and the means to reduce these risks by conducting educational and outreach programs.
  9. Encourage and support leadership within the private sector, nonprofit agencies and community-based organizations to promote and implement local floodplain management activities.
  10. Anticipate and minimize effects of climate change on flood risk.
  11. Minimize adverse impacts from flood risk on vulnerable communities.

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 actions were identified that achieve multiple objectives.

MITIGATION ACTIONS

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

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

For the purposes of this document, mitigation actions 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 was CRS, this plan does not focus solely on CRS credits. It was important to the City and the Steering Committee to examine actions that would work through all phases of emergency management. Some of the actions 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 actions' effectiveness in achieving the goals of the plan and whether they are within the City's capabilities. Table ES-1 presents a summary of the hazard mitigation actions identified in the action plan.

Table ES-1. Summary of Hazard Mitigation Actions

#	Description	Priority
P-1	Continue to maintain the City Tsunami Response Plan Annex and community education effort and participate in the Los Angeles County Operational Area Tsunami Mitigation Task Force. Consider inclusion of outreach to identified vulnerable populations.	High
P-2	Continue to partner with the NOAA and the NWS, who provide tsunami warning information to the state, the county and the city.	High
P-3	Maintain the City Tsunami Response Plan Annex as part of the City's Emergency Operations Organization Master Plan.	High
P-4	Update evacuation plans for areas potentially affected by a tsunami according to California State Office of Emergency Services tsunami inundation maps and the City's Tsunami Response Plan Annex. Forward these evacuation plans to appropriate agencies for coordination (police, sheriff, Department of Transportation, Department of City Planning, Los Angeles County, etc.).	High
P-5	Continue to maintain and annually update the Dam and Reservoir Emergency Notification List.	High
P-6	Continue to evaluate reservoirs in terms of earthquake safety and implement necessary mitigation or improvement measures, as required by the California Department of Water Resources Division of Safety of Dams.	Medium
P-7	Continue to collect and analyze data regarding water volumes and pumping capabilities in water storage facilities provided by the Los Angeles Water Systems Data Acquisition Center to ensure those facilities are functioning properly to minimize potential hazards.	High
P-8	Continue to dispatch reservoir inspection and damage teams following natural disasters to inspect and report the condition of facilities.	High
P-9	Continue to routinely monitor the existing structural condition of City-owned water storage facilities.	High
P-10	Maintain a flood threat recognition system for properties downstream of City-owned water tanks.	High
P-11	Prepare and update emergency response plans for water tanks and other non-dam systems.	Medium

#	Description	Priority
P-12	Continue to provide and participate in community education and outreach programs and events in the City (such as Earth Day, Public Woks Week and preparedness fairs), prioritizing identified vulnerable populations.	High
P-13	Maintain the City's Emergency Management Department and ReadyLA websites and other City social media sites to provide emergency preparedness information to the general public and media.	High
P-14	Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.	High
P-15	Maintain the City's Emergency Operations Master Plan and Procedures including, but not limited to, periodic plan updates and training and exercises.	High
P-16	Make sand and 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
P-17	Maintain and improve the drainage complaint database to help identify flood risks.	High
P-18	Maintain and improve a technically based prioritization methodology for use in developing the stormwater capital improvement program.	High
P-19	Maintain regular contact with surrounding cities, the Los Angeles County Department of Public Works, and applicable state and federal agencies regarding floodplain management and the National Flood Insurance Program.	High
P-20	Network with other agencies and participate in organizations such as the Association of State Floodplain Managers, California Floodplain Management Association and the National Association of Flood and Stormwater Management Agencies to remain current in the field of floodplain management.	High
P-21	Provide training and necessary support to foster Certified Floodplain Managers within the Department of Public Works and other Departments with floodplain management responsibilities.	High
P-22	Conduct an annual National Flood Insurance Program seminar for City agencies responsible for applying and enforcing floodplain management regulations.	High
P-23	Based on the annual National Flood Insurance Program seminar, update operational procedures and training materials for staff who apply and enforce floodplain management regulations and provide annual training.	High
P-24	Maintain Geographic Information System mapping and modeling capability to support the stormwater facilities condition assessment program.	High
P-25	Continue to maintain precise survey benchmarks throughout the City.	High
P-26	Develop and maintain a citywide list of priority maintenance-related flood problem sites for where the City has jurisdiction.	High
P-27	Based on the citywide list of priority maintenance-related flood problem sites (see P-26), conduct necessary inspection and maintenance at priority maintenance-related flood problem sites prior to the wet season and after significant storms, where the City has jurisdiction.	High
P-28	Provide public education about keeping the stormwater system free of debris, the blockage of flow paths and reporting violations.	High
P-29	Post "No Dumping" signs at points of entry to the stormwater system.	High
P-30	Maintain a map for potential landslide and mudflow areas (including post-fire impact areas).	High
P-31	Update the established policy for substantial improvement/damage assessment that is consistent with FEMA requirements as needed.	High
P-32	Verify, through the plan check process and post development review, that new development complies with the regulations in the City's Ordinance for the Management of Flood Hazards (Ordinance No. 172,081), including freeboard requirements on new construction and substantial improvements.	High
P-33	Update the City's Flood Damage Prevention Ordinance to incorporate standards appropriate for the flood risk in the City and to incorporate natural floodplain functions and green infrastructure elements. Consider the inclusion of additional measures to address flood risk to identified vulnerable populations. Coordinate with the Department of City Planning on the development of Wildlife Protection regulations.	High

#	Description	Priority
P-34	Provide information to the Flood Hazard Mitigation Coordinator on July 1 of each year for preparation of the Annual Floodplain Management Plan Evaluation Report. Describe the progress made for each mitigation action and any floodplain management regulatory actions and compliance actions conducted during the reporting period, including the number of permits approved in designated flood hazard areas, the number of waivers applied for, and the number of waivers approved. Following the completion of the Plan Evaluation Report, the Steering Committee will meet at least one time during the year to finalize the report for posting and presentation to the City Council.	High
P-35	Maintain a filing system for all Elevation Certificates that includes a process for obtaining accurately completed Elevation Certificates that is based upon a review and approval of all elevation certificates prior to the closure of a permit record.	High
P-36	Continue to refine the use of the Plan Check and Inspection System to track high-risk properties and ensure that drainage is adequately addressed through the plan check process.	High
P-37	Incorporate floodplain management information into the Zoning Information and Map Access System (NavigateLA). Ongoing updates will be needed based on updated floodplain management data.	High
P-38	Transfer electronic data annually to the Flood Hazard Mitigation Coordinator regarding structures damaged due to flooding caused by catastrophic events.	High
P-39	Update Certified Unified Program Agency data annually regarding hazardous materials storage (including water-reactive chemicals).	High
P-40	Continue to notify insurance agencies and realtors of the requirement that all lessors or renters give written notice to all prospective and interested parties—including but not limited to, purchasers, lessee and renters—prior to finalization of a transaction when the subject land and/or structures are located within FEMA-designated flood zones. The notice shall comply with the latest version of CRS manual.	High
P-41	Provide flood zone information to all residents. Provide notifications when flood insurance is required. Provide notifications when FEMA-designated flood zone changes are made.	High
P-42	Develop and distribute flood protection information and materials to property owners and developers in high-risk areas including FEMA mapped floodplains, identified repetitive loss areas, and areas outside of mapped floodplains with known flood risks.	High
P-43	Maintain a list of critical facilities in the city as documented in the City's Local Hazard Mitigation Plan. Provide flood protection information to operators of critical facilities in FEMA-designated flood zones. Encourage the implementation of flood protection measures at such facilities.	High
P-44	Maintain a current list of City-owned or city-leased properties located in FEMA-designated flood zones and evaluate floodplain management alternatives.	High
P-45	Pursuant to the directives of the City's Repetitive Loss Area Analysis, continue to investigate repetitive loss properties as they are identified by FEMA. Annually notify repetitive loss property owners about local flood hazards and property protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current repetitive loss property questionnaire to new repetitive loss properties.	High
P-46	Identify flood risk areas in the City. Provide annual investigation and notification to property owners of high-risk areas about local flood hazards and proper protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current flood hazard questionnaire to new owners in high risk areas.	High
P-47	In the Plan Check and Inspection System database, flag repetitive loss properties and high-risk areas for review and approval of building permit applications by the Flood Hazard Mitigation Coordinator. Ongoing updates will be needed based on updated floodplain management data. Include data in ZIMAS and NavigateLA.	High
P-48	Request that FEMA modify the repetitive loss property list based on mitigation projects implemented by owners or other responsible parties.	High
P-49	Identify possible sources of funding (increased cost of compliance funds, mitigation grant funds, and others), and provide this information to repetitive loss property owners.	High
P-50	Establish standards and/or incentives for the use of structural and nonstructural techniques that mitigate flood hazards and manage stormwater pollution.	High
P-51	Plan and design stormwater projects so that water quality is protected, and flood risks are reduced on site and off site.	High
P-52	Continue to require environmental review in the development process to provide for the protection of, or creation of natural resources that can mitigate the impacts of the development.	High
P-53	Continue to implement environmentally sensitive property management at City-owned sites.	High

#	Description	Priority
P-54	Update a City-wide Watercourse Permit Manual.	High
P-55	Update the City's floodplain management website to promote awareness of programs that pursue flood hazard resilience including but not limited to: the National Flood Insurance Program, FEMA's Hazard Mitigation Assistance programs, HUD's CDBG programs, and EPA's Building Blocks programs.	High
P-56	Develop a program for regular condition assessment of stormwater facilities where the City has jurisdiction to identify the physical and hydraulic condition of the system and to support infrastructure management needs.	Medium
P-57	Conduct a systematic evaluation of FEMA designated flood zones and revise/update designated flood zones to reflect current conditions. Any revised data generated by the City will be provided to FEMA with a request for effective map revision.	Medium
P-58	Evaluate current development regulations, including the grading ordinance and zoning ordinances (floodplain management ordinance, proposed wildlife protection ordinance) to determine whether the standards provide sufficient protection for adjacent (downstream or down-slope) development. Evaluate the effects of remedial grading and revise practices to minimize downstream impacts such as soil erosion and drainage.	High
P-59	Update the Map of Hillside Areas (BOE Basic Grid Map A- 13372) to more accurately reflect areas subject to hillside regulations based on latest data and regulations (CF 09-1390 and related documents).	Medium
P-60	Study and recommend solutions to conflicts between height limitations and flood mitigation elevation requirements for structures.	Medium
P-61	Research and continue to improve municipal code regulations regarding soil stability and erosion abatement.	Medium
P-62	Require that all land division proposals in FEMA-designated flood zones include base flood elevation data including recordation of this information on final plats.	Low
P-63	Develop a model educational program for hillside properties in general and Mandeville Canyon in particular. The target audience should be, at minimum, residents and real estate agents.	Medium
P-64	Develop an annual inspection program of watercourse obstructions and revetments in Mandeville Canyon.	Low
P-65	Emergency Management Department to continue to coordinate its ongoing access to Federal Empower data that identifies residents of the City who may have disabilities or other medical conditions, access or functional needs that increase their vulnerability to disasters. This information can be used by field level incident commanders or the City's Emergency Operations Center in order to ensure timely and efficient evacuation of vulnerable populations in an event of fire, flood, or tsunamis.	Low
P-66	Continue to develop and maintain evacuation plans for areas potentially affected by a catastrophic dam failure, as identified in the Dam Inundation Map of the General Plan and forward these evacuation plans to appropriate agencies for coordination (police, sheriff, Los Angeles County, etc.).	Low
P-67	Maintain self-registry for vulnerable populations with access and functional needs and strive to identify sources of public safety hazards caused by all flood risk zones, including but not limited to: the city regulated floodplain, identified repetitive loss areas, dam failure inundation areas, tsunami inundation areas, and areas potentially impacted by sea level rise.	Low
P-68	Conduct regular coordination meetings with the Los Angeles County Department of Public Works to communicate the City's list of priority stormwater projects, discuss watershed management programs, and develop countywide standards.	Low
P-69	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 and areas with greatest economic need.	Medium
P-70	Utilize risk-based information from the City of Los Angeles 2020 Floodplain Management Plan and the City of Los Angeles 2018 Local Hazard Mitigation Plan to update the Safety Element of the City's General Plan pursuant to California Assembly Bill 2140 California Senate Bill 379 and California Senate Bill 1000.	Low
P-71	Institute a program to capture perishable data (e.g., high water marks, damages, functional downtime) after flood events in the City, especially where flooding occurs in places that have not been identified a hazard areas on existing FEMA or City maps.	Medium
P-72	Continue to maintain/ enhance the city's classification under the Community rating System (CRS) as a means to mitigate the impacts from flood insurance reform.	Medium

#	Description	Priority
P-73	Where feasible, cost effective and supported both publicly and politically, restore the natural and beneficial floodplain functions of appropriate floodplains (floodplains that have been identified through a master plan or study certified by a qualified agency) in the City.	High
P-74	Using the best available data and science, consider probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the City's comprehensive floodplain management program. This would include but is not limited to codes, ordinances, plans, studies, public information programs and city directives.	High
P-75	Update the open space and conservation elements of the General Plan and identify ways to promote the preservation and enhancement of the beneficial functions of floodplains.	Medium
P-76	Coordinate floodplain management programs within the Los Angeles River impact area with those projects identified in the Los Angeles River Revitalization Master Plan.	Medium
P-77	The City currently has five approved Enhanced Watershed Management Plans: Ballona Creek, Dominguez Channel, Marina Del Rey, Santa Monica Bay, and Upper Los Angeles River. These plans were approved in 2016 by the Los Angeles Regional Water Quality Control Board. The plans are considered adaptive management plans and must be reassessed and submitted for approval to the Water Quality Control Board every 5 years to ensure the City is working toward meeting its water quality compliance mandates.	Medium
P-78	Coordinate floodplain management program recommendations and objectives with the Enhanced Watershed Management Plans.	High
P-79	Include an identifier for RLAA properties in the DBS permitting process so that property owners can be made aware of the potential flood risk when applying for construction permits.	High

IMPLEMENTATION

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.

The City of Los Angeles has a long-standing tradition of proactive response to issues that may impact its citizens. The City'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 City to pursue actions when the benefits of a project exceed its costs. Most important, the City 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 City Council will assume responsibility for adopting the recommendations of this plan and committing City resources toward its implementation as the City's budget permits.

City of Los Angeles 2020 Floodplain Management Plan

PART 1—PLANNING PROCESS AND PROJECT BACKGROUND

1. INTRODUCTION

1.1 WHY PREPARE THIS FLOODPLAIN MANAGEMENT PLAN?

The 2020 *City of Los Angeles Floodplain Management Plan* (FMP2020) presents measures to mitigate potential flood problems in the City of Los Angeles. 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. The FMP2020 identifies resources to help guide and coordinate mitigation activities.

All citizens and businesses of the City of Los Angeles are the ultimate beneficiaries of the FMP2020. Participation in development of the FMP2020 by key stakeholders helped ensure that outcomes will be mutually beneficial for all affected interests. The responsibility for floodplain management lies with many, including private property owners, business, industry, and local, state and federal government. The FMP2020's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

Numerous state and federal programs and regulations promote floodplain management planning. Notable among these are two programs of the Federal Emergency Management Agency (FEMA): the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). These programs provide benefits in the form of reduced flood insurance costs for communities that meet minimum requirements for floodplain management. The City of Los Angeles participates in both the NFIP and the CRS. The FMP2020 was developed to meet the following objectives:

- Comply with local, state and federal requirements for floodplain management planning.
- Meet requirements allowing the City of Los Angeles to enhance its CRS classification.
- Coordinate existing plans and programs to fund and implement high-priority floodplain management measures.
- Create a linkage between the FMP2020 and established plans of the City of Los Angeles so that they can work together in achieving successful mitigation.

1.2 PREVIOUS FLOODPLAIN MANAGEMENT PLANS

The City of Los Angeles joined the NFIP on December 2, 1980 and has participated in the CRS since October of 1991. Floodplain management planning and implementation are principal activities of the City's compliance with the CRS. In November 2001, the City Council adopted the City's first floodplain management plan. That plan identified the City's flood-prone areas and established goals, objectives, policies and programs to reduce flood related hazards and protect the natural and beneficial functions of the City's floodplains.

The original floodplain management plan was updated in April 2010. That update identified 74 citywide activities to be implemented and presented actions that property owners could take to address flooding at 82 repetitive loss properties (properties that have experienced flood damage multiple times) where flooding remained a problem at that time.

A second update in 2015 (FMP2015) addressed changes in local development and other conditions since the 2010 update was prepared, as well as evolving local, state and federal regulations and programs. The 80 citywide actions recommended in the FMP2015 were selected because they meet state or federal program requirements as well as the needs of Los Angeles and its citizens. At the time of the FMP2015, 152 repetitive loss properties were identified.

The City has developed the current floodplain management plan as an up-to-date tool for flood preparedness and floodplain management. It also addresses the 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 this plan were selected because they meet various state or federal program requirements as well as the needs of the City of Los Angeles and its citizens.

Unlike the previous City floodplain management plans, the FMP2020 addresses areas that have experienced repetitive flood losses in a separate companion document—the *City of Los Angeles 2020 Repetitive Loss Area Analysis*—prepared in conjunction with this plan. That document provides a detailed assessment of areas in Los Angeles that have experienced repeated flood damage in the past, with recommended actions to mitigate flooding at each specific repetitive loss area.

1.3 CRS STEPS FOR FLOODPLAIN MANAGEMENT PLANNING

The first priority for the FMP2020 is to benefit the citizens of Los Angeles by providing protection against flood hazards. In addition, the FMP2020 has been developed and updated to follow FEMA's guidelines for flood planning under the CRS program. Developing and maintaining a comprehensive floodplain management plan is among the activities that earn CRS credits toward reduced flood insurance rates. 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.

1.4 HOW TO USE THIS PLAN

The FMP2020 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 include information to support the main content of the FMP2020:

- Appendix A—Description of CRS planning requirements
- Appendix B—Steering committee charter
- Appendix C—Public outreach information
- Appendix D—Summary of results of core capabilities exercise
- Appendix E—Summary descriptions of relevant federal and state programs and laws
- Appendix F—Repetitive loss area analysis
- Appendix G—Template for progress reports to be completed as the FMP2020 is implemented

2. PLAN DEVELOPMENT METHODOLOGY

The process followed to prepare the FMP2020 had the following primary objectives:

- Form the planning team
- Define the planning area
- Establish the steering committee
- Coordinate with other agencies
- Review existing plans and programs
- Engage the public.

These objectives are discussed in the following sections.

2.1 FORMATION OF THE PLANNING TEAM

This planning effort was initiated and overseen by the Los Angeles Department of Public Works Bureau of Engineering. The City hired Tetra Tech, Inc. to assist with the development of the FMP2020. A planning team formed to lead the planning effort included the following City and Tetra Tech staff (CRS Step 1):

- Susan Shu—Department of Public Works Bureau of Engineering, Street & Stormwater Division, Senior Civil Engineer
- Chang Lin—Department of Public Works Bureau of Engineering, Street & Stormwater Division, Pre-Design Engineering & Investigations
- Romano Galassi— Department of Public Works Bureau of Engineering, Street & Stormwater Division, NFIP/CRS Project Engineer
- Ira Artz—Tetra Tech Divisional Vice President
- Steve Parker—Tetra Tech Project Manager
- Rob Flaner—Tetra Tech Hazard Mitigation Program Manager
- Melisa Schloss—Tetra Tech Hazard Mitigation Planner
- Carol Baumann—Tetra Tech Risk Assessment Lead
- Katherine Padilla—KPA Public Outreach Lead
- Lorena Y. Hernandez—KPA Project Manager

2.2 DEFINING THE PLANNING AREA

The planning area was defined as all areas within the Los Angeles city limits. For planning purposes, the City has been divided into smaller communities overseen by seven Area Planning Commissions (APC): North Valley, South Valley, West Los Angeles, South Los Angeles, Central, Harbor, and East (this is the east part of the City of Los Angeles, not the unincorporated Los Angeles County area known as East Los Angeles). The APC boundaries were used in the FMP2020 as the basis for reporting information on risk and vulnerability. The overall planning area and the APC boundaries are described in Chapter 3.

2.3 THE STEERING COMMITTEE

The Steering Committee was formed to oversee the planning effort to develop the FMP2020. Committee members included Los Angeles staff, citizens, and other stakeholders. The planning team assembled a list of candidates representing interests within the City that could have recommendations for the plan or be impacted by its recommendations. The planning team organized the makeup of the Steering Committee to maximize CRS credit under Step 2 of CRS Activity 510. This step credits a planning process conducted through a planning committee that includes members of the public and/or non-governmental stakeholders. The team confirmed a committee of 22 members, listed in Table 2-1. The makeup of this committee was as equal 50/50 split between governmental and non-governmental stakeholders.

Table 2-1. Steering Committee Members

Name	Department/Agency	Governmental[a]	Non-Governmental[b]
Aaron Gross [c]	Mayor's Office (MO) – Chief Resiliency Officer	✓	
Conni Pallini [d]	Department of City Planning	✓	
Susan Shu	Bureau of Engineering (BOE)	✓	
Michael Affeldt	Mayor's Office Los Angeles River Works	P	
Carolynn Nepomuceno-Juacalla	Los Angeles Department of Building and Safety (DBS)	P	
Orval Hernandez-Marcial	Los Angeles Sanitation (LASAN)	P	
Emmanuel Tan	Los Angeles Department of Water and Power (DWP)	P	
Allen Pijuan	Los Angeles Emergency Management Department	P	
John Ignatczyk	City of Los Angeles Fire Department	P	
John Campos	City of Los Angeles Police Department	P	
Lynette Reed	Port of Los Angeles	P	
Pat Wood	Los Angeles County Flood Control District		P
Salomon Miranda	California Department of Water Resources		P
Ed Demesa	U.S. Army Corps of Engineers		P
Mike Greenspan	Resident		P
Jessica Duboff	Los Angeles Chamber of Commerce		P
Marissa Christiansen	Friends of the Los Angeles River		P
Dr. Andre Ellis	California State University, Los Angeles- Geosciences & Environment		P
Desmian Alexander	Student in Public Policy, University of Southern California		P
Joselito Garcia-Ruiz	Red Cross of Greater Los Angeles		P
Sarah Rascon	Mountain Recreation & Conservation Authority		P
Britta McOmber	University of California Los Angeles- Luskin School of Public Affairs		P

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

a. "Governmental" refers to representatives of the City of Los Angeles associated with permit authority, who are responsible for the development and enforcement of City plans, programs, codes and standards.
b. "Non-governmental" refers to any stakeholder not affiliated with the permit authority of the City of Los Angeles who could have a stake in the outcome and directives of this plan.
c. Steering Committee Chair
d. Steering Committee Vice-Chair

Among governmental representatives on the Steering Committee, the City 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.

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
Aaron Gross	✓					✓
Conni Pallini	✓		✓			✓
Susan Shu			✓		✓	✓
Michael Affeldt	✓					✓
Carolynn Nepomuceno-Juacalla	✓	✓				✓
Orval Hernandez-Marcial			✓		✓	✓
Emmanuel Tan		✓			✓	✓
Allen Pijuan				✓		✓
John Ignatczyk				✓		✓
John Campos				✓		✓
Lynette Reed		✓			✓	✓

Leadership roles and a committee charter were established during the Steering Committee's initial meeting on July 24, 2019. The Steering Committee met eight times from July 2019 through April 2020. The planning team facilitated each meeting, which addressed a set of objectives based on an established work plan. All meetings were open to the public and advertised on the City's floodplain management plan website, with agendas and meeting summaries posted on the website as well. The charter is included in Appendix B. Agendas and meeting summaries are included in Appendix C.

2.4 COORDINATION WITH OTHER AGENCIES

Opportunities for involvement in the planning process were provided 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).

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
- Los Angeles County Flood Control District
- Los Angeles County Public Works
- Floodplain Management Association
- City of Los Angeles Chamber of Commerce
- U.S. Army Corps of Engineers, Los Angeles District
- Friends of the Los Angeles River
- Mountain Recreation & Conservation Authority
- Red Cross of Greater Los Angeles
- California State University Los Angeles, Geosciences & Environment
- University of Southern California, Public Policy
- University of California Los Angeles, Luskin School of Public Affairs

2.4.2 Agency Notifications

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

- City of Loma Linda
- City of Long Beach
- City of Carson
- City of Torrance
- City of Gardena
- City of El Segundo
- City of Hawthorne
- City of Lynwood
- City of South Gate
- City of Inglewood
- City of Huntington Park
- City of Vernon
- City of Commerce
- Culver City
- City of Monterey Park
- City of West Hollywood
- City of Alhambra
- City of Beverly Hills
- City of South Pasadena
- City of Calabasas
- City of Hidden Hills
- City of Pasadena
- City of Glendale
- City of San Fernando
- City of Burbank
- City of Santa Monica
- Rancho Palos Verdes
- Simi Valley

During this plan update process, notifications also went to the Department of Neighborhood Empowerment, which is the central point for communicating with all 99 neighborhood councils. Notices for each meeting and the survey also went to every Council District office, which should send along important information to their constituents.

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 the City of Los Angeles regulatory, technical and financial capabilities to implement floodplain management actions. In addition, the following plans and implementation programs can affect floodplain management in the City of Los Angeles:

- "Resilient Los Angeles," The City's resilience plan
- "Our County," Los Angeles Countywide Sustainability Plan
- City of Los Angeles Capital Improvement Program
- City of Los Angeles Emergency Operations Plan
- City of Los Angeles General Plan
- City of Los Angeles Local Hazard Mitigation Plan
- City of Los Angeles Municipal Code
- City of Los Angeles Zoning Ordinance
- Los Angeles River Revitalization Master Plan
- Enhanced Watershed Management Plans

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 City's current capabilities in managing floodplains. At its

November 14, 2019, meeting, the Steering Committee reviewed a catalog of 30 core capability statements (see Figure 2-1). Members placed green dots by statements they felt represented City strengths, and red dots by statement they felt represented weaknesses. The results were used to enhance the catalog of alternatives the City considered for mitigation actions in the plan (see Chapter 13). Appendix D summarizes results of this exercise.

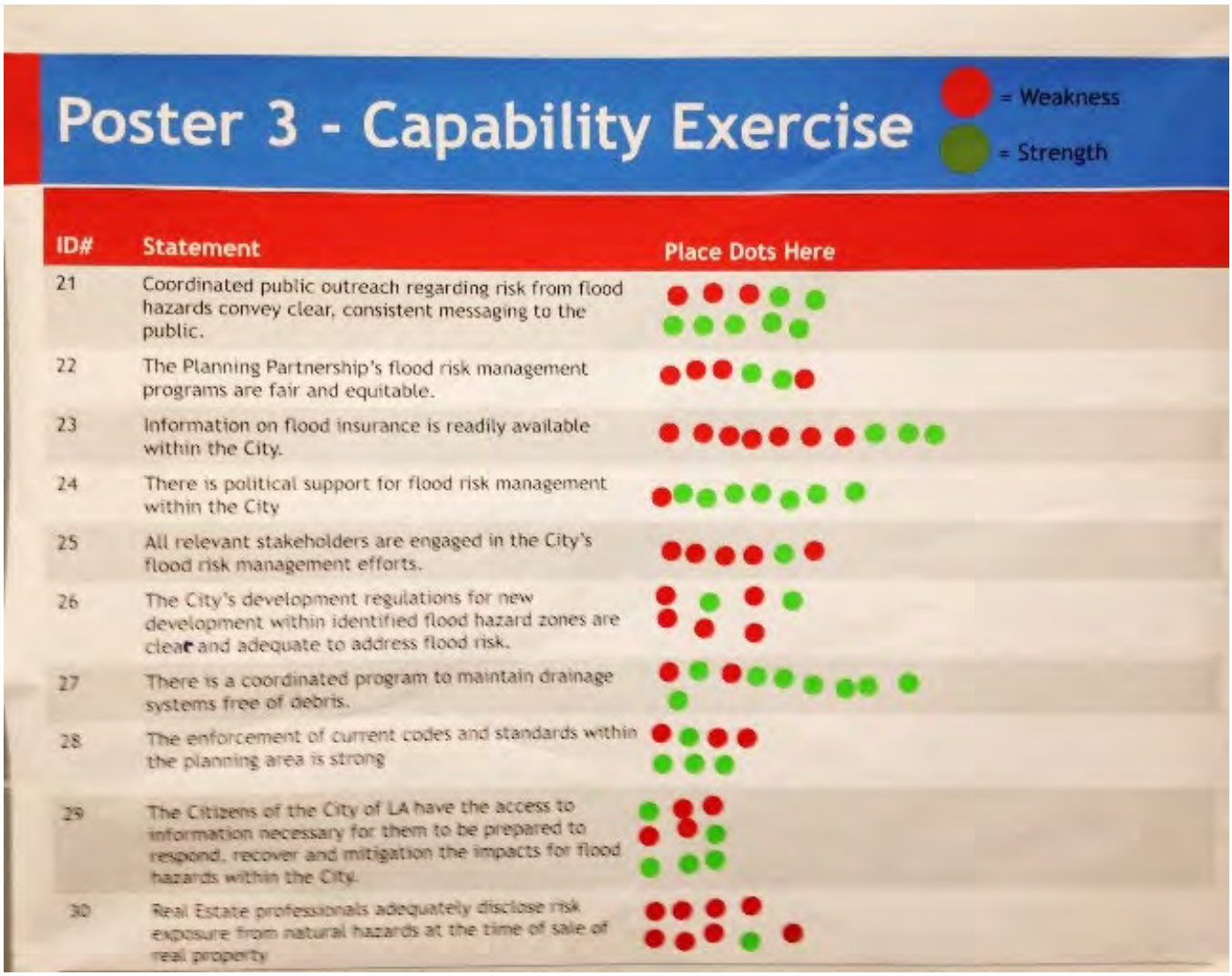

Figure 2-1. Example Core Capability Exercise Poster

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 floodplain management 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 development of the FMP2020 emphasized the following elements:

- Include members of the public and key non-governmental stakeholders on the Steering Committee.

- Attempt to reach citizens using multiple media.
- Leverage the vast social media resources that are available to the City.
- Distribute press releases through the Department of Public Works Public Affairs Office.
- Deploy the strategy in two phases:
  - Phase 1 to gauge the public's perception of the flood risk in the City
  - Phase 2 to present the draft plan.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders.

The strategy had to be modified in the middle of its implementation due to the significant impacts of the COVID-19 pandemic response by the State of California and the City of Los Angeles. This impacted the Phase 2 public meetings during the final public comment period for the draft plan as discussed below.

A summary of all public outreach efforts is provided in Appendix C.

Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the outcomes of a planning effort, or that have information or capabilities that support the identification and prioritization of action for the FMP2020. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. Stakeholders targeted for this process included:

- Citizens
- Community Emergency Response Team representatives
- Environmental advocacy groups
- State and federal agencies with floodplain management responsibilities
- Owners/operators of businesses within the floodplain
- Academia
- Community 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 22-member Steering Committee includes 11 non-governmental stakeholders (50 percent).

Floodplain Management Plan Website

The City maintains a floodplain management plan website with information on the 2001, 2010 and 2015 floodplain management plans, as well as annual progress reports and resources related to floodplain management. At the beginning of the development process for the FMP2020, the website was updated to keep the public posted on planning activities and to solicit input (see Figure 2-2). The site's address (https://eng.lacity.org/fmp-updates) was publicized in all press releases, mailings and public meetings. The site provided the public with information on the planning process, the Steering Committee, a project survey, and drafts of the FMP2020. The City will keep the website active to keep the public informed about successful mitigation projects and future plan updates.

The Flood Preparedness Survey

The planning team developed a 27-question survey with guidance from the Steering Committee (see Figure 2-3). The survey assessed household preparedness for flooding, residents' level of knowledge about ways to reduce risk and loss from flooding, and areas vulnerable to floods. Responses helped guide selection of mitigation actions for the FMP2020.

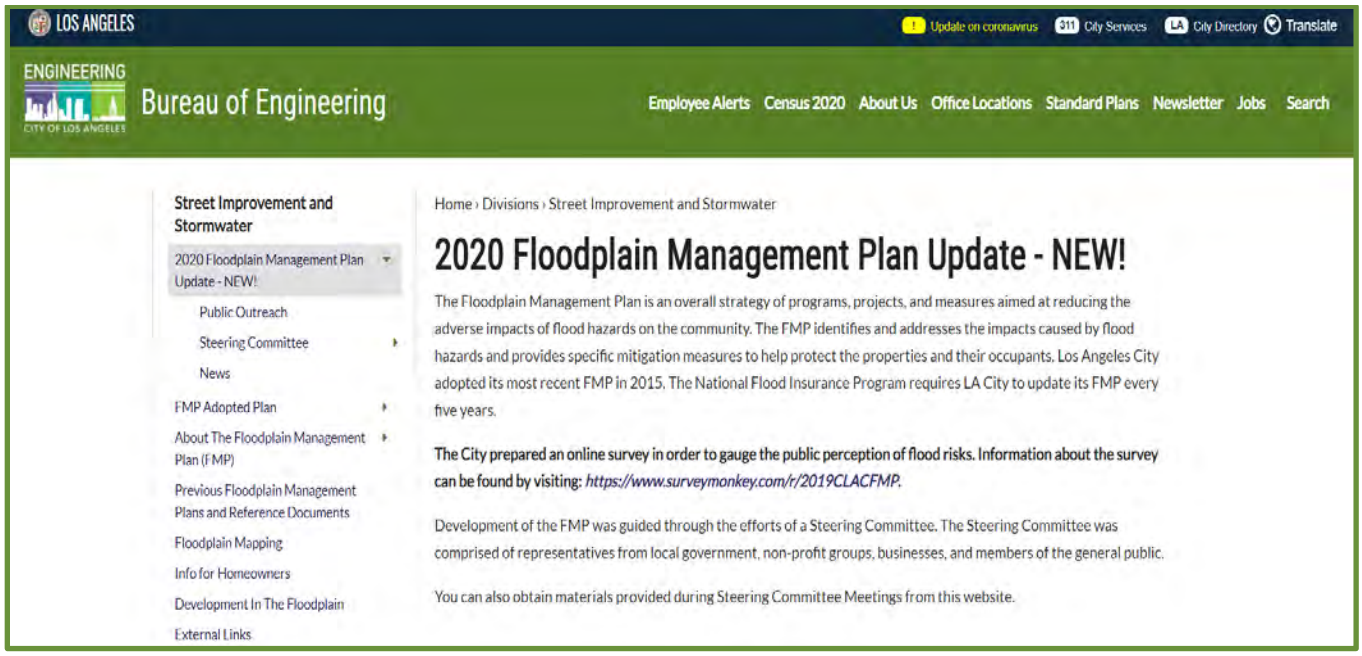

Figure 2-2. Sample Page from Floodplain Management Plan Website

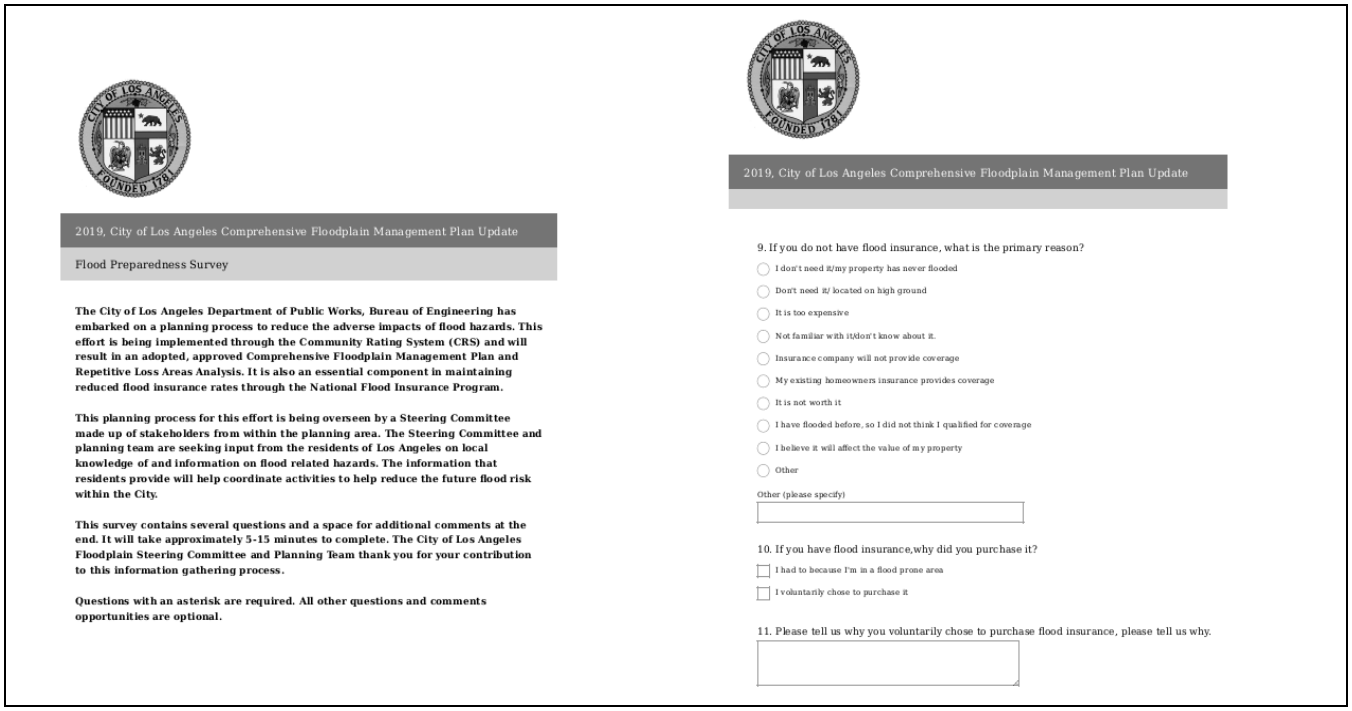

Figure 2-3. Sample Pages from Survey Distributed to the Public

Questions addressed the following topics:

- Level of awareness of flood risks
- Steps respondents have taken to prepare for floods
- Preferred communication methods for distributing information about flood risk
- Knowledge about the level and sources of flood risks

- Awareness of City floodplain management policies
- Flood insurance.

Multiple methods were used to solicit survey responses:

- The survey was prepared in both English and Spanish
- Web-based versions of both languages were made available on the plan website.
- All attendees at the public open houses were asked to complete a survey, using the web site or hard copies of the survey form available at the open houses.
- Extensive outreach was implemented using the City's extensive social media resources (see Figure 2-4)
- The survey and the plan information website were advertised in the "flood bulletin" that is sent annually to all floodplain and repetitive loss area residents (see Figure 2-5).
- Individual Steering Committee members contacted organizations to request that they publicize the link to the online survey; the following organizations were contacted in this way:
    - City of Los Angeles Neighborhood Councils
    - City of Los Angeles City Council.

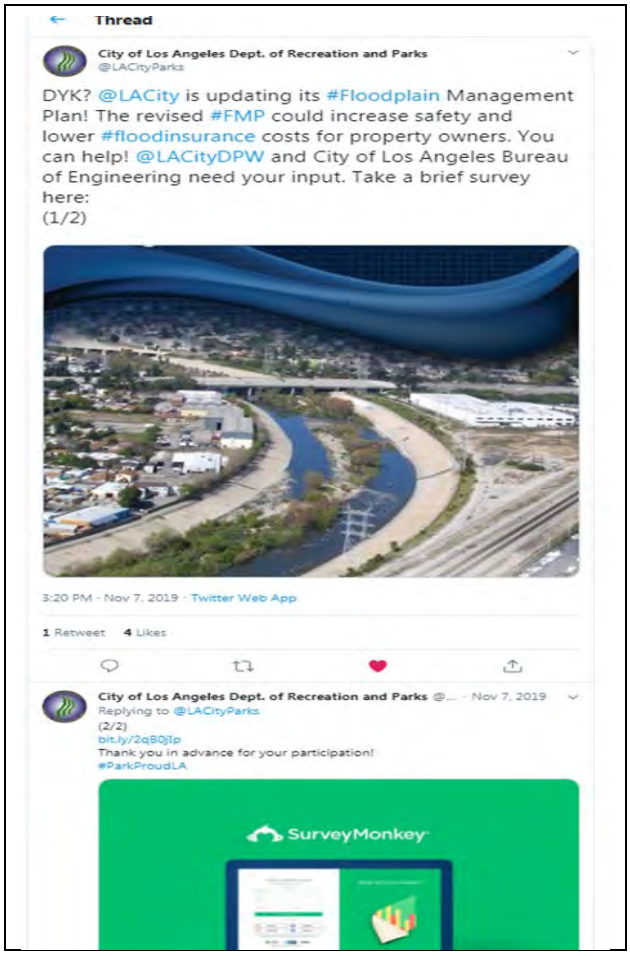

Figure 2-4. Social Media posts advertising the survey

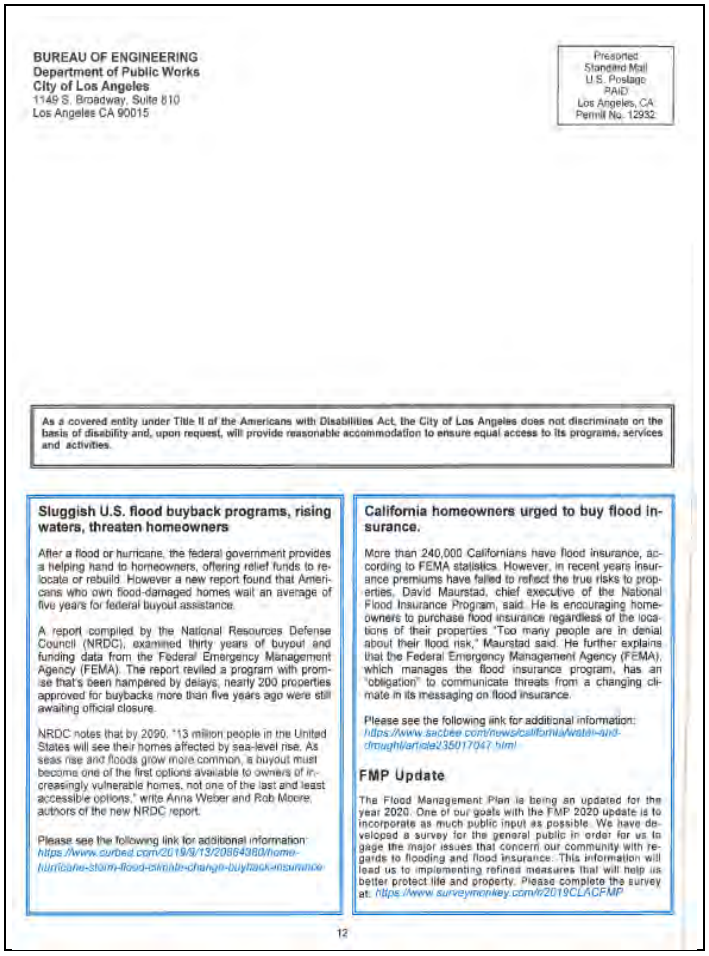

Figure 2-5. Back Page of Floodplain Resident and Repetitive Loss Area Mailing

Public Meetings

Phase 1 Public Meetings

The objective of Phase 1 of the public outreach strategy was to engage the public early in the planning process and to gauge public perception of flood risk. A public meeting was held near the Los Angeles River, an area that will be impacted by future FEMA flood map updates. The meeting was held as part of the "P-22" event, in Griffith Park, on October 19, 2019, about three months after the planning process began with the first Steering Committee meeting. The P-22 Day Festival is part of P-22 Day & Urban Wildlife Week, a series of events across the Santa Monica Mountains and the Los Angeles area that celebrates wildlife, with an emphasis on the Santa Monica Mountains Cougars. P-22 is a specific Cougar who has been tagged and monitored by several wildlife agencies. Over 7,000 people attended the P-22 Day Festival in 2019, and thousands more at the events throughout Urban Wildlife Week (see https://savelacougars.org/p-22-day/ for more information on this event).

This event provided an opportunity to reach a large audience and educate them on flood risk and the drivers for the FMP2020. The Bureau of Engineering had booth space at the event, providing the following information (see Figure 2-6 and Figure 2-7):

- An easel focusing on the Los Angeles River floodplain adjacent to Griffith Park was set up, and floodplain maps for all of the City were on hand and available for residents.
- Hazard modeling computer workstations provided property-specific flood risk information to inquirers
- A spinning wheel offered chances to win prizes, provided BOE and LASAN.
- Snacks were set out.
- FEMA and flood risk flyers were available.
- The online survey QR code and website were provided, and printed versions were on hand.

Members of the planning team on hand to engage participants recorded the number of adults who stopped at the booth. They counted 131 people, not including their children.

Figure 2-6. BOE FMP Booth at P-22 Festival

Figure 2-7. Planning Team Engaging the Public at the P-22 Festival

A second Phase 1 public meeting was held on Thursday, January 9, 2020, from 6 to 8 p.m. at the Studio City Branch Library (12512 Moorpark Street). This was an open house meeting that began with a short presentation on the planning process, flood risk, and preliminary findings from the flood risk assessment. The open house allowed attendees to examine maps and handouts and to talk with project staff. Computer mapping workstations allowed property owners to see information about their property—including exposure and damage estimates for flood hazard events (see Figure 2-8)—that could be printed out for them at the meeting or sent to them by email. Planning team members were present to answer questions. Each attendee was asked to complete a survey form, and each was given an opportunity to provide written comments describing personal experiences with flood related hazards in their community.

Figure 2-8. Sample Property-Specific Output from Open-House Computer Modeling Work Station

The meeting was lightly attended, with 10 members of the public as well as several members of the Steering Committee and executive officers from the City of Los Angeles (see Figure 2-9). The session was covered by Channel 35 for a spot on "LA This Week" (see Figure 2-10) that was presented via multiple media outlets (https://www.facebook.com/LAThisWeek/videos/654350835103481/).

Phase 2 Public Meetings

The objective for the Phase 2 public outreach strategy was to provide the public an opportunity to provide comment on the proposed draft plan during an advertised public comment period. The planning team, directed by the Steering Committee, announced a three-week public comment period to begin on May 19, 2020 and end at the close of business on June 9, 2020. Notice about the public comment period was sent to multiple media outlets and posted on the FMP2020 website and the social media networks available to the City.

This phase 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 prohibited the City from holding open-air public meetings for this phase.

Figure 2-9. 1/9/2020 Open House, Studio City

Figure 2-10. LA This Week Coverage of the 1/9/2020 Public Meeting

Following direction provided by the Insurance Services Office, FEMA's CRS program management contractor, the City mitigated these impacts as follows:

- Provide notice as usual of a 3-week public comment period—through press release, website and social media—with information on how the public can comment on the draft plan during the comment period.
- Post a narrated PowerPoint presentation about the draft plan on the FMP2020 website.
- Conduct a minimum of two virtual public meetings (webinars) by the planning team through a web-based media platform that can provide a digital signature by those participating and that allows for polling so that those in attendance can ask questions and those questions can be recorded by the planning team.

The planning team scheduled a virtual webinar to present the draft plan. The webinar was conducted during the public comment period, on June 2, 2020 from 5 to 6:30 p.m. The narrated PowerPoint posted to the FMP2020 website was presented at the webinar. All questions asked and the answers provided, as recorded by the medium used, informed the final draft of the FMP2020. A full summary of the virtual public meeting can be found in Appendix C of this plan.

2.6.2 Public Involvement Results

Survey Outreach

Los Angeles County Public Works was facilitating an update to its Comprehensive Flood Hazard Management Plan concurrent with the City's FMP2020 update. The City and County were active stakeholder participants in each other's plan update efforts. Both efforts used surveys, and the two surveys were very similar in the number and types of 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)

Public Meetings

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. Meeting attendance and comments received are summarized in Table 2-3.

Table 2-3. Summary of Public Meetings

Date	Location	Number of Residents in Attendance	Number of Survey Forms Completed	Comments Received
10/19/2019	P-22 Festival, Griffith Park	131	6	3
1/9/2020	Studio City Library Public Workshop	10	0	6
5/19 to 6/2	3-Week Public Comment Period	—	—	152
6/2/2020	Virtual Public Meeting	317	0	31
Total		458	0	40

2.7 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 2-4 summarizes important milestones in the development of the plan.

Table 2-4. Plan Development Milestones

Date	Event	Description	Attendance
2019			
7/14	Steering Committee Meeting #1	• Project Overview • Timeline • Milestones • Steering Committee Ground Rules/Organization • Plan Review • Public Outreach Strategy	38
8/8	Steering Committee Meeting #2	• Provide Plan review Comments • Goal Setting • Public Outreach Strategy	33
9/12	Steering Committee Meeting #3	• Review Objectives Exercise Results • Define Critical Facilities/Infrastructure • Phase 1, Public Outreach Strategy Logistics	30
9/19	Phase 1 Public Outreach	Initial press release of the FMP2020 update and update process released by the City of Los Angeles Department of Public Works Public Affairs Office	N/A
9/23	Phase 1 Public Outreach	Press coverage by MynewsLA.com on the FMP2020 plan update	N/A
10/10	Steering Committee Meeting #4	• Repetitive Loss Area Analysis Update • Risk Assessment Results, Maps and General Building Stoc Analysis • Approve Final Critical Facilities/Infrastructure CI Definition • Phase 1 Public Outreach Strategy o Website Preview o Approve Survey Language o P-22 Festival Debrief	60
10/15	Phase 1 Public Outreach	Floodplain Management Survey Deployed	N/A
10/19	Phase 1, Public Meeting #1	Informational booth at the P-22 Festival at Griffith Park	131
11/7	Phase 1, Public Outreach	Blog post from the Mayor's Office advertising the FMP2020 website and floodplain management survey. The survey links along with social media example content were direct emailed to the public information officers for all city agencies and departments	N/A
11/14	Steering Committee Meeting #5	• Repetitive Loss Area Analysis Update • Core Capabilities Exercise • Survey Status • Next Phase 1 Public Meeting	59

Date	Event	Description	Attendance
11/19	Phase 1 Public Outreach	Steering Committee Chair and City Chief Resiliency Officer distributed post card that included the FMP2020 website and survey link during two community meetings. A blog post was also posted to the Bureau of Engineering website that advertised the survey link.	20
12/5	Phase 1, Public Outreach	Steering Committee Chair and City Chief Resiliency Officer distributed floodplain management survey link to emergency personnel at faith groups	+/- 30
2020			
1/1	Phase 1 Public Outreach	Phase 1 Public Meeting #2 advertised via social media on Facebook, Twitter, Nextdoor	N/A
1/9	Steering Committee Meeting #6	• Repetitive Loss Area Analysis Update • Hazus Results • Core Capabilities Exercise Results • 2nd Phase 1 Public Meeting Logistics • Review of Relevant Programs Findings • Draft Plan Status	28
1/9	Phase 1, Public Outreach	1 minute preview radio piece for public meeting on 89.3, KPCC Radio	N/A
1/9	Phase 1, Public Meeting #2	Studio City Public Meeting, from 6:00 to 8:00 PM	10
1/12	Phase 1, Public Outreach	LA This Week piece on the public meeting posted to Facebook	N/A
2/13	Steering Committee Meeting #7	• Repetitive Loss Area Analysis Update • Hazus Results, Critical Facilities and Infrastructure • Confirm Plan Maintenance Strategy	26
3/12	Steering Committee Meeting #8	• Repetitive Loss Area Analysis Update • Final Loss Matrix • Draft Plan Status • Phase 2 Public Outreach Schedule • Review Actions/Alternatives	25
4/9	Steering Committee Meeting #9	• Repetitive Loss Area Analysis Update • Confirm Plan Maintenance strategy • Phase 2 Public Outreach-Options in light of COVID-19 • Confirm Action plan (Note: This was a virtual meeting due to the COVID-19 response)	28
5/19	Phase 2, Public Outreach	Initiate 3-Week Final Public Comment Period for the Draft FMP2020	N/A
6/2	Phase 2 Public Outreach	Virtual Public Meeting	317
X/X	Plan Approval	Final draft plan submitted to Insurance Services Office for review and approval	N/A
X/X	Adoption	Plan adopted by City Council	N/A
X/X	Plan Approval	Final plan approved by Insurance Services Office	N/A

3. City of Los Angeles Profile

The City of Los Angeles, on the southwest coast of California, is the most populous city in the state, with a 2019 estimated population of 4,040,079 (10 percent of the total population of California). It is also the state's largest city by area, at 465 square miles. The City of Los Angeles (the City) is the county seat of Los Angeles County. Figure 3-1 shows the City's location and main features.

3.1 HISTORICAL OVERVIEW

Archeological studies have indicated that people have been living in the area that now surrounds Los Angeles since 3000 B.C. By the time of the arrival of the Spanish in the 1700s, an estimated 5,000 native people lived in the Los Angeles basin (Wikipedia, 2014).

The city that is now Los Angeles was founded in September 1781, with the name "El Pueblo de la Reina de Los Angeles" (the Town of the Queen of the Angels). By 1821, when Mexico became independent of Spain, Los Angeles had grown into the largest self-sustaining farming community in the province of Alta California. In 1835, the Mexican Congress declared Los Angeles a city, making it the official capital of Alta California. The City came under the control of the United States in 1848 with the ending of the Mexican American War. Los Angeles was incorporated in the U.S. on April 4, 1850 (Wikipedia, 2014).

The City of Los Angeles mostly remained within its original 28-square-mile area until the 1890s. The first large additions were the districts of Highland Park, Garvanza, and South Los Angeles. In 1906, the approval of the Port of Los Angeles and a change in state law allowed the City to annex "the Shoestring," or Harbor Gateway, a narrow strip from Los Angeles to the port. San Pedro and Wilmington were added in 1909 and Hollywood was added in 1910. Also added in 1910 were Colegrove, Cahuenga, and a part of Los Feliz. By referendum, 170 square miles of the San Fernando Valley, along with the Palms district, were added to the City in 1915, almost tripling its area. Additional annexations brought the City's area to 450 square miles by 1932 and to 469 square miles by 2004 (Wikipedia, 2014).

The City's economy began steady growth with completion of the Santa Fe railroad line from Chicago to Los Angeles in 1885 and subsequent immigration from the east. A strong economic base was developed early, in farming, oil, tourism and real estate. Hollywood made the city world famous, and World War II brought new industry, especially high-tech aircraft construction. Since the 1960s growth old industries have declined, including farming, oil and aircraft, but tourism, entertainment and high tech remain strong (Wikipedia, 2014).

3.2 PHYSICAL SETTING

Much of the City of Los Angeles is built within old floodplains and mountains or adjacent to the Pacific Ocean. The population is concentrated in urban centers, which are interspersed by low-density residential neighborhoods. Most of the flat lands of the City have been developed. The remaining open space tends to be concentrated in floodplains or along steep hillside and drainage water courses, which typically have been designated as public park land, recreational, flood control or low intensity uses, consistent with state law.

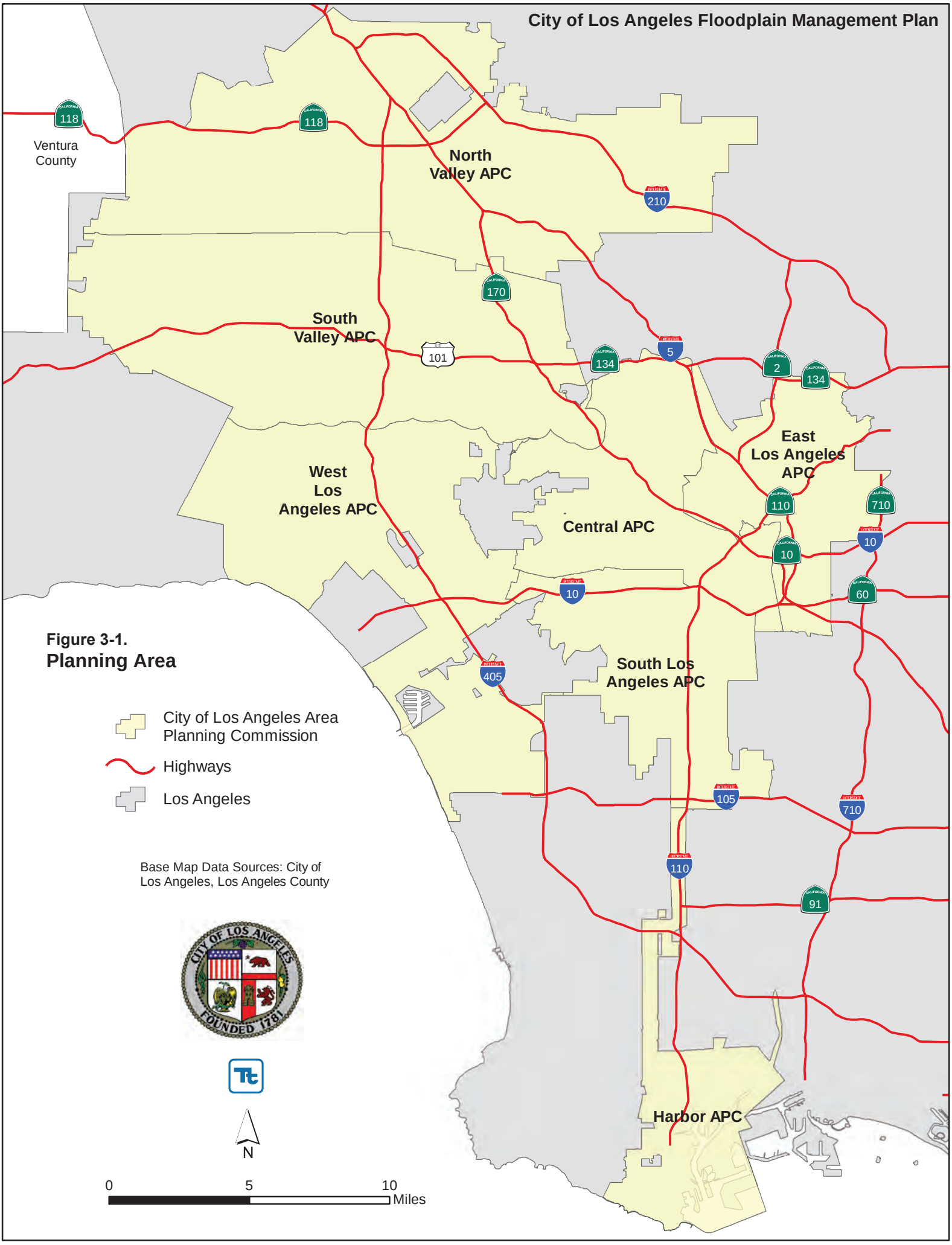

Figure 3-1.
Planning Area

3.2.1 Topography

The Los Angeles area consists of flat basins defined by the San Gabriel, Santa Susana and Santa Monica Mountains, three major rivers, and the Pacific Ocean. The terrain is about 75 percent alluvial plain and 25 percent rugged canyons and hills. Elevations range from 5,074 feet at Sister Elsie Peak in the San Gabriel Mountains to nearly mean sea level in the southwestern part of the City. The Santa Monica Mountains and Hollywood Hills crossing east-west across the alluvial plain divide the City into northern and southern portions (City of Los Angeles, 2010).

3.2.2 Soils and Geology

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 Survey Area	Soil	% of Total Survey Area	Soil	% of Total Survey 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 the 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, ranging in texture from coarse to a medium line grade. 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 a light to dark gray silt loam, varying from a loose, easily cultivated soil to one with a heavy texture and a tendency to pack, bake, and crack open when dry. The soil 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 consists of a yellowish-gray, dark-gray, or grayish-brown sand varying from 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.

California is divided into several large "geomorphic provinces" defined by similar topography and geologic structure. The northern portion of the City of Los Angeles is in the Transverse Ranges geomorphic province and the southern portion is in the Peninsular Ranges geomorphic province (California Geological Survey, 2002). The boundary between the two provinces is generally the Santa Monica-Hollywood-Raymond fault system along the south edge of the Santa Monica Mountains (Bilodeau, et al., 2007).

The Transverse Ranges geomorphic province is characterized by east-west trending mountains, valleys, and faults that extend eastward from the Channel Islands to the eastern end of the San Bernardino Mountains. Most active faults in the Transverse Ranges are east-west trending faults. Rock types in this province near the City include gneiss, granitic rocks, and sedimentary rocks (Bilodeau et al., 2007). Volcanic rocks are found in the Santa Monica Mountains. Alluvial sediments are typically in canyon bottoms and valleys, with broad alluvial fans at the mouths of steep canyons.

The Peninsular Ranges geomorphic province extends southward from the south edge of the Transverse Ranges geomorphic province to the tip of Baja California in Mexico (Norris and Webb, 1990). The Peninsular Ranges are characterized by northwest-southeast trending hills and valleys separated by similarly trending faults. Most active faults in the Peninsular Ranges province are northwest trending. Rock types in this province in the Los Angeles region generally include schist and sedimentary rocks. Surface materials in canyon bottoms and basins generally consist of alluvium.

The City of Los Angeles is within a seismically active region that is well known for its many active faults. Due to the area's historical seismicity, it is reasonable to expect future seismic shaking along local or regional faults. The San Andreas Fault is a major tectonic boundary about 34 miles northeast of downtown Los Angeles, outside the city limits. Significant faults within the City include the Newport-Inglewood, Santa Monica, Hollywood, Puente Hills Blind Thrust, Palos Verdes Hills, Verdugo, San Fernando, Northridge, and Santa Susana faults.

Subsurface geology of the area is generally shown in Figure 3-2, which illustrates mapped rock types and seismic faults and folds. The City of Los Angeles is delineated by the blue line in the figure.

3.2.3 Climate

In the basins and valleys 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. In general, the Los Angeles area has a mild climate characterized by warm, dry summers and cool, wet winters. Temperature and precipitation vary considerably with elevation, topography, and distance from the Pacific Ocean. A storm producing moderate rainfall on the coast (1 inch during a 24-hour period) may produce very heavy rainfall in the mountains (10 to 20 inches during the same 24-hour period). Table 3-2 summarizes key climate data at Los Angeles International Airport on the coast and in downtown Los Angeles.

Nearly all precipitation occurs from December through March. Precipitation during the summer is infrequent, and rainless periods of several months are common. Precipitation usually occurs as localized cloudburst in summer and general heavy rains in winter; snow occurs at higher elevations. In general, the quantity of precipitation increases with elevation.

Source: California Geological Survey, 2010.

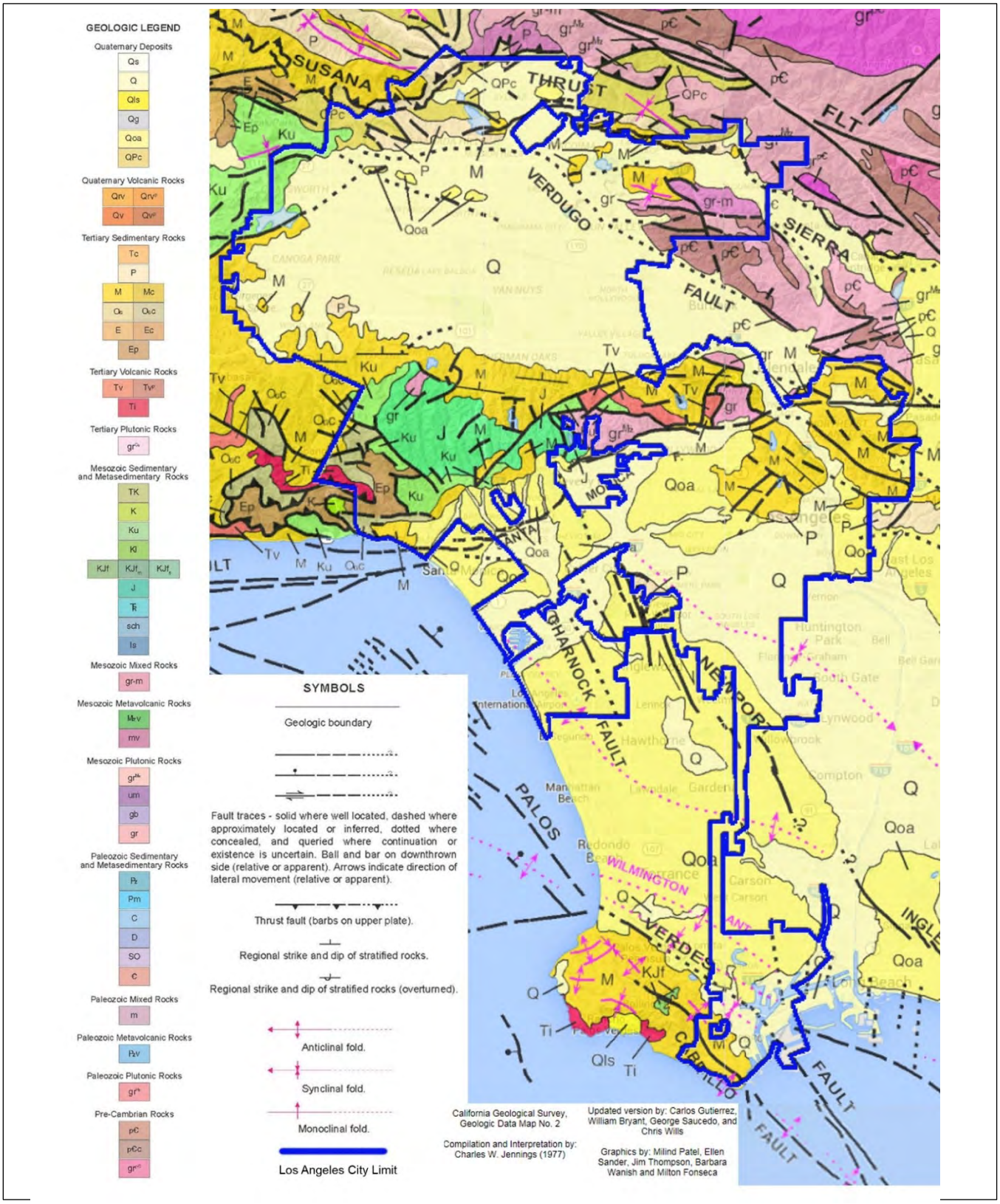

Figure 3-2. Los Angeles Geologic Features

Table 3-2. Average Los Angeles Climate Data

	L.A. International Airport	Downtown Los Angeles
Period of record	1944 – 2018	1906 – 2018
Average Annual Minimum Temperature	55.3ºF	55.8ºF
Average Annual Maximum Temperature	70.1ºF	74.0ºF
Average Annual Mean Temperature	62.7ºF	64.9ºF
Maximum Temperature	110ºF, September 26, 1963	113ºF, September 27, 2010
Minimum Temperature	27ºF, January 4, 1949	25ºF, February 19, 1911
Average Annual Precipitation	12.02 inches	14.77 inches
One Date Maximum Precipitation	5.60 inches, November 21, 1967	5.88 inches, March 2, 1938

Source: Western Regional Climate Center, 2019

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 the coast from the west. In southern California these winds are called “Santa Ana Winds.” Their air is typically very 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. In addition, 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 coastal location of the Los Angeles Basin permit a fairly regular daily reversal of wind direction—offshore at night and onshore during the day (Western Regional Climate Center, 2014).

3.3 DEVELOPMENT FEATURES

3.3.1 Land Use

Development patterns in Los Angeles have evolved in response to factors as diverse as the area’s geological features and the arrival of the automobile. Of 465 square miles of land in the City, 78 percent is developed. Residential land use covers 56 percent of the land, commercial development accounts for 8 percent, and industrial development makes up 7 percent. This high percentage of development has resulted in a large percentage of the area being covered by impervious surfaces, which alters natural drainage characteristics. Most of the developed City is on the coastal plain; development in the hills and mountainous areas is challenging due to steep slopes, landslide areas and unpredictable bedrock. In the areas of the City that are currently undeveloped (22 percent of the total), only 5 percent is considered to be subject to urban development (Los Angeles Department of City Planning, 2020a). Table 3-3 summarizes the breakdown of current land use in the City.

A 2008 study by the U.S. Department of Agriculture estimated that 61 percent of the City’s non-mountainous land cover is composed of impervious surfaces, such as paving or development, or water features. The remaining areas are estimated to consist of irrigated grass (12 percent), dry grass or bare soil (6 percent) and tree canopy cover (21 percent) (McPherson et al., 2008).

Table 3-3. General Plan Land Use within the Planning Area

Land Use	Planning Area	
	Area (acres)	% of total
Agriculture	76.5	0.03%
Commercial	19,354.2	7.65%
Government	17,842.1	7.05%
Industrial	20,816.2	8.23%
Multi-Family Residential	33,399.1	13.20%
Open Space	51,027.3	20.17%
Parking	13.1	0.01%
Single Family Residential	110,411.6	43.65%
Total	252,940.1	100.00%

The General Plan and zoning code guide the City's development. The Land Use Element of the General Plan has 35 Community Plan areas, which guide the physical development of the City's neighborhoods. These community plan areas are distributed between seven Area Planning Commissions (APC):

- Central APC
- East Los Angeles APC
- Harbor APC
- North Valley APC
- South Los Angeles APC
- South Valley APC
- West Los Angeles APC

The APC boundaries, shown on Figure 3-1, are used as the basis for reporting information on risk and vulnerability in the FMP2020.

3.3.2 Critical Facilities

Critical facilities are those that are essential to the health and welfare of the population. These become especially important after a hazard event. Through a facilitated process, the Steering Committee established the following definition of critical facilities for the FMP2020:

> 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 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

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

- Geographic information system (GIS) data downloaded from Los Angeles County's GIS Data Portal as source for ferry, communications, natural gas, and potable water facilities, and for highway bridges.
- Dam debris location GIS data provided by the Los Angeles County's Chief Executive Office.
- Facility registry services GIS data downloaded from the U.S. Environmental Protection Agency's website for facilities under EPA's Toxic Release Inventory program used as source for 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.
- The critical facilities/infrastructure inventory created as part of the development of the City of Los Angeles 2018 Local Hazard Mitigation Plan.

Due to the sensitivity of this information, a detailed list is not provided in the FMP2020; the list is on file with the City. Table 3-4 provides summaries of the general types of critical facilities in the City of Los Angeles. General locations are shown on Figure 3-3 through Figure 3-16.

Table 3-4. City of Los Angeles Critical Facilities

Category	Central APC	East Los Angeles APC	Harbor APC	North Valley APC	South Los Angeles APC	South Valley APC	West Los Angeles APC	Total
Safety and Security	37	15	13	23	18	29	20	155
Food, Water and Sheltering	206	174	94	236	281	274	189	1,454
Health and Medical	15	8	1	6	4	12	3	49
Energy	7	0	35	6	6	7	12	73
Communications	6	5	3	6	5	8	4	37
Transportation	212	240	116	308	140	227	149	1,392
Hazardous Materials	24	69	61	127	38	44	16	379
Overall	507	511	323	712	492	601	393	3,539

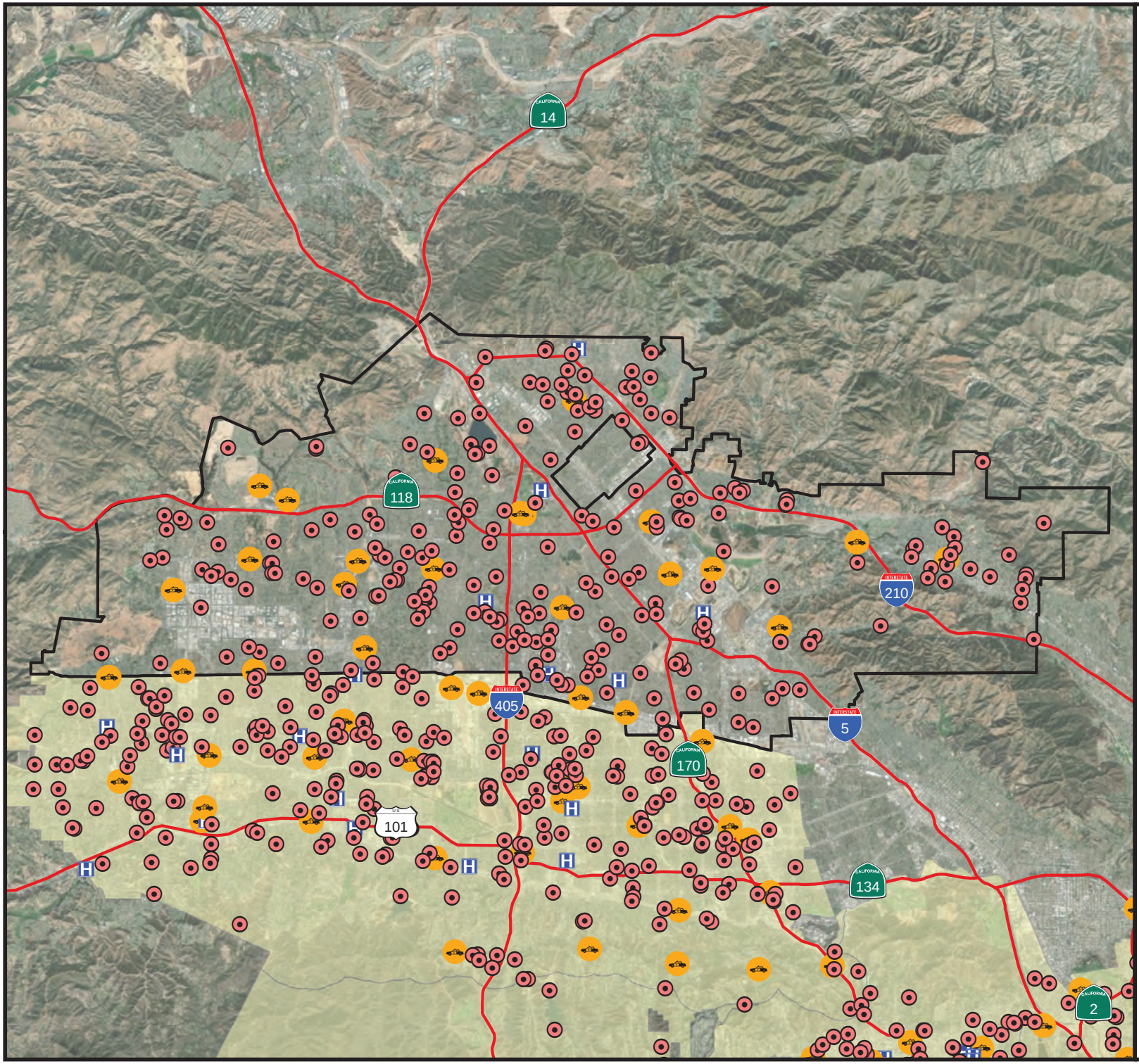

Figure 3-3.

Identified Critical Facilities in the North Valley APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

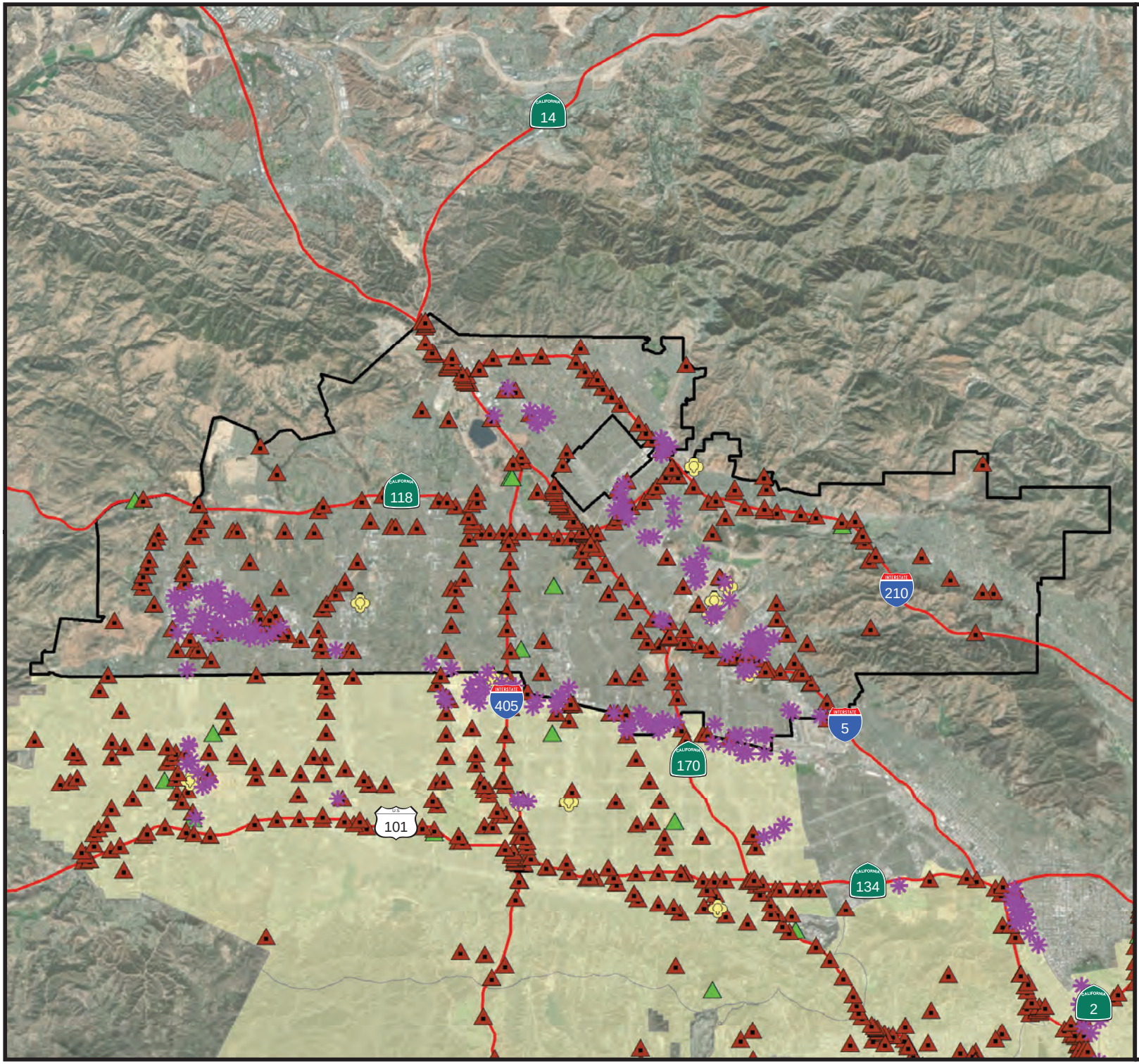

Figure 3-4.

Identified Critical Facilities in the North Valley APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

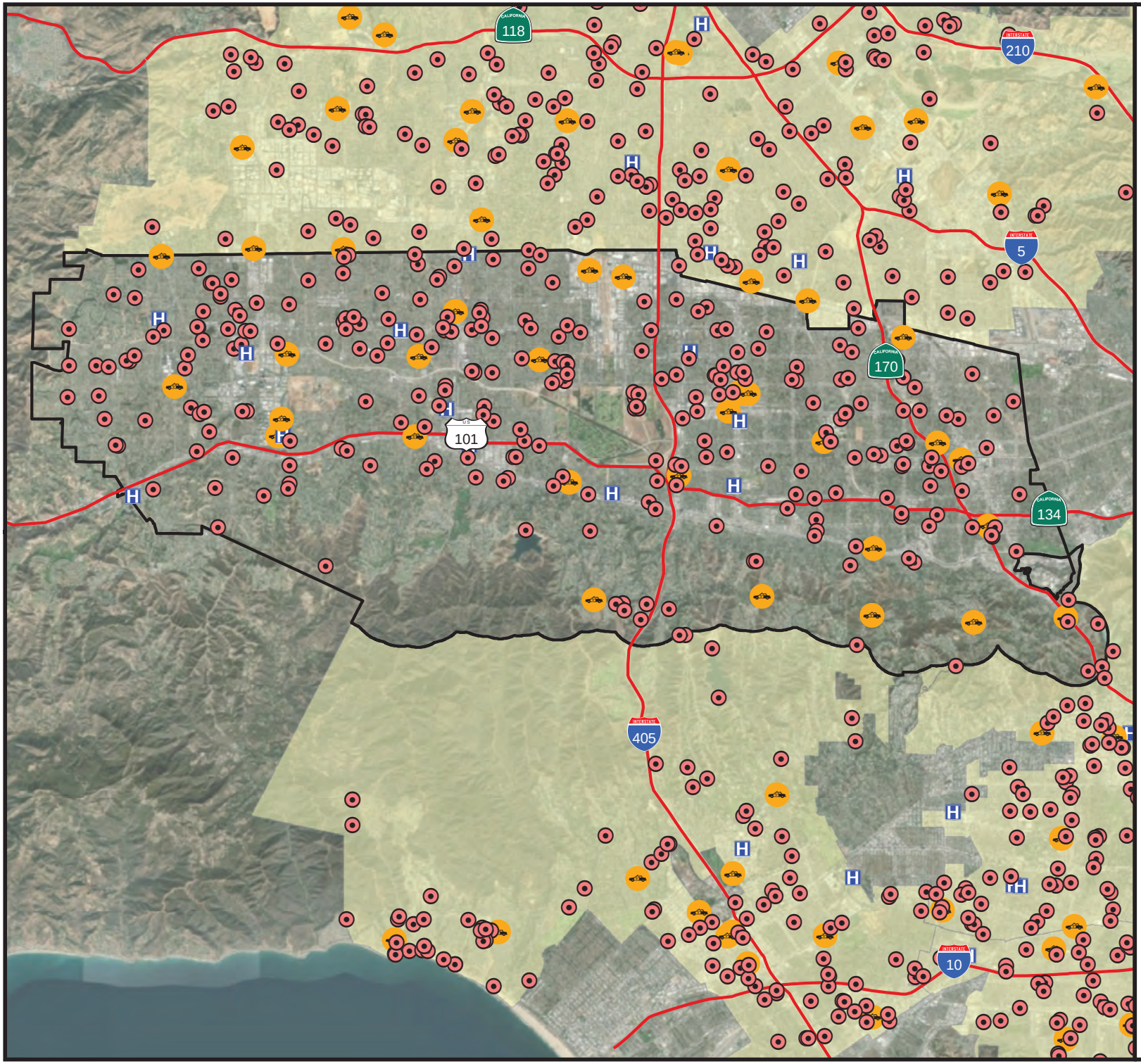

Figure 3-5.

Identified Critical Facilities in the South Valley APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los
Angeles

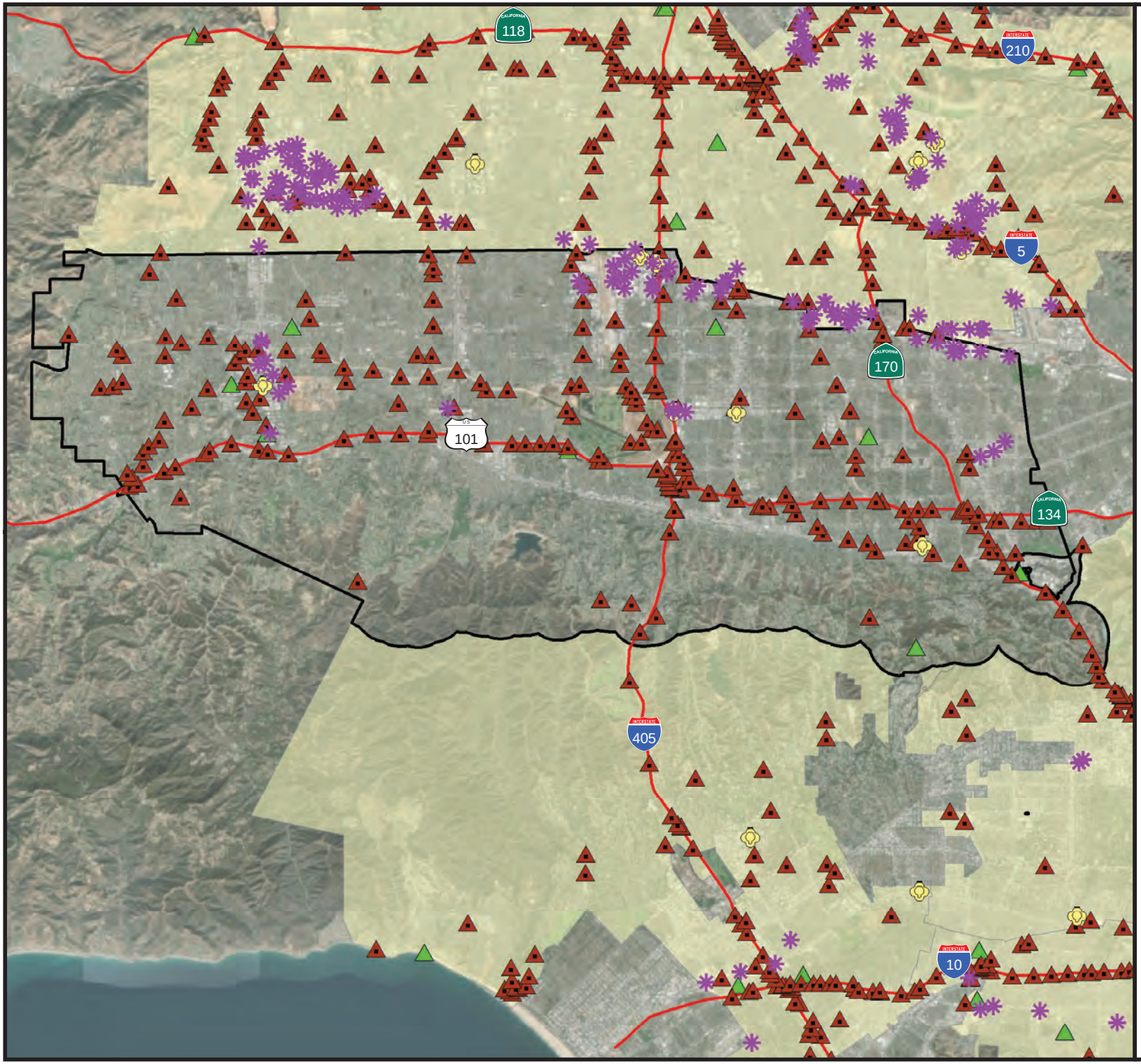

Figure 3-6.

Identified Critical Facilities in the South Valley APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los
Angeles

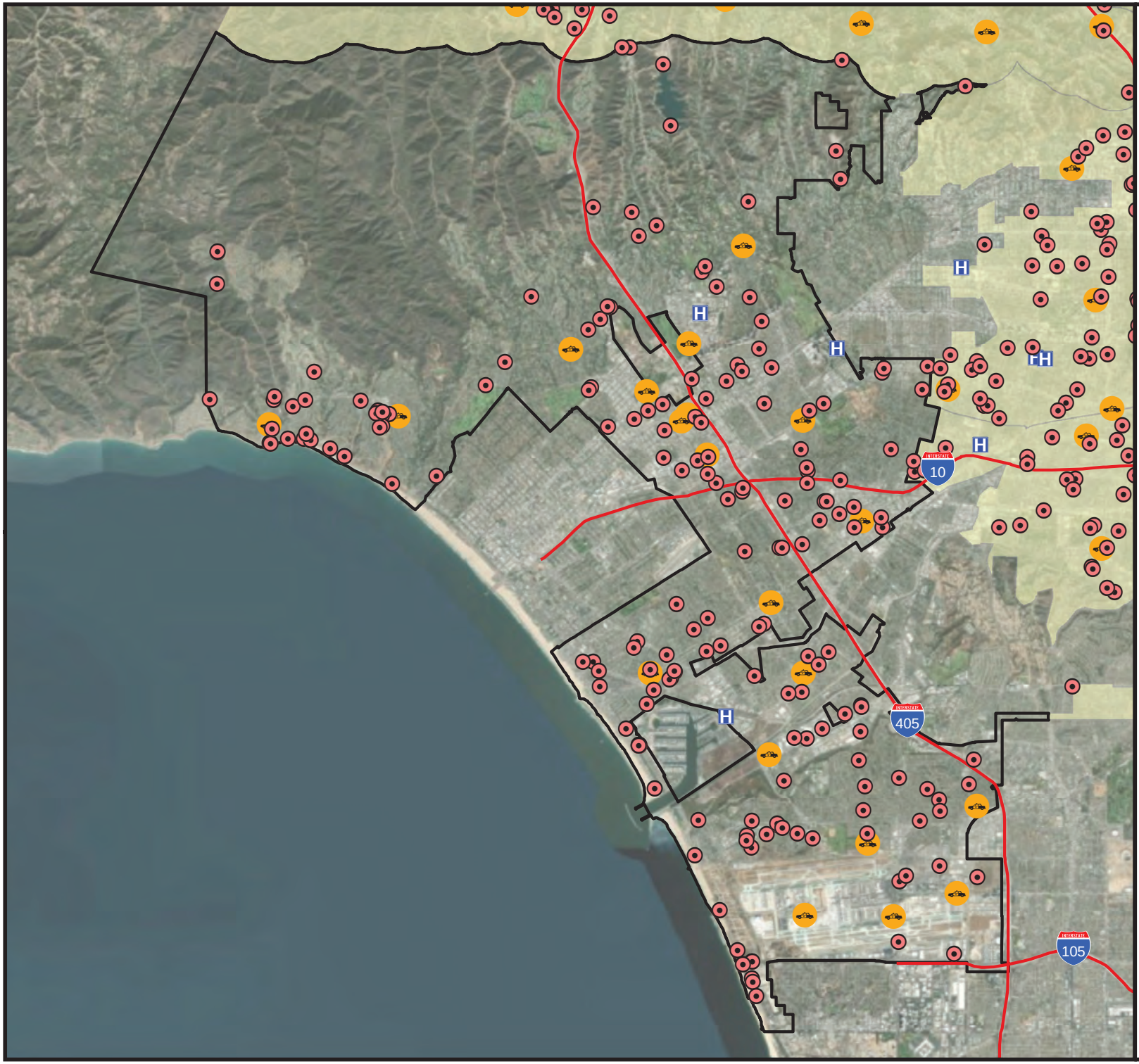

Figure 3-7.

Identified Critical Facilities in the West Los Angeles APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

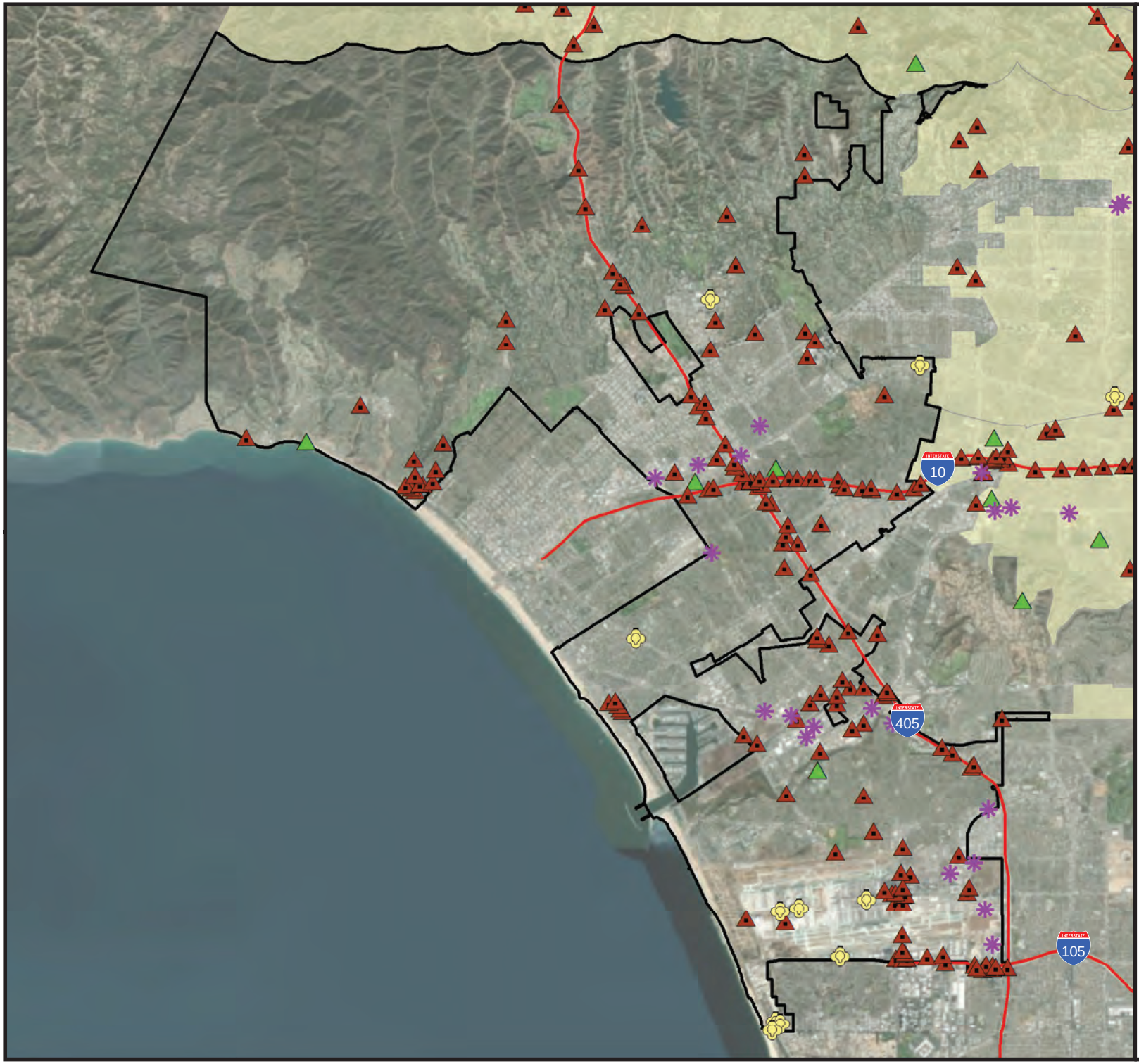

Figure 3-8.

Identified Critical Facilities in the West Los Angeles APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

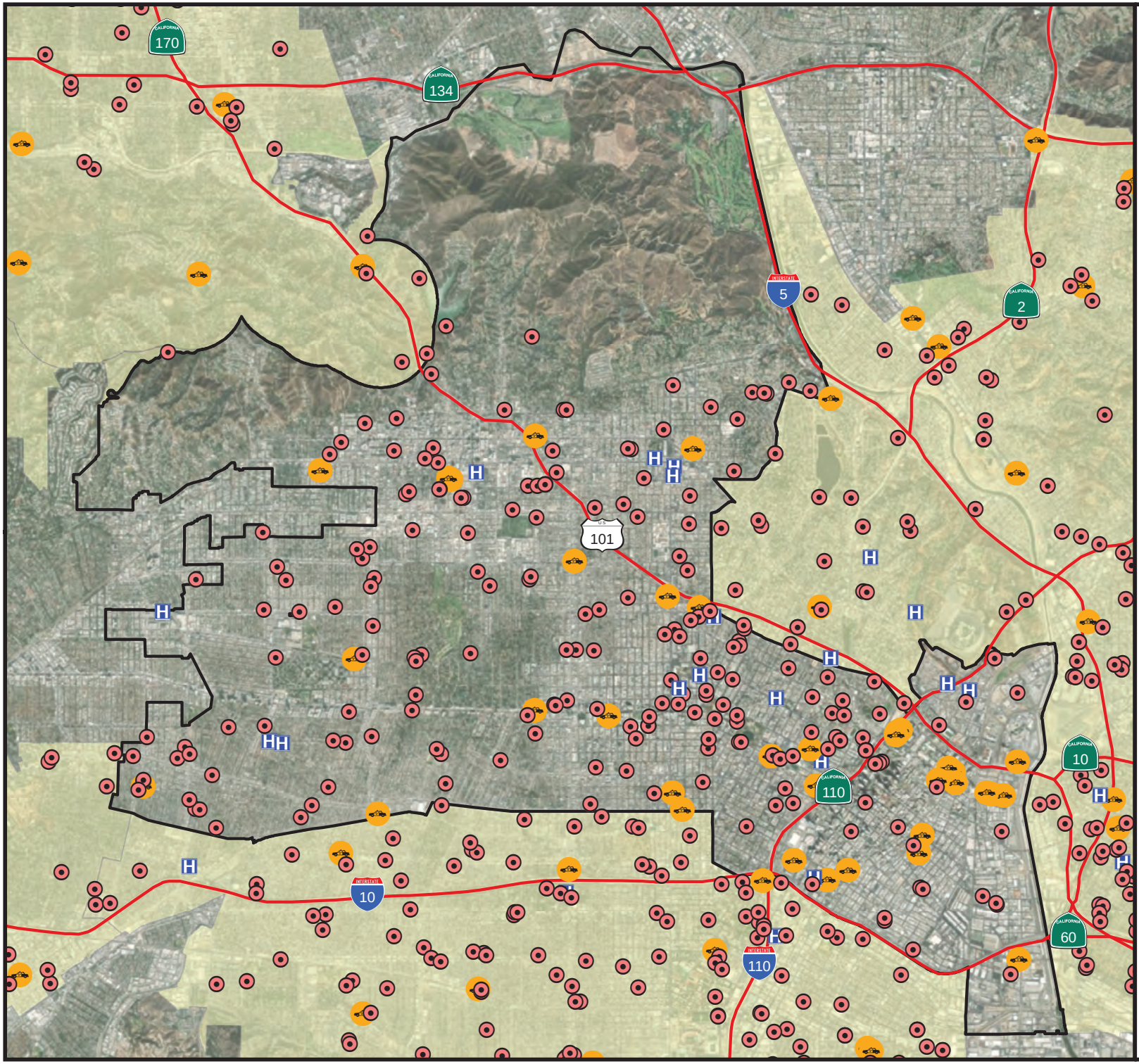

Figure 3-9.

Identified Critical Facilities in the Central APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

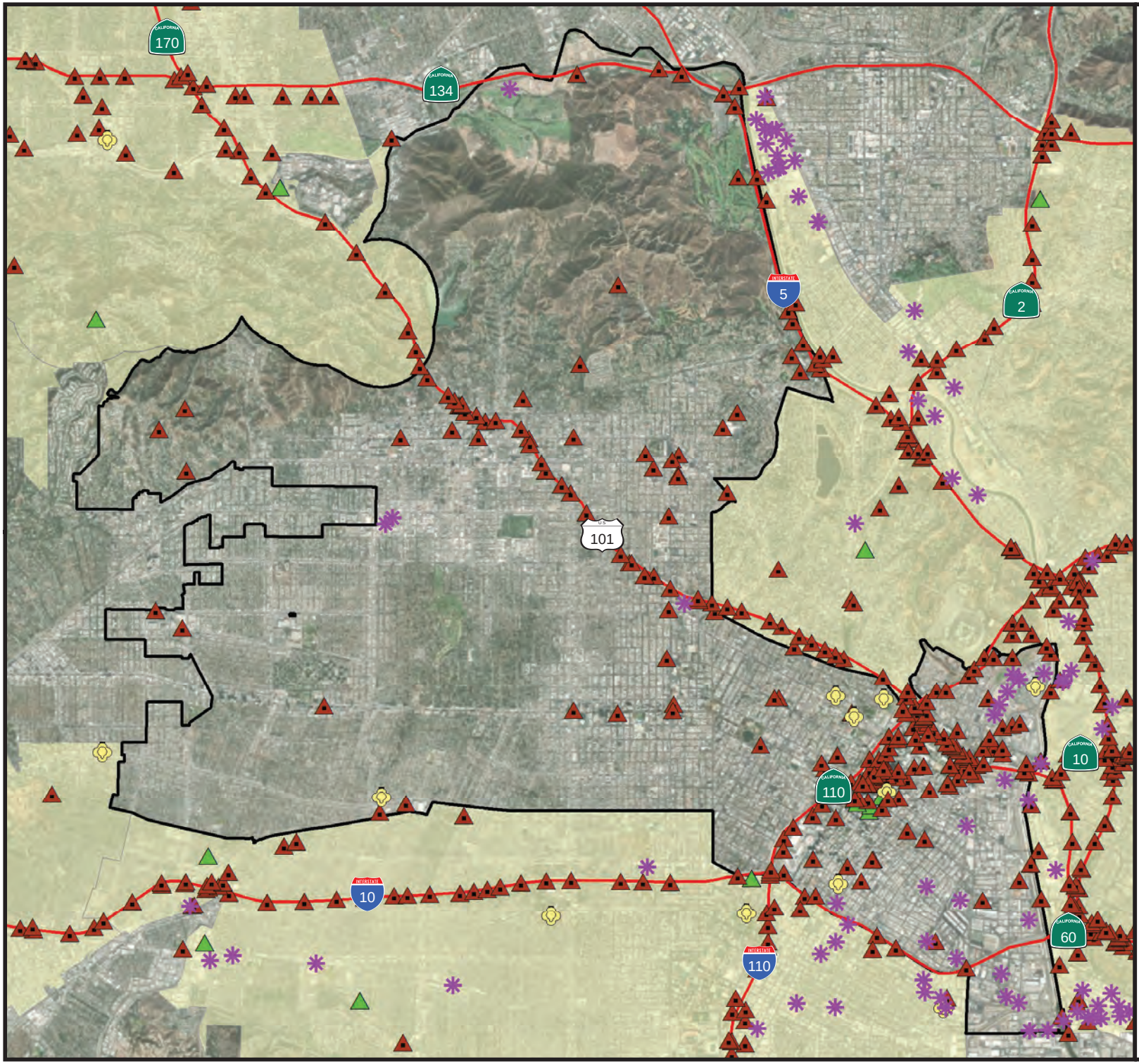

Figure 3-10.

Identified Critical Facilities in the Central APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

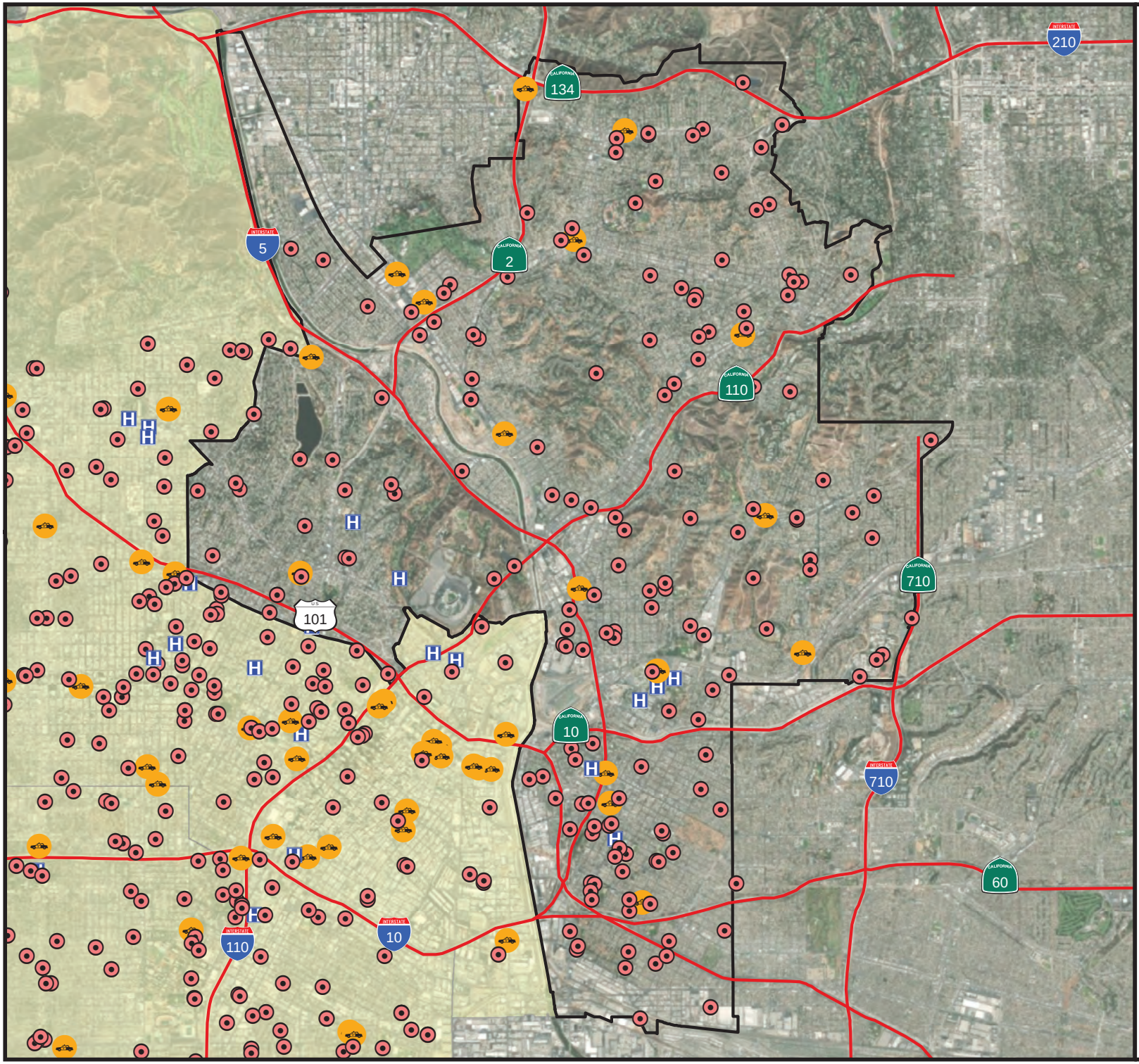

Figure 3-11.

Identified Critical Facilities in the East APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,600 feet 1:91,200

Feet
0 5,500 11,000

Meters
0 1,375 2,750

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

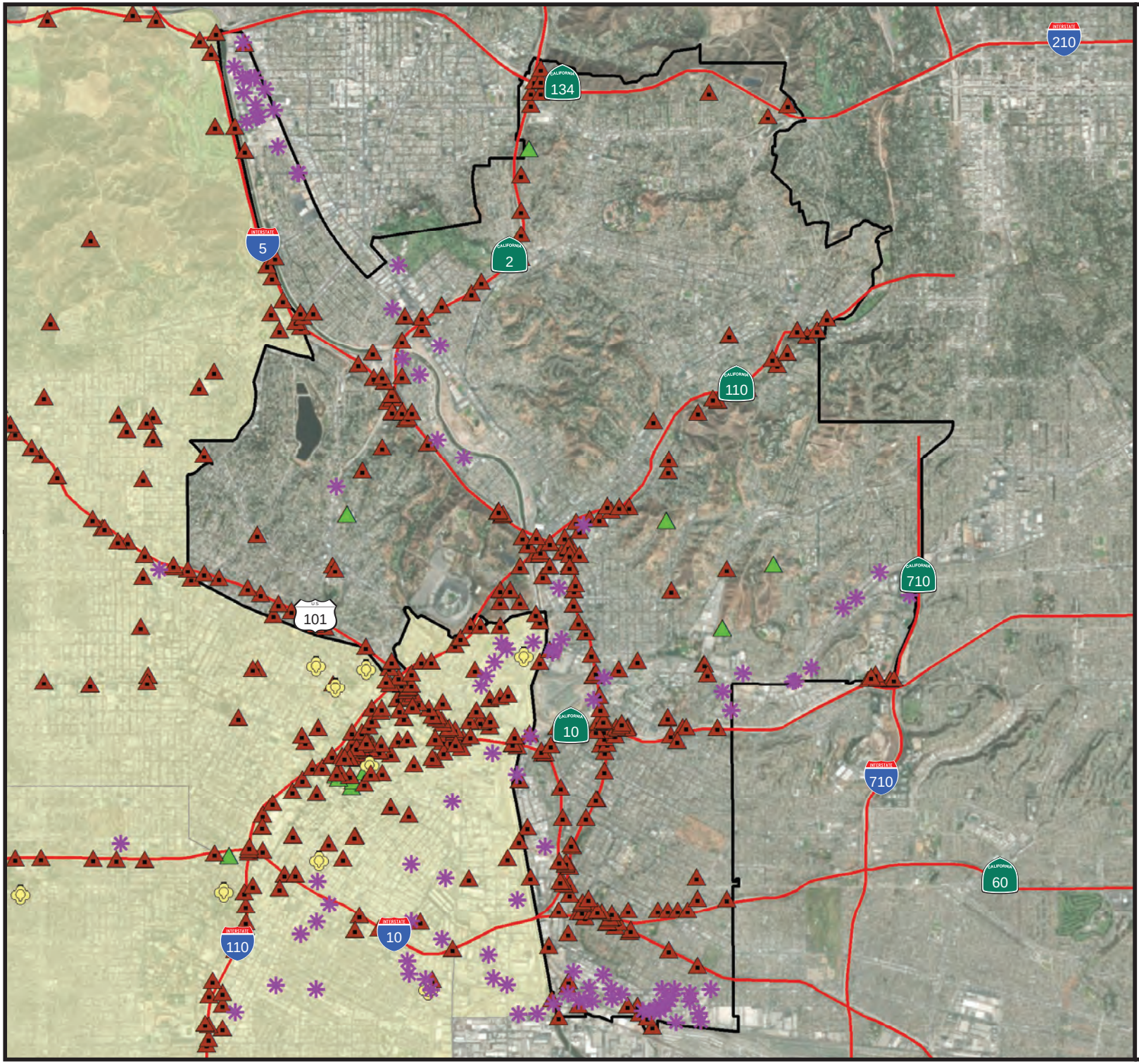

Figure 3-12.

Identified Critical Facilities in the East APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,600 feet 1:91,200

Feet
0 5,500 11,000

Meters
0 1,375 2,750

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

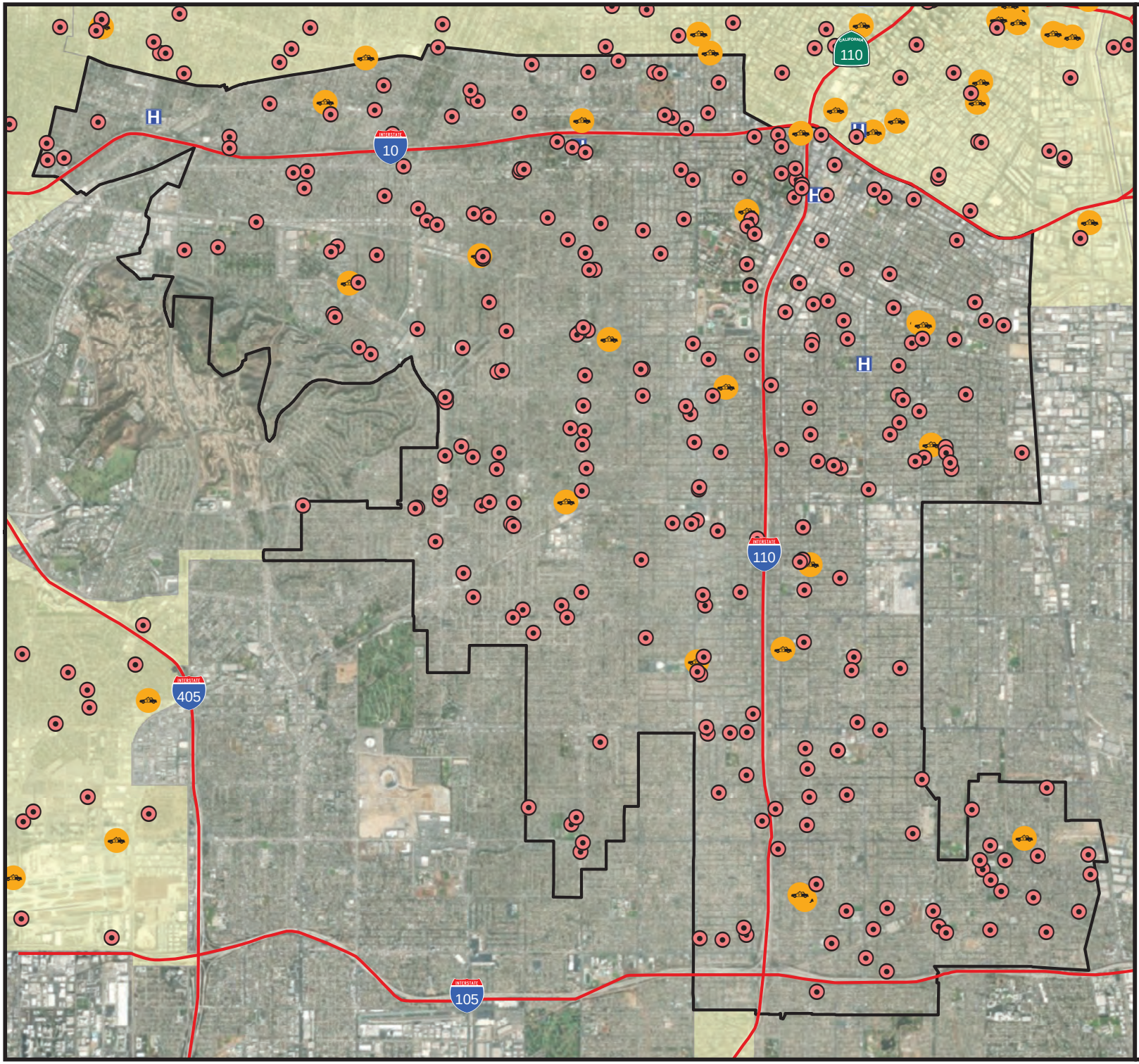

Figure 3-13.

Identified Critical Facilities in the South Los Angeles APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,000 feet 1:84,000

Feet
0 5,000 10,000

Meters
0 1,250 2,500

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

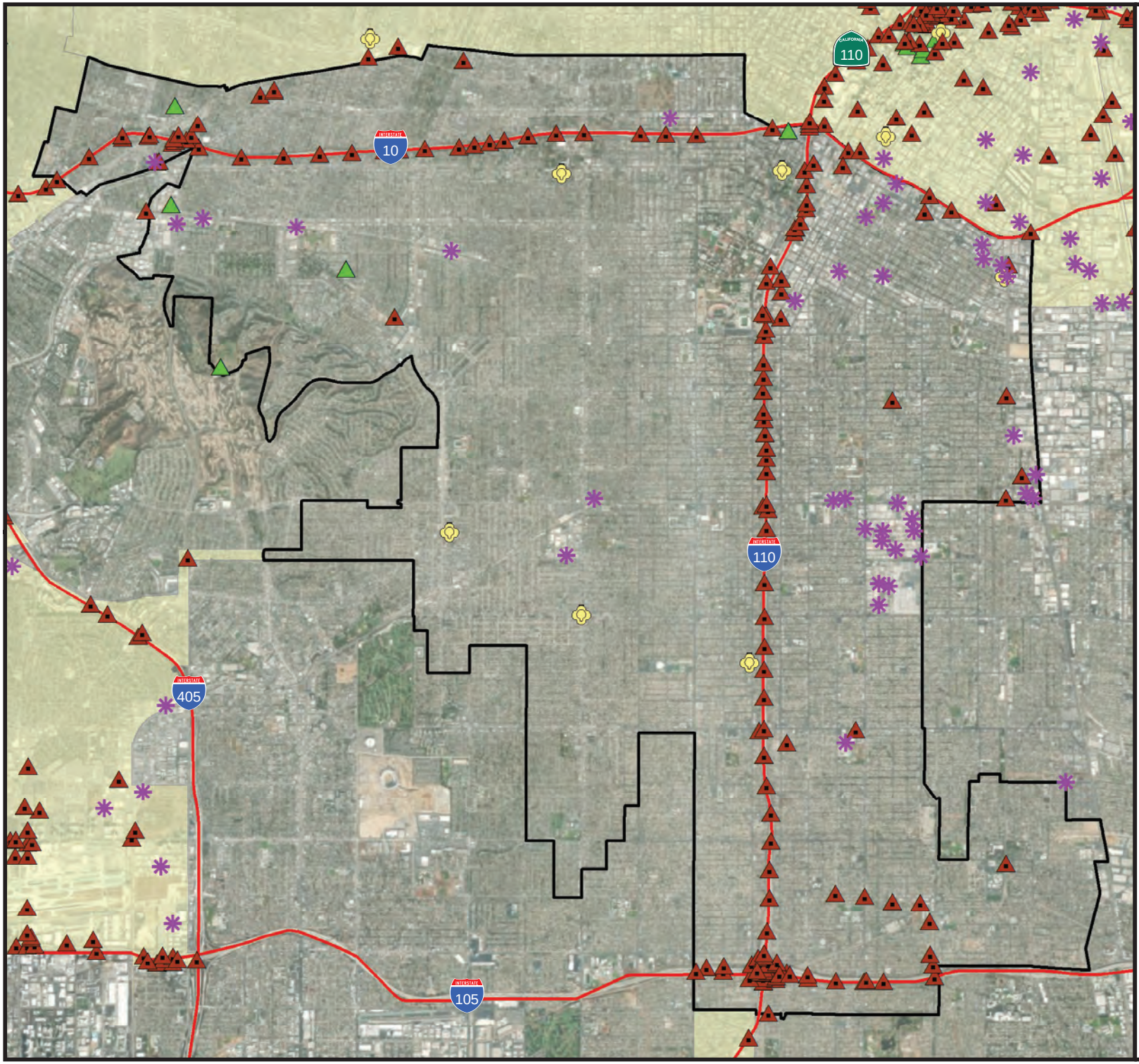

Figure 3-14.

Identified Critical Facilities in the South Los Angeles APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,000 feet 1:84,000

Feet
0 5,000 10,000

Meters
0 1,250 2,500

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

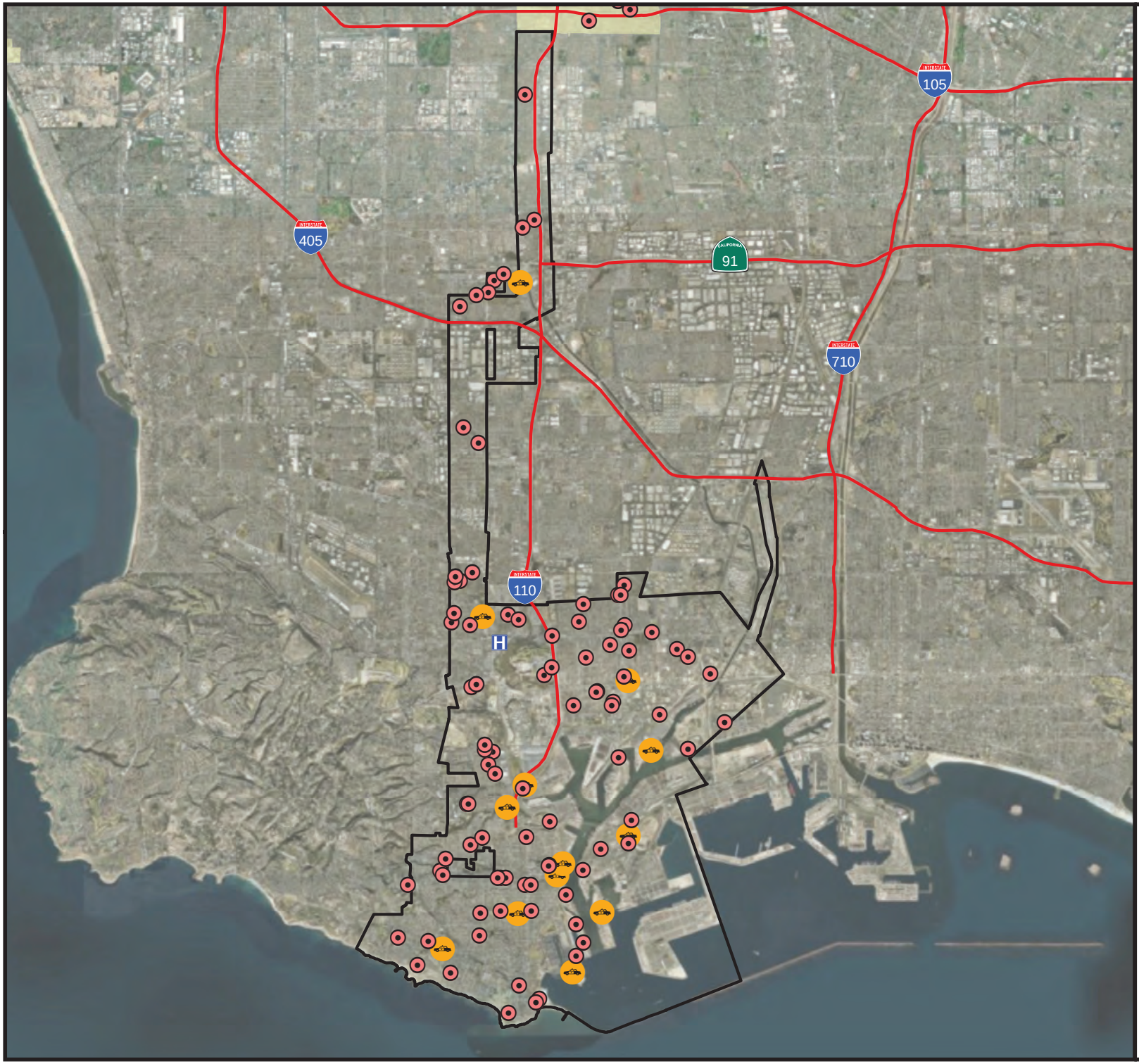

Figure 3-15.

Identified Critical Facilities in the Harbor APC (1 of 2)

Legend

- Food, Water and Sheltering
- Health and Medical
- Safety and Security
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

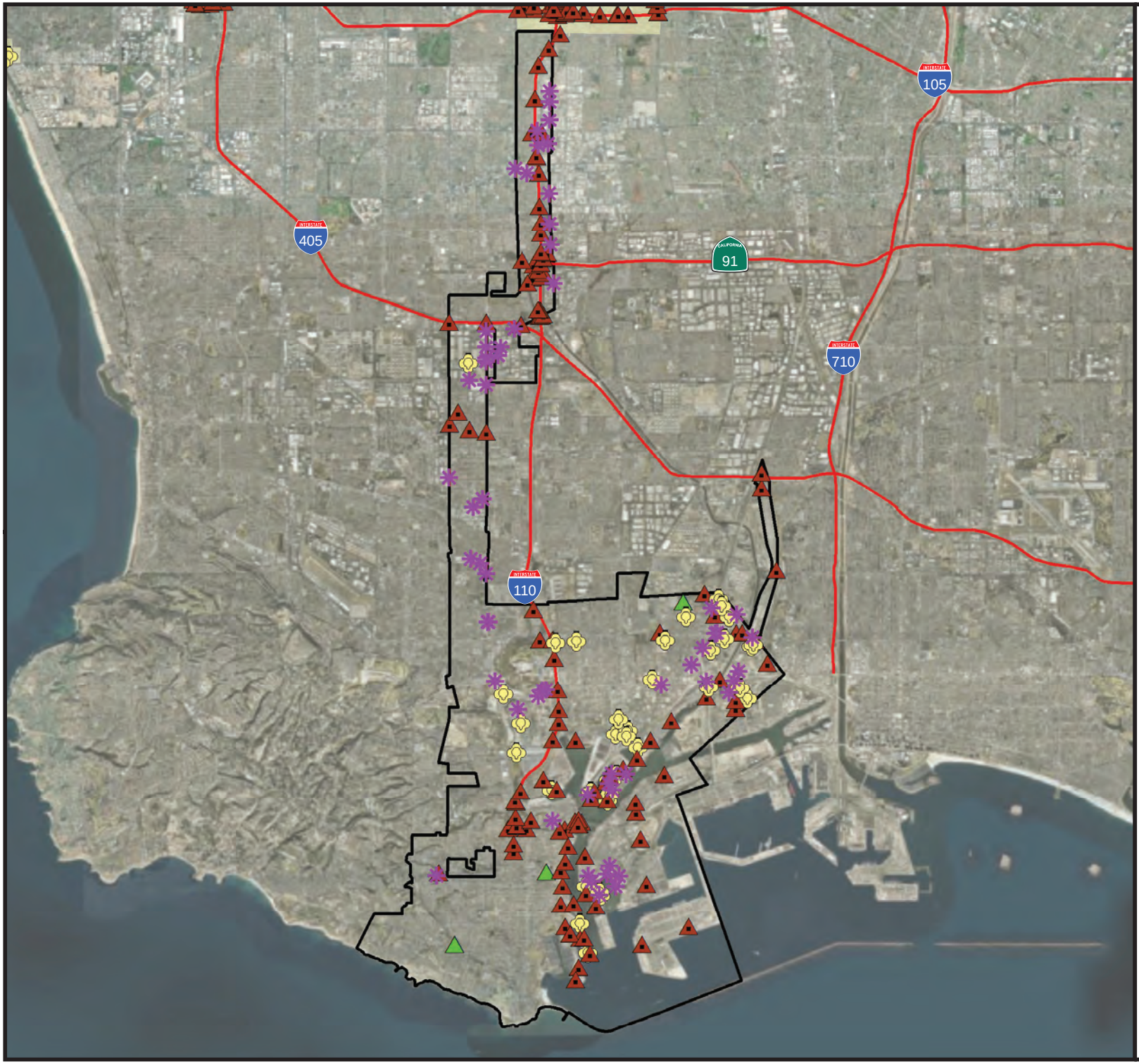

Figure 3-16.

Identified Critical Facilities in the Harbor APC (2 of 2)

Legend

- Communications
- Energy
- Hazardous Materials
- Transportation
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, County of Los Angeles

3.4 DEMOGRAPHICS

Some populations are at greater risk from hazard events, such as floods, because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), the disabled, 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 hazard 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 citizens.

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 the City of Los Angeles population at 4,040,079 as of January 1, 2019, making it the largest city by population in the state (California Department of Finance, 2019a).

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population may signify economic decline. Figure 3-17 shows the planning area population change from 2000 to 2019 compared to that of the State of California (California Department of Finance, 2012 and 2019a).

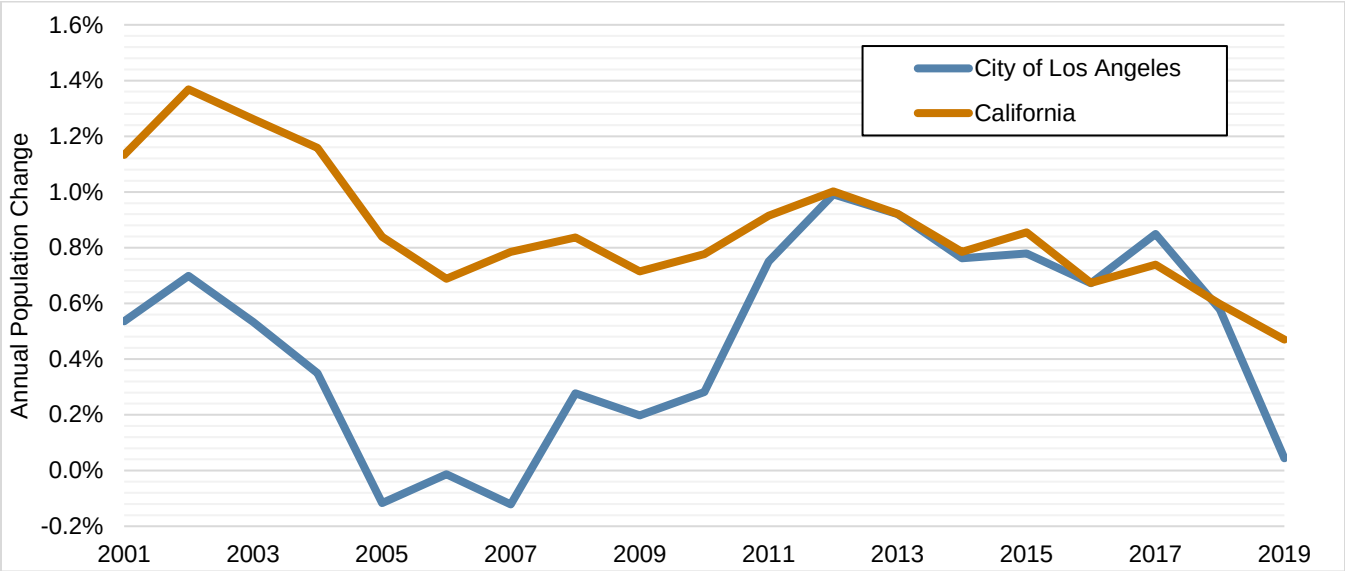

Figure 3-17. California and City of Los Angeles Population Growth

Between 2000 and 2019, California's population grew by 17.8 percent (about 0.87 percent per year) while the planning area's population increased by 9.3 percent (0.47 percent per year). The City and the state both experienced peak population growth in 2002, with the annual growth rate generally slowing until 2006-2007. The rate increased again until 2012, but has declined since then. Table 3-5 shows the population in the planning area from 2000 to 2019.

Table 3-5. Annual Population Data

	City of Los Angeles Population		City of Los Angeles Population
2000	3,694,742	2010	3,792,621
2001	3,714,515	2011	3,821,068
2002	3,740,481	2012	3,858,949
2003	3,760,410	2013	3,894,465
2004	3,773,549	2014	3,924,129
2005	3,769,131	2015	3,954,715
2006	3,768,645	2016	3,981,283
2007	3,764,063	2017	4,015,087
2008	3,774,497	2018	4,038,313
2009	3,781,952	2019	4,040,079

Source: California Department of Finance, Demographic Research Unit, 2012 and 2019a

3.4.2 Age Distribution

As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events 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, the elderly 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. Elderly residents 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 the elderly is an important consideration given the current aging of the American population.

Children under 16 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 the planning area is shown in Figure 3-18. Based on the most recent 5-year estimates from the U.S. Census Bureau’s American Community Survey (2015-2018), 12.1 percent of the planning area’s population is 65 or older. According to U.S. Census data, 37.8 percent of the over-65 population have disabilities of some kind and 15.8 percent of the over-65 population have incomes below the poverty line. The City’s population includes 21 percent who are 18 or younger. Among children under 18, 27 percent are in families that live below the poverty line.

3.4.3 Race, Ethnicity and Language

Research shows that racial and ethnic 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.

Figure 3-19 shows the U.S. Census racial distribution in the City of Los Angeles based on race categories mandated by U.S. Office of Management and Budget. The Census Bureau also reports that 48.6 percent of the planning area population is of Hispanic origin, which indicates the heritage, nationality, lineage, or country of birth of the person or the person’s parents or ancestors before arriving in the United States, and may be any race.

Source: American Community Survey, 2019

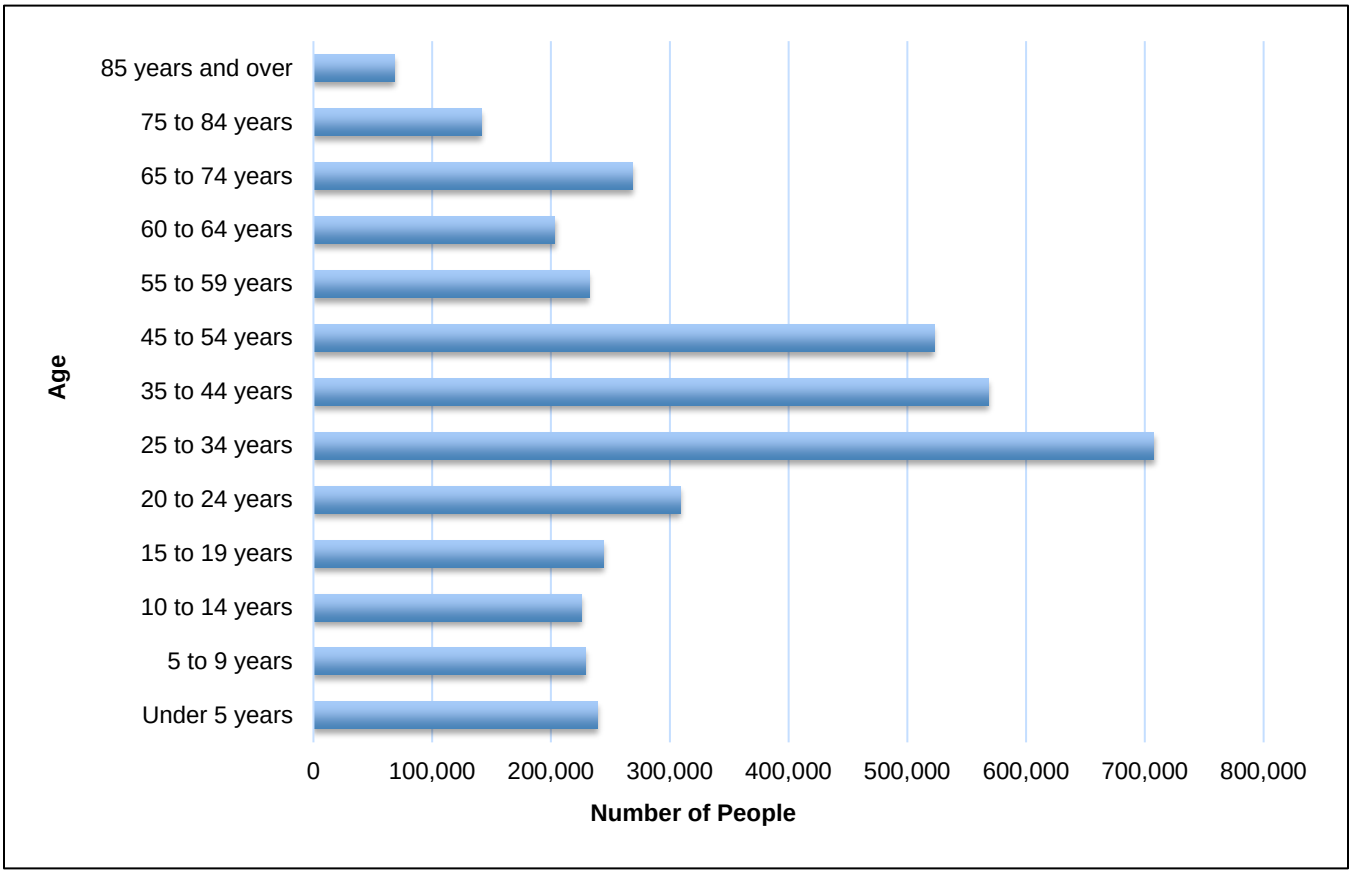

Figure 3-18. Planning Area Age Distribution

Source: American Community Survey, 2019

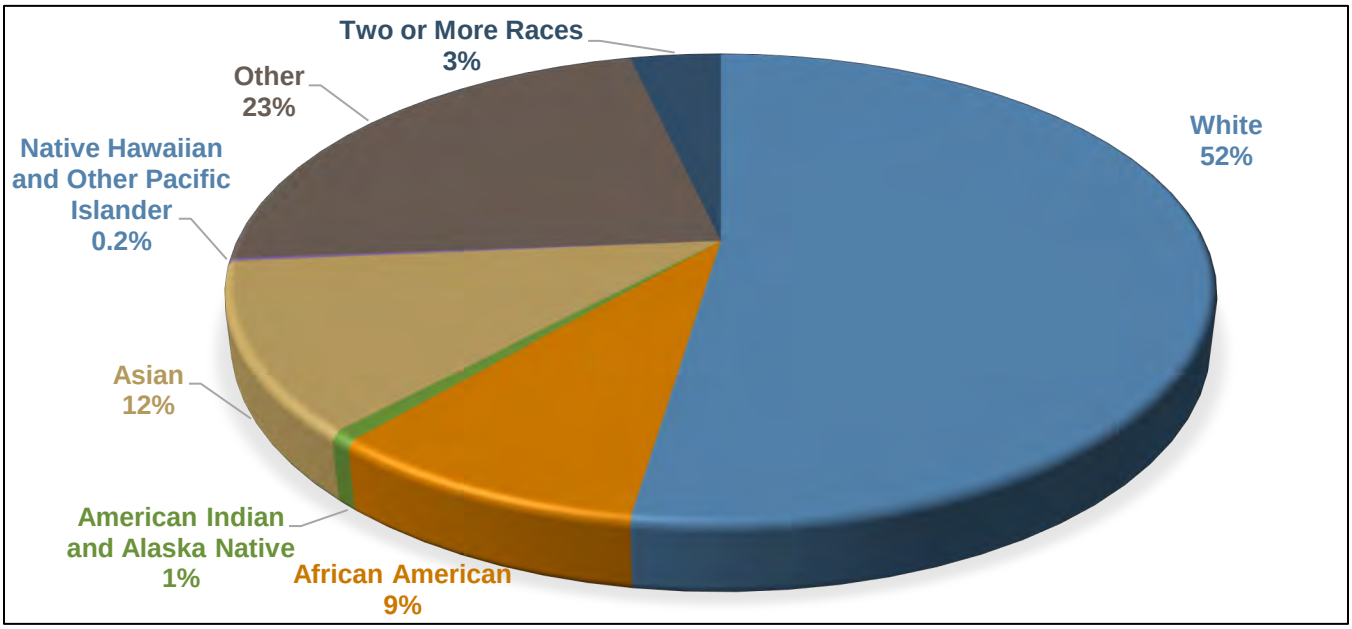

Figure 3-19. Planning Area Race Distribution

The planning area has a 38.2-percent foreign-born population. Other than English, the most commonly spoken language in the planning area is Spanish. The census estimates that 27.7 percent of residents speak English "less than very well."

3.4.4 Persons with Disabilities or with Access and Functional Needs

Persons with disabilities or others with access and functional needs are more likely to have difficulty responding to a 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 5-year American Community Survey (2015-2018), there are 395,513 individuals with some form of disability in the City of Los Angeles, representing 10.1 percent of the total.

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 automatically 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.

Based on U.S. Census Bureau estimates, the per capita family income in the planning area in 2018 was $33,420, and the median household income was $65,422. It is estimated that about 14.8 percent of households receive an income between $100,000 and $149,999 per year, and over 18.6 percent of household incomes are above $150,000 annually. About 13.6 percent of the households in the planning area make less than $25,000 per year and are therefore below the poverty level. The weighted average poverty threshold for a family of four in 2018 was $26,370; for a family of three, $19,988; for a family of two, $17,120.

3.5.2 Industry, Businesses and Institutions

The Los Angeles metropolitan area has a gross metropolitan product of $1.0 trillion (as of 2017), the third-largest in the world, after the Tokyo and New York City metropolitan areas. The Port of Los Angeles handles tens of billions of dollars in industry sales. The City is also home to the Los Angeles International, L.A./Ontario International and Van Nuys airports, generating billions of dollars in revenue and transporting millions of passengers. The Los Angeles Customs District set a U.S. record for the 13th consecutive year in 2017, with total commerce of $431.4 billion: record exports of $128.8 billion and record imports of $302.64 billion.

Los Angeles is well known for its higher education institutions, events, sports centers, urban and outdoor recreational tourist attractions, shopping enclaves, dining destinations, and arts and cultural institutions. Los Angeles is regarded as the entertainment capital of the world and is leading in several growth industries, including

the fashion, health services/biomedical, and aerospace/technology industries. According to the Los Angeles Tourism & Convention Board, leisure and hospitality is a leading industry in Los Angeles, employing 464,600 individuals in 2014. The apparel, health care, aerospace product and manufacturing, entertainment industries also employ thousands of employees and generate billions of dollars in revenue (Los Angeles Tourism and Convention Board, 2019). Table 3-6 lists employers of 10,000 or more in Los Angeles County as of 2018. Figure 3-20 shows the breakdown of U.S. Census-defined industry types in the planning area.

Table 3-6. Major Employers in Los Angeles County

Employer Name	Employees	Employer Name	Employees
County of Los Angeles	107,400	Cedars-Sinai Medical Center	14,900
Los Angeles Unified School District	104,300	Ralphs / Food 4 Less (Kroger Co.)	14,900
University of California, Los Angeles	65,600	Los Angeles Community College District	13,200
City of Los Angeles (including DWP)	61,900	Walt Disney Co.	13,000
Federal Government (non-Defense Dept.)	43,600	Allied Universal	12,800
Kaiser Permanente	37,400	Long Beach Unified School District	12,700
State of California (non-education)	29,800	NBCUniversal	12,000
University of Southern California	21,000	Los Angeles County Metropolitan Transportation Authority	12,000
Northrop Grumman Corp.	16,600	AT&T Inc.	11,500
Providence Health & Services	15,900	Home Depot	11,200
Target Corp.	15,000	Albertsons / Vons / Pavilions	10,200

Source: LA Almanac, 2020

Source: American Community Survey, 2019

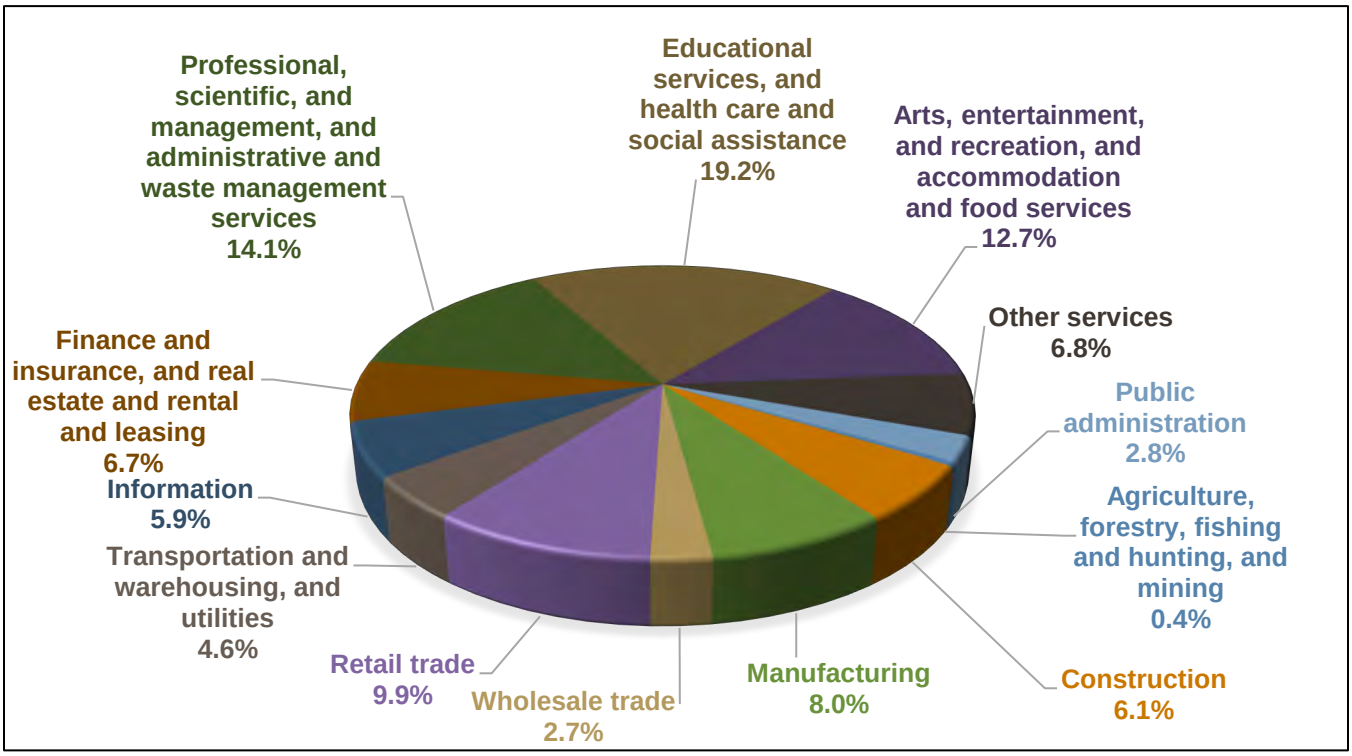

Figure 3-20. Industry in the Planning Area

3.5.3 Employment Trends and Occupations

According to the 5-year American Community Survey (2015-2018), about 66.4 percent of the City of Los Angeles's population 16 years old or older is in the labor force. Of the working-age population, 40.2 percent of men and 59.8 percent of women are in the labor force.

Figure 3-21 compares unemployment trends from 2000 through 2019 for California and the Los Angeles metropolitan area. The metropolitan area unemployment rate peaked at 12.5 percent in 2010, and declined after that to a rate of 4.4 percent in 2019. The metropolitan area unemployment rate has generally been slightly higher than the statewide rate.

Figure 3-22 shows Census Bureau estimates of employment distribution by occupation category. Management, business, science and arts occupations make up 37.8 percent of the jobs in the City of Los Angeles. Sales and office occupations make up 21.2 percent of the local working population.

The U.S. Census estimates that over 69.4 percent of workers in the planning area commute alone (by car, truck or van) to work, and mean travel time to work is 31.4 minutes.

Source: California Employment Development Department, 2020

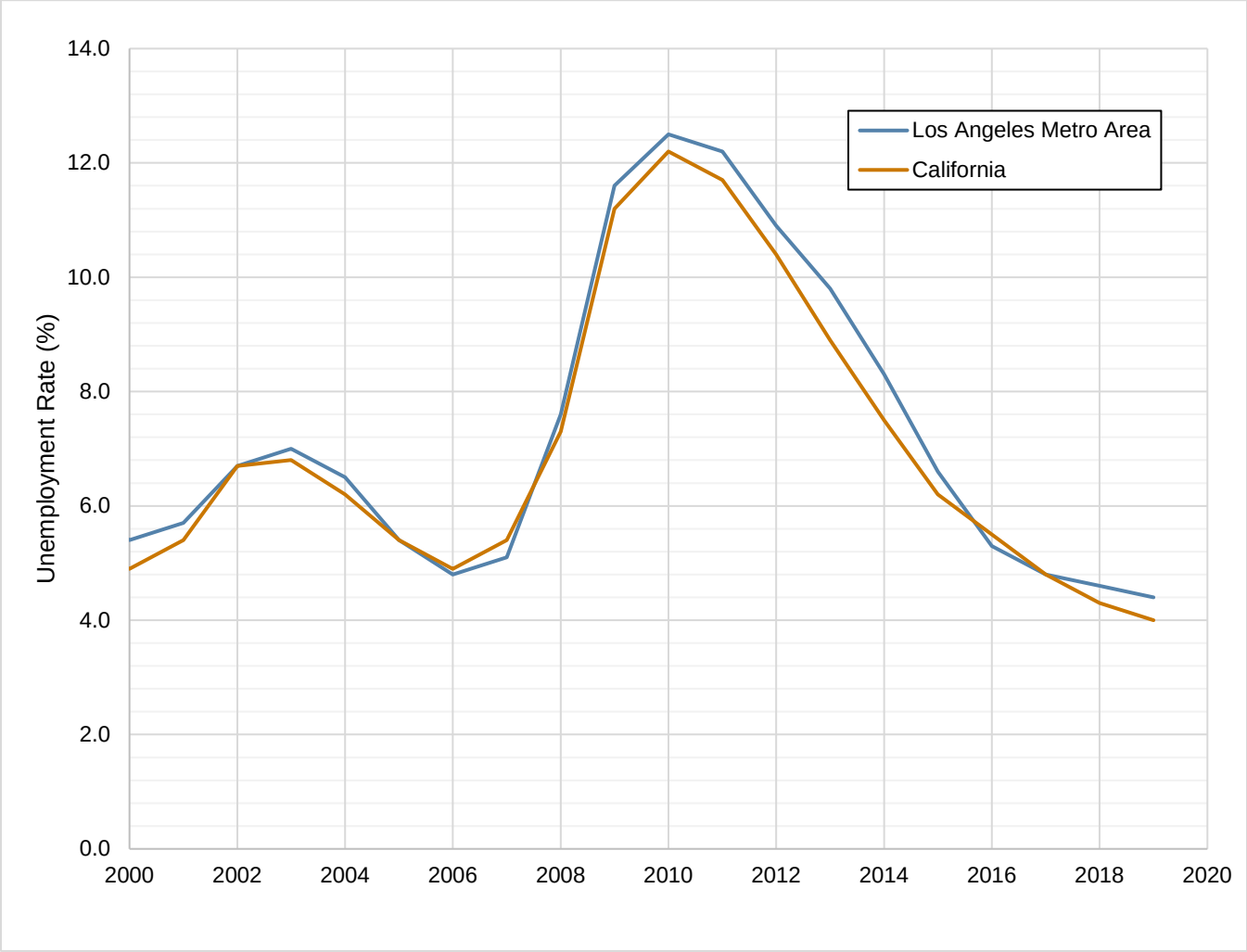

Figure 3-21. California and City of Los Angeles Unemployment Rate

Source: American Community Survey, 2019

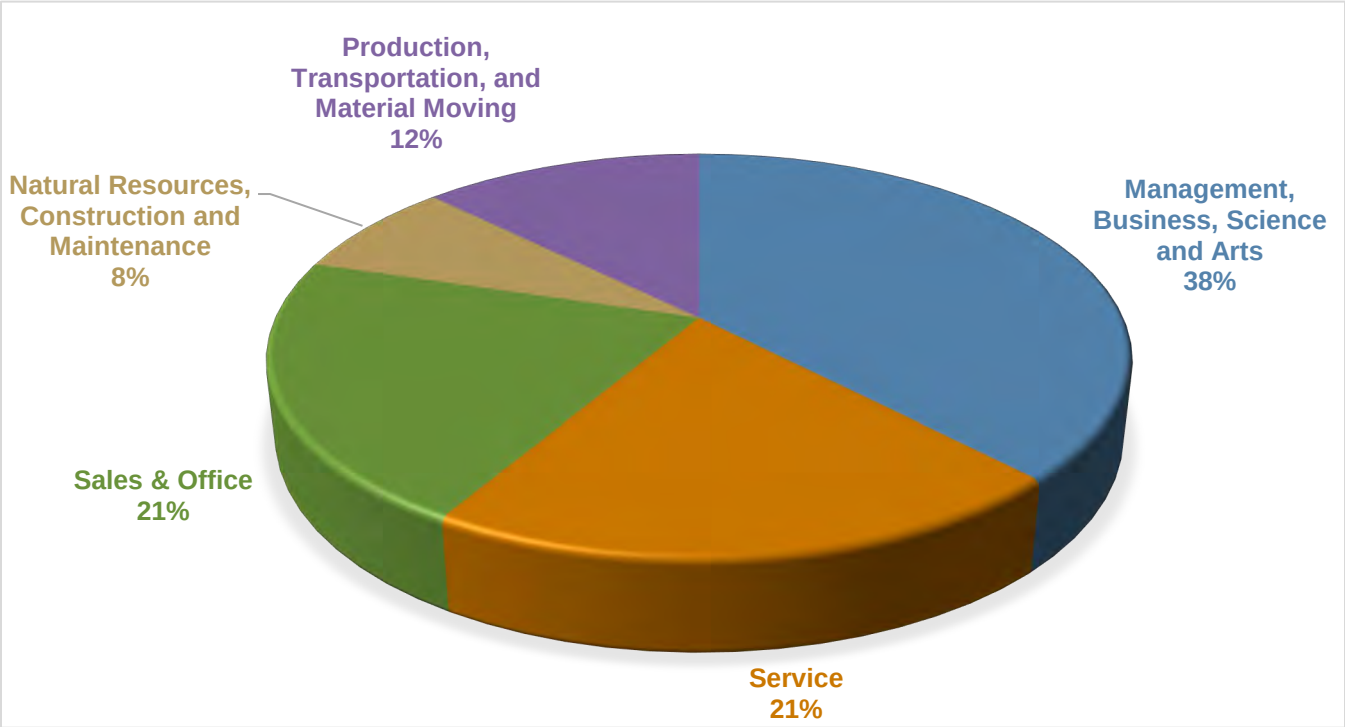

Figure 3-22. Occupations in the City of Los Angeles

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 (CRS 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.

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. The information provided is used to support the capabilities assessment presented in Section 4.3. Each program identified in this chapter represents a capability that the City has to implement actions identified in Chapter 13. These are ongoing programs leveraged by the City to promote flood resiliency within the planning area.

Federal, state, and local agencies share and coordinate responsibilities for flood protection in the City of Los Angeles. 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. The City of Los Angeles County Bureau of Engineering, with support from Los Angeles County Flood Control District, works to reduce flood risk in the City of Los Angeles. The City of Los Angeles Department of Public Works, Bureau of Engineering and City Planning also work to reduce flood risk in the City of Los Angeles. Development of this plan included a review and incorporation, as appropriate, of existing plans, studies, reports, and technical information. Pertinent federal, state and local laws are described below.

4.1 FEDERAL AND STATE

State and federal 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 floodplain management planning. The findings are summarized in Table 4-1 and Table 4-2. Short descriptions of each program are provided in Appendix E. Additional discussion is provided in the sections following the tables for the National Flood Insurance Program (NFIP) and Community Rating System (CRS), because of their direct and significant relevance to floodplain management planning

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

Agency, Program or Regulation	Plan Area Affected	Relevance
Americans with Disabilities Act	Action Plan Implementation	In the event of a flood, persons with disabilities may require additional assistance in evacuation (e.g., vehicles with wheelchair lifts or paratransit buses). Local governments may consider implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance. FEMA floodplain management project grant applications require full compliance with applicable federal acts.
Civil Rights Act of 1964	Action Plan Implementation	FEMA floodplain management project grant applications require full compliance with applicable federal acts.

Agency, Program or Regulation	Plan Area Affected	Relevance
Clean Water Act	Action Plan Implementation	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. FEMA floodplain management project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	Action Plan Funding	This is a potential alternative source of funding for actions identified in this plan.
Community Rating System	Flood Hazard	This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements. The City of Los Angeles has participated in the CRS program since 1991. To maintain or improve its rating, the City goes through an annual recertification and a re-verification every five years. This plan has been developed to help the City maintain or enhance its CRS classification in the future.
Emergency Watershed Program	Action Plan Funding	This is a possible funding source for actions identified in this plan.
Endangered Species Act	Action Plan Implementation	FEMA floodplain management project grant applications require full compliance with applicable federal acts. Floodplain managers should be aware of any potential floodplain management measures that could fall under the Endangered Species Act.
Federal Energy Regulatory Commission Dam Safety Program	Dam Failure Hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
Floodplain Management and Protection of Wetlands (44 CFR Part 9)	Flood Hazard	This federal code requires federal agencies to avoid long and short-term adverse impacts associated with occupancy and modification of floodplains.
National Dam Safety Act	Dam Failure Hazard	This act requires a periodic engineering analysis of most dams in the country
National Environmental Policy Act	Action Plan Implementation	FEMA floodplain management project grant applications require full compliance with applicable federal acts.
National Flood Insurance Program	Flood Hazard	This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations. The City of Los Angeles participates in the NFIP and has adopted regulations that meet the NFIP requirements. The City is currently in good standing with the provisions of the NFIP as monitored by FEMA Region IX and the California Department of Water Resources.
National Incident Management System	Action Plan Development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards
U.S. Army Corps of Engineers Dam Safety Program	Dam Failure Hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	Action Plan Implementation, Funding	The Corps of Engineers offers multiple funding and technical assistance programs available for floodplain management actions

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

Agency, Program or Regulation	Plan Area Affected	Relevance
AB 162: Flood Planning (Chapter 369, Statutes of 2007)	Flood Hazard	Cities and counties must address flood-related matters in the land use, conservation, and safety and housing elements of their general plans.
AB 2800: Climate Change—Infrastructure Planning	Action Plan Development	This act requires state agencies to take into account the impacts of climate change when developing state infrastructure.
AB 32: The California Global Warming Solutions Act of 2006	Action Plan Development	This act establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020
AB 70: Flood Liability	Flood Hazard	A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a state flood control project
California Coastal Management Program	Flood and Tsunami	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.
California Department of Water Resources	Flood Hazard	This state department is the state coordinating agency for floodplain management.
California Division of Safety of Dams	Dam Failure Hazard	This division monitors the dam safety program at the state level and maintains a working list of dams in the state.
California Environmental Quality Act	Action Plan Implementation	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
California General Planning Law	Floodplain Management Planning	This law requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of floodplain management plans with general plans.
California State Building Code	Action Plan Implementation	Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events.
City of Los Angeles Coastal Transportation Corridor Specific Plan	Action Plan Implementation	This City ordinance establishes a Specific Plan for the Coastal Transportation Corridor and identifies a set of comprehensive transportation improvements funded by usage fee revenue.
City of Los Angeles Ordinance Number 183144: Los Angeles River Improvement Overlay District	Action Plan Implementation	This City ordinance establishes the Los Angeles River Improvement Overlay District and amends the zoning map accordingly.
City of Los Angeles Ordinance Number 183145: River Improvement Overlay District	Action Plan Implementation	This City ordinance authorizes the establishment of River Improvement Overlay Districts and River Design Guidelines for designated areas adjacent to the City's waterways.
City of Los Angeles Ordinance Number 183954: Elysian Valley Q Condition Ordinance	Action Plan Implementation	This City Ordinance changes the zone and height district and amends the Los Angeles Municipal Code for certain parcels adjacent to the Los Angeles River.
Disadvantaged and Low-Income Communities Investments	Action Plan Funding	This is a potential source of funding for actions located in disadvantaged or low-income communities.
First Validating Act of 2019	Action Plan Implementation	This act requires cities and counties to include climate adaptation and resiliency strategies in the safety element of their general plans.
Governor's Executive Order S-13-08 (Climate Impacts)	Action Plan Implementation	This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects.
Los Angeles Regional Water Quality Control Board	Action Plan Implementation	The Los Angeles Regional Water Quality Control Board protects ground and surface water quality in the Los Angeles region.

Agency, Program or Regulation	Plan Area Affected	Relevance
One Water LA	Action Plan Implementation and Funding	The One Water LA 2040 Plan identifies projects programs and policies that will provide sustainable, long-term water supplies for Los Angeles, emphasizing resilience to drought conditions and climate change.
Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements	Action Plan Implementation	Under this bill, review and revision of general plan safety elements are required to address only flooding and fires (not climate adaptation and resilience), and environmental justice is required to be included in general plans.
Senate Bill 97: Guidelines for Greenhouse Gas Emissions	Action Plan Implementation	This bill establishes that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for California Environmental Quality Act analysis.
Standardized Emergency Management System	Action Plan Implementation	Local governments must use this system to be eligible for state funding of response-related personnel costs.

4.1.1 National Flood Insurance Program

The National Flood Insurance Program (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 flood (called the 100-year flood or base flood) and the 0.2-percent-annual-chance flood (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 floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened and endangered species.

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.

Los Angeles Participation in NFIP

The City of Los Angeles participates in the NFIP and has adopted regulations that meet the NFIP requirements. The City entered the NFIP in 1980; its first FIRM was issued February 12, 1980. The effective date for the current FIRM is December 21, 2018. Los Angeles is currently in good standing with the provisions of the NFIP. A detailed flood insurance study for the areas subject to flooding was originally completed on September 2, 1980, with updates in 1984, 1987, 1991, 1998, 1999, 2008 and 2018. The capability assessment at the end of this chapter includes a summary of the NFIP capabilities of the City of Los Angeles.

As of July 31, 2019, 9,801 flood insurance policies in the City of Los Angeles provide $3.03 billion in coverage at a combined annual premium of $6.1 million. According to FEMA statistics, 3,663 flood insurance claims were paid between January 1, 1978 and July 31, 2019, for a total of $20.2 million, an average of $5,515 per claim. The following observations are based on a review of City of Los Angeles flood insurance statistics:

- The use of flood insurance in the City of Los Angeles is similar to the national average, with 46.8 percent of insurable buildings in the City covered by flood insurance. According to an NFIP study, about 49 percent of single-family homes in special flood hazard areas (SFHAs) are covered by flood insurance nationwide.
- The average cost of a flood insurance policy within the SFHA is $1,266 per year.
- The average cost of a policy outside the SFHA is $764.
- 78 percent of the policies in force are for residences.
- 81.5 percent of the policies are for pre-FIRM construction.
- The amount of insurance in force represents 30.5 percent of the total value of exposed assets in the SFHA.
- Over 30 percent of flood insurance claims paid were for policies outside the SFHA.
- The high percentage of flood insurance policies in force outside the SFHA (roughly 76 percent of the policies) suggests that the currently effective mapping does not reflect the total flood risk.

Flood Insurance Reform

The NFIP is currently $21 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 required the NFIP to raise rates to reflect true flood risk, make the program more financially stable, and change how FIRM updates impact policyholders. The law eliminated some artificially low rates and discounts, as well as subsidies to certain pre-FIRM policyholders. The law called for adjusting most flood insurance rates to reflect full risk. It identified investments property owners and communities can make to reduce the impact of rate changes.

The Homeowner Flood Insurance Affordability Act of 2014 delayed the increases in flood insurance premiums mandated under the Biggert–Waters Flood Insurance Reform Act of 2012 for four years. During that time, FEMA was 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 allowed 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, 81 percent of current policies in force in the City of Los Angeles are the pre-FIRM subsidized policies that the legislation is targeting.

4.1.2 The Community Rating System

The Community Rating System (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 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.)

As of June 2017, there were 1,444 communities participating in the CRS program covering nearly 3.6 million policy holders. Although CRS communities represent only 5 percent of the over 22,000 communities participating in the NFIP, more than 69 percent of all flood insurance policies are written in CRS communities. Figure 4-1 shows the nationwide number of CRS communities by class as of October 2019.

Map from FEMA

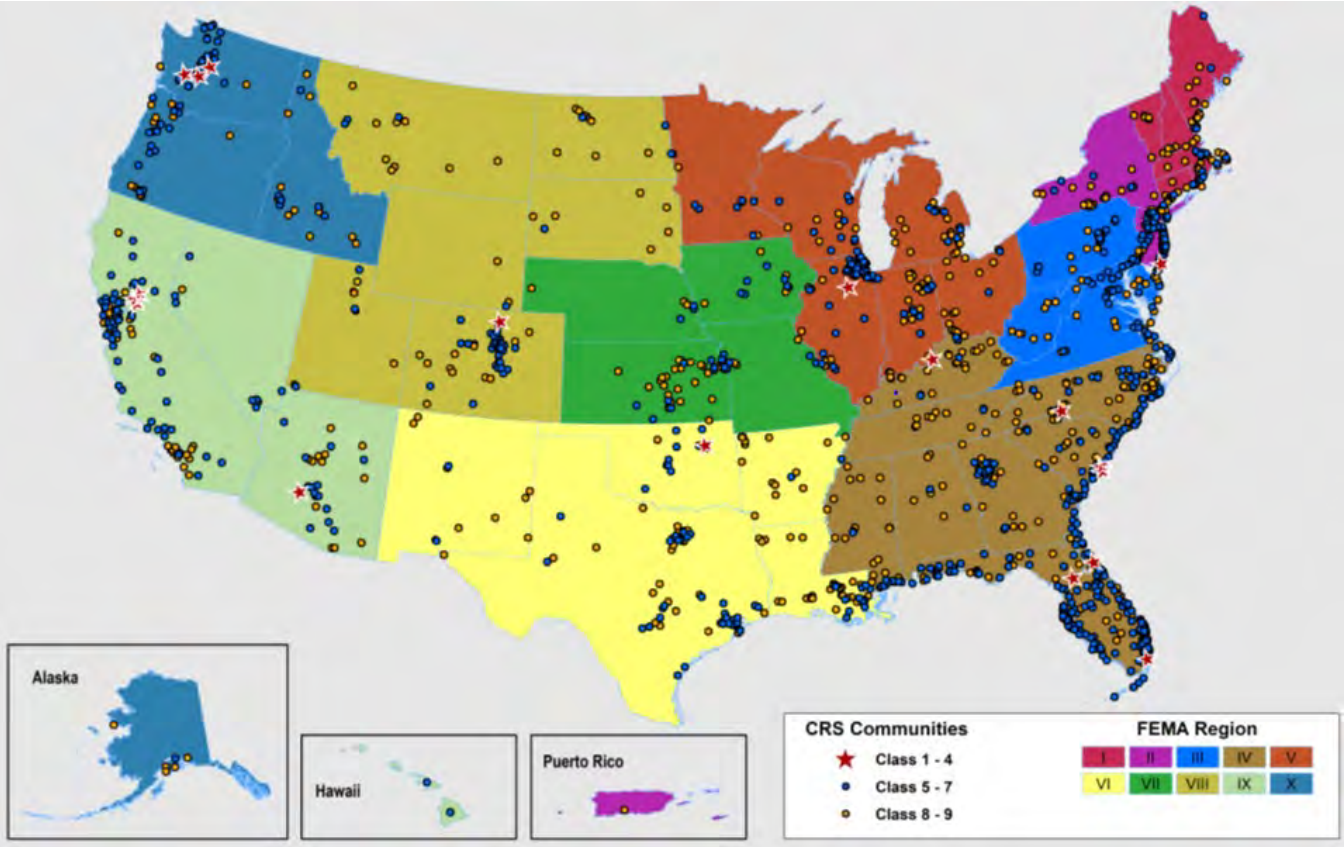

Figure 4-1. CRS Communities by Class Nationwide as of October 2019

The CRS classes for local communities are based on 19 creditable activities in the following four categories:

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

CRS activities can help to save lives and to 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 river flood risks.

Los Angeles Participation in the CRS

The City of Los Angeles has been participating in the CRS program since October 1, 1991, and currently holds a Class 7 CRS rating that became effective on October 1, 2005 and was last confirmed on August 19, 2014. Under that classification, flood insurance policies within the special flood hazard area (SFHA) receive a 15 percent premium discount, and policies outside the SFHA receive a 5 percent discount. This equates to a savings ranging

from $59 to $223 per policy, for a total citywide premium savings of $511,286 (Insurance Services Office, 2019, personal communication). The last cycle reverification visit for the City of Los Angeles was conducted on August 9, 2014, during which the City's floodplain management program was verified for 1,700 points and the corresponding CRS Class 7 rating.

Repetitive Loss Area Analysis

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 or severe repetitive loss properties:

- 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 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.

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.

4.2 LOCAL

4.2.1 City of Los Angeles

General Plan

The Los Angeles General Plan is a comprehensive set of purposes, policies and programs to guide the future form and development of the City. The plan is approved by the Planning Commission and adopted by the City Council. The General Plan is a strategic and long-term document, broad in scope and specific in nature. It is implemented by decisions that direct the allocation of public resources and that shape private development, which affects the lives of the residents and business community. The General Plan is prepared and maintained by the Department of City Planning. The City is currently updating the General Plan. The update (OurLA2040) is anticipated to be completed in 2024. The current plan consists of the following elements:

- Plan for a Healthy LA: A Health and Wellness Element of the General Plan, March 2015
- Air Quality Element: An Element of the City of Los Angeles General Plan, November 1992
- Conservation Element of the City of Los Angeles General Plan, September 2001
- The Housing Element 2013 – 2021 of the City of Los Angeles General Plan, December 2013 (update pending)
- Noise Element of the City of Los Angeles General Plan, February 1999
- The Open Space Element of the City of Los Angeles General Plan, June 1973
- Infrastructure Systems Element of the City of Los Angeles General Plan, October 1971
- Safety Element of the City of Los Angeles General Plan, November 1996
- Mobility Plan 2035, An Element of the General Plan, September 2016 (previously the Transportation Plan)
- The Land Use Element of the General Plan, various, 2003 – 2017 (consisting of 35 community plans)
- Framework Element: Growth Strategy for Los Angeles, August 2001

The Safety Element addresses protection from unreasonable risks associated with natural disasters, including stormwater and inundation. The Safety Element includes goals and policies for the Emergency Management Department and other interagency coordination, the California State safety element requirements, and emergency response, disaster recovery and hazard mitigation.

The Department of City Planning is reviewing all of the General Plan elements, establishing a schedule for updating plans that are still pending, and developing a sequence for updating other elements. The following new laws, requirements, resources, and research will affect general planning:

- SB 375 (Sustainable Communities Strategies)
- SB 5 (Affordable Housing and Community Development Investment Program)
- SB 743 (Environmental Quality)
- SB 244 (Island or Fringe Communities)
- AB 52 (Tribal Consultation)
- AB 2140 (General Plan Safety Element)
- Home-Sharing Ordinance adopted November 2019
- Accessory Dwelling Unit Ordinance adopted August 2019
- Historic Preservation Overlay Zone code amendment
- Proposed Vacation Rental Ordinance drafted November 2019.

The General Plan must comply with the California General Planning Law and with the additional flood planning provisions of AB 162. The General Plan and the FMP2020 are considered to be linked.

Comprehensive Zoning Plan

The Zoning Code regulates all land, building, structures, and uses within the City of Los Angeles. Since 2013, the City has been in the process of creating a new zoning code for the 21st century. The original zoning regulations were developed in 1946 and had not been comprehensively revised since then. An ongoing initiative called, “Plan re:code LA” is the City’s latest effort to update the zoning code with an engaged community vision, policies and implementation strategies, alignment with various adopted plans, land use and zoning maps, and address the issues of unique neighborhoods with needs that differ by neighborhood. The re:code LA team released a draft of an ordinance September 2017, held five public hearings and a dozen stakeholder group meetings. A City Planning Commission meeting was held October 2018 and is currently making its way through the legislative process.

Los Angeles Municipal Code Chapter 1, Article 2, also known as the Comprehensive Zoning Plan of the City of Los Angeles, coordinates all City zoning regulations and provisions in order to regulate the location and use of buildings, structures and land. The goals of the Comprehensive Zoning Plan are to encourage the most appropriate use of land; to stabilize the value of property; to provide adequate open spaces; to prevent and fight fires; to

prevent undue concentration of population; to lessen street congestion; to facilitate adequate provisions for transportation, water, sewerage, schools, parks and other public requirements; and to promote health, safety and the general welfare in accordance with the General Plan. It includes designation of zones that allow for floodplains and flood control facilities and presents design standards including those that deal with flood prevention and control.

Los Angeles River Revitalization Master Plan

The Los Angeles River has a long history of modifications that were made to control flooding as the City of Los Angeles grew. More recently, community leaders, elected officials, concerned citizens, environmental groups and recreational groups began to look for ways to return the natural benefits of the river to the people of Los Angeles while maintaining flood protection and safety. In 2007, the City adopted the Los Angeles River Revitalization Master Plan, establishing a blueprint for future revitalization of the Los Angeles River.

The master plan's long-term vision is to restore a continuous, functioning ecosystem along the river corridor. This would involve restoring vegetation and developing fish passages, fish ladders, and riffle pools. It also would involve expanding channel capacity and reducing flow velocity through a combination of flood storage outside the channel, underground flow diversions, and land acquisition to allow for channel widening. In the short-term, channel walls can be modified to provide landscaped terraces for wildlife habitat, water quality treatment, and increased public enjoyment. Pathways and overlooks can provide safe public access (City of Los Angeles, 2007).

Additional information on this master plan is provided in Section 12.2 of this FMP2020.

Programs to Preserve or Enhance Natural Beneficial Functions

The City of Los Angeles has implemented numerous programs to preserve or enhance the natural beneficial functions that floodplains provide. This includes projects to improve local water quality, as well as development review requirements for mapped significant ecological areas. These programs are described in detail in the natural beneficial functions plan that is presented in Chapter 12.

Flood-Related Activities of City Departments

Several City departments perform activities and collect data related to flooding issues. The following is a summary of key City activities related to floodplain management (City of Los Angeles, 2010):

- Department of Public Works, Bureau of Engineering
    - Maintain FEMA Flood Insurance Rate Map data.
    - Maintain a map of hillside areas.
    - Maintain records of drainage complaints. Complaints are investigated by staff engineers or maintenance crews. Complaints have been entered into a database and geo-coded for display on the GIS.
    - Maintain a list of known deficiencies. A project is identified to address each deficiency, so the deficiency list serves as a list of proposed projects. The projects can also be displayed on the GIS.
    - Assess infrastructure damage through field investigations after major storms.
    - Prepare geotechnical reports related to geologically unstable areas.
    - Maintain a database of FEMA Repetitive Loss Properties.
    - Maintain participation in the One Water LA initiative
- Department of Public Works, Bureau of Sanitation
    - Assess infrastructure damage through field investigations after major storms.
    - Identify areas in need of frequent maintenance of the flood control system.

  - Maintain participation in the One Water LA initiative
  - Maintain participation in the Enhanced Watershed Management Program

- Department of Building and Safety
  - Inspect buildings after major storms.
  - Issue building permits
  - Identify mud-prone and landslide areas throughout the City.
  - Track the number of building permits issued in flood risk areas.
  - Maintain participation in the One Water LA initiative

- City Planning Department
  - Maintain demographic, building, land use and zoning data.
  - Determine flood protection provided by the General Plan and each Community Plan.
  - Maintain tsunami maps, dam failure inundation maps and landslide hazard identification maps from the Safety Element of the General Plan (input from the State Division of Mines and Geology and the State Office of Emergency Services).
  - Assess City policy in maintaining open space and the effectiveness of regulatory and preventive standards in preventing flood damage.
  - Maintain list of natural and beneficial areas within the City (wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species).
  - Maintain participation in the One Water LA initiative

- Department of Emergency Management
  - Assess ability of emergency plan to respond to flooding events.
  - Maintain the City's Hazard Mitigation Plan and its flood-related hazards
  - Maintain hazard preparedness guides for the public

- Port of Los Angeles/Los Angeles Harbor Department
  - Maintain tsunami signage program
  - Maintain participation in the One Water LA initiative

- Department of Water and Power
  - Implement necessary planning in the design, construction, reconstruction and maintenance of water and power systems to carry out floodplain management principles.
  - Maintain participation in the One Water LA initiative

City of Los Angeles Resilience Program

The City of Los Angeles is committed to addressing resilience by strengthening the city's physical, social, and economic foundations. The Mayor's Office has adopted far-reaching strategies to develop the tools the City needs to rebound from major crises if and when they come. By creating a pathway that recognizes roles across various scales of governance, planning, and action, we ensure our collective work is connected—providing opportunities for information sharing and collaboration.

The context of Los Angeles presents unique risks and vulnerabilities that impact the city's ability to sustain and strengthen its resilience. In resilience terms, "shocks" are sudden or acute events that threaten or impact Los Angeles' immediate well-being. These can include earthquakes, extreme weather events, infrastructure failures, or

civil unrest. “Stresses” are daily or chronic challenges that weaken our natural, built, or human resources. Examples include climate change, aging infrastructure, inequity, and homelessness. Stresses can amplify the effects of shocks when they occur, particularly for vulnerable populations.

One focus of Resilient Los Angeles is climate adaptation, which highlights taking action to reduce the impact of future climate change, while also preparing for and adapting to the already changing environment. Over the past few years, Los Angeles has experienced a new normal, with record-breaking drought, heat, and storms; climate projections indicate future challenges associated with urban heat island effects, unpredictable snowpack, and sea level rise. Among the expected challenges are severe weather and flooding—whether from storms or sea level rise or a combination of both.

With that in mind, the City takes very seriously all planning efforts intended to better prepare our City, its residents and its businesses to deal with and recover from any type of flooding that might occur. The Floodplain Management Plan serves as one of the City’s primary tools to plan for, educate about, and inform the public regarding flooding, flood preparation, and flood recovery.

100 Resilient Cities

In 2013, the City of Los Angeles was selected as an inaugural member of 100 Resilient Cities network pioneered by the Rockefeller Foundation, an organization that helps cities confront 21st century challenges. The network gives cities tools to develop a road map to resilience:

- Financial and logistical guidance for establishing an innovative new position in city government—a Chief Resilience Officer—to lead the city’s resilience efforts
- Expert support for development of a robust resilience strategy
- Connection with service providers and others who can help implement resilience strategies
- Membership in a global network of member cities that share best practices and support pioneering resilience.

Through these actions, the 100 Resilient Cities network aims to build urban resilience and establish guidelines for resilience among governments, non-governmental organizations, the private sector, and individual residents.

The Sustainable City pLAn

The Sustainable City pLAn is a road map for a Los Angeles that is environmentally healthy, economically prosperous, and equitable in opportunity for all—now and over the next 20 years. The pLAn focuses on both short-term results and long-term goals to transform the City. The pLAn provides the following:

- A vision for Los Angeles’ future—Presents a clear vision and details specific long-term outcomes to be achieved over the next two decades in 14 key aspects of the environment, the economy and measures of social equity.
- A pathway to short-term results that lay the foundation for long-term outcomes—Creates a set of near-term, back-to-basics outcomes by 2017 that create a foundation to achieve transformational change by 2025 and 2035.
- A framework to build out policies—Lays out strategies and priority initiatives that will be developed and detailed to deliver the tangible outcomes in the pLAn.
- A platform for collaboration—Creates a platform for collaboration to identify, create, and strengthen programs, policies, and partnerships that cut across bureaucratic boundaries to improve the city and neighborhoods.
- A set of tools to help manage Los Angeles—Provides the Mayor with a set of tools to ensure implementation and empower the men and women who work for the City.

- A dashboard of sustainability metrics to transparently measure progress—Identifies and tracks clear metrics to measure progress and share how everyone—in city operations, and as Angelenos—is doing along the way.
- A pathway for engaging residents—Builds on leadership throughout Los Angeles, while providing Angelenos ways and opportunities to participate in creating tangible improvements to their lives, their neighborhoods, and the entire city.

Los Angeles "Green New Deal" is the first 4-year progress report on the accomplishments of the Sustainable City pLAn. It augments, expands, and elaborates in detail the city's vision for a sustainable future and it tackles the climate emergency with accelerated targets and new aggressive goals. The Green New Deal is an expanded vision for the pLAn—securing clean air and water and a stable climate, improving community resilience, expanding access to healthy food and open space, and promoting justice. The Green New Deal includes four key principles:

- A commitment to the Paris Climate Agreement and to act urgently with a scientifically driven strategy for achieving a zero carbon grid, zero carbon transportation, zero carbon buildings, zero waste, and zero wasted water
- A responsibility to deliver environmental justice and equity through an inclusive economy, producing results at the community level, guided by communities themselves
- A duty to ensure that every Angeleno has the ability to join the green economy, creating pipelines to good paying, green jobs and a just transition in a changing work environment
- A resolve to demonstrate the art of the possible and lead the way, walking the walk and using the City's resources—its people and its budget—to drive change

Venice Local Coastal Program

The California Coastal Act requires coastal communities to prepare a local coastal program, which must address potential hazards associated with coastal areas and establish policies and implementation measures to avoid or reduce coastal hazards. Sea level rise is a coastal hazard that scientific research has linked to climate change. Because the State of California and City of Los Angeles have made it a priority to prepare for climate change, the Venice Local Coastal Program must include a section on coastal hazards related to sea level rise, along with policies and implementation measures to avoid or reduce risks based on a Venice-specific sea level rise vulnerability assessment.

Sea level rise and climate change present challenges of a new magnitude. Sea level rise has the potential to significantly threaten many coastal resources, including shoreline development, coastal beach access and recreation, natural habitats, and cultural and scenic resources, all of which are subject to specific protections and regulations in the California Coastal Act. Sea level rise in Venice also has the potential to threaten critical infrastructure, transportation systems, canal and oceanfront communities, and public facilities, which could affect safety, health, and economic and environmental sustainability.

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program is designed to help identify flood risk and promote informed planning and development practices on a nationwide level. FEMA maps community-wide flood risks on maps called Flood Insurance Rate Maps (FIRMs), which provide detail about different flood hazard zones but do not incorporate or address anticipated sea level rise. The local coastal program sea level rise planning is developed at the local government level and is a comprehensive local plan to adapt to sea level rise unique to the Venice coastal zone.

4.2.2 Los Angeles County and Regional Agencies

Enhanced Watershed Management Program

In order to improve water quality, comply with water quality mandates and address water supply issues, Municipalities and community stakeholders throughout Los Angeles County watersheds are working to develop Enhanced Watershed Management Plans for each of the five watersheds—Ballona Creek, Dominguez Channel, Marina del Rey, Santa Monica Bay and Upper Los Angeles River. The efforts are being led by the City of Los Angeles with the exception of Marina Del Rey watersheds led by the Los Angeles County public Works.

Each plan identifies projects to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve local aesthetics, and support public education. Each outlines water quality priorities, watershed control measures, reasonable assurance analysis, the scheduling of projects and the monitoring, assessment and adaptive management of projects. The plans were submitted to the Los Angeles Regional Water Quality Control Board in 2017 and 2018 (LASAN, 2019).

Additional information on these plans is provided in Section 12.5 of this FMP2020.

Greater Los Angeles County Region Integrated Regional Water Management Plan

Municipalities and groups across the Greater Los Angeles County Region collaborated to develop an Integrated Regional Water Management Plan in 2006 that focuses on water resource management. The plan identifies solutions over the next 20 years to reduce dependence on imported water, clean up local groundwater and stormwater, enhance in-stream water quality, improve habitat, and expand parks and open space. The plan can support development of local funding sources and help local jurisdictions comply with regulatory mandates. It provides a tool for achieving planning targets for the region and improving the sustainability of water resources and ecological health of local watersheds. More sustainable water resources will improve the quality of life for all communities. (Los Angeles County Department of Public Works, 2020)

Los Angeles County Flood Control District

The Los Angeles County Flood Control Act was adopted by the State Legislature in 1915, after a disastrous regional flood took a heavy toll on lives and property. The Act established the Los Angeles County Flood Control District and empowered it to provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries. The Flood Control District is governed, as a separate entity, by the County of Los Angeles Board of Supervisors.

In 1984, the Flood Control District entered into an operational agreement with the Los Angeles County Department of Public Works transferring planning and operational activities to the Department of Public Works. Watershed Management Division is the planning and policy arm of the Flood Control District. Public Works Flood Maintenance and Water Resources Divisions, respectively, oversee its maintenance and operational efforts.

The Flood Control District encompasses more than 2,700 square miles, 86 cities and 2.1 million land parcels. It includes the vast majority of drainage infrastructure within incorporated and unincorporated areas in every watershed, including 483 miles of open channel, 3,330 miles of underground storm drain, and an estimated 82,000 catch basins. The District includes all of the City of Los Angeles.

U.S. Army Corps of Engineers Los Angeles River Ecosystem Restoration Feasibility Study

The Los Angeles River Ecosystem Restoration Integrated Feasibility Report documents a study that was initiated in 2003 to determine whether there is a federal interest in ecosystem restoration along the Los Angeles River within the City of Los Angeles. The primary purpose of the project is to restore approximately 11 miles of the Los

Angeles River from Griffith Park to Downtown Los Angeles by reestablishing riparian strand, freshwater marsh and aquatic habitat communities and reconnecting the river to major tributaries, its historic floodplain, and nearby regional habitat zones, all while maintaining existing levels of flood risk management. A secondary planning objective is to provide recreational opportunities consistent with the restored ecosystem.

The City of Los Angeles adopted the Los Angeles River Ecosystem Restoration Study on June 20, 2016. The study includes a hydraulic analysis along the proposed project's 11-mile extent that produced a set of floodplain maps. The purpose of this hydraulic analysis is to produce baseline and "with-project" snapshots of potential impacts that an ecosystem restoration plan might have on the flood conveyance capacity of the river. The resulting floodplain from this study is different from that on the currently effective FEMA FIRM for the City of Los Angeles. This study is the basis for a future proposed FIRM being considered by FEMA and is considered to be "preliminary" as of this plan update process. This preliminary data was used in conjunction with the flood extent and location data from the current effective FIRM, dated December 21, 2018, for the flood risk analysis for this plan update.

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 the City of Los Angeles. Table 4-4 summarizes the administrative and technical capability. Table 4-5 summarizes fiscal capability. Table 4-6 summarizes the City's standing in various risk-related national programs. Table 4-7 summarizes the City's participation in flood-related national programs. These programs rank and evaluate the City's capabilities to implement flood hazard reduction programs such as building code enforcement and flood warning and response activities. The community's adaptive capacity for the impacts of climate change is presented in Table 4-8.

Table 4-3. Legal and Regulatory Capability

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated
CODES, ORDINANCES & REQUIREMENTS				
Building Code	Yes	No	No	Yes
Comment: City of Los Angeles Municipal Code, Chapter IX, Article I, Amended by Ordinance No. 185,198, effective 11/22/17				
Zoning Code	Yes	No	No	Yes
Comment: City of Los Angeles Municipal Code, Chapter I, Article 2 and Article 3, Amended by Ordinance No. 184,766, effective 3/27/17				
Subdivisions	Yes	No	No	No
Comment: City of Los Angeles Municipal Code, Chapter I, Article 7, Added by Ordinance No. 122,064, effective 6/14/62				
Post-Disaster Recovery	Yes	No	No	No
Comment: City of Los Angeles, Administrative Code, Division 8, Chapter 3, Section 8.61 Amended by Ordinance No. 179,421, effective 1/19/08				
Real Estate Disclosure	No	No	No	Yes
Comment: State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1002.6c)				
Growth Management	Yes	No	Yes	Yes
Comment: City of Los Angeles Municipal Code, Article 1.5, Section 11.5.6 General Plan, Amended by Ordinance 173,268, effective 7/1/00, Operational 7/1/00. Other jurisdictional authority is with the Southern California Association of Governments				
Site Plan Review	Yes	No	No	No
Comment: City of Los Angeles, Municipal Code, Chapter I, Article 6.1, Section 16.05, Renumbered and amended by ordinance No. 166,127, effective 9/23/90. Operational 10/13/90				
Stormwater Management	Yes	No	Yes, Los Angeles County	Yes
Comment: City of Los Angeles Municipal Code, Chapter VI, Article 4.4, Section 64.70, Article and Section added by Ord. No. 181,701, EFF. 6/12/11				
PLANNING DOCUMENTS				
General Plan	Yes	No	No	Yes
Comment: Consists of a Framework, 10 citywide elements, and land use elements for 35 planning areas, effective through 2040. This plan is currently being updated by the City Planning Department				
Capital Improvement Plan	Yes	No	No	No
What types of capital facilities does the plan address? City buildings and projects (fire facilities/fire stations, animal shelters, police facilities, seismic retrofit program of bridges, construction projects such as neighborhood city halls, Chicago Building, Police SID Tech Lab, El Pueblo Capital Program, youth recreational and cultural facilities, street and transportation projects, clean stormwater, recharge groundwater and provide cleaner beaches projects, zoo exhibits). Public housing, community investments.				
Comment City of Los Angeles Capital Improvement Program, 2008-2009 – 2012-13 (last version available online)				
Economic Development Plan	Yes	No	No	No
Comment: City of Los Angeles Citywide Economic Development Strategy, August 28, 2018				
Floodplain Plan	Yes	No	No	No
Comment: City of Los Angeles Floodplain Management Plan, adopted 2015, to be replaced by the FMP2020				
Stormwater Plans	Yes	No	Yes	Yes
Comment: Standard Urban Stormwater Mitigation Plan, adopted by the State Regional Water Quality Control Board in 2000, Enhanced Watershed Management Plan 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				

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated
Habitat Conservation Plan	No	No	No	No
Comment: Conservation Element within the City of Los Angeles General Plan. Also see City of Los Angeles Master Plan 2035				
Shoreline Management Plan	Yes	No	No	Yes
Comment: Local Coastal Program Land Use Plan. Venice is undergoing an update as of this plan update process.				
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	No	No	Yes
Comment: Emergency Operation Master Plan and Procedures, November 2017				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: The City Council has provided for the preservation of the City government in the event of an emergency (City of Los Angeles Administrative Code, Section 8.25), The alternates to key positions in the regular departments and agencies of government, or of business and industry, are shown in the City's Continuity of Operations/Continuity of Government Plan, department emergency plans, and executive or administrative orders or the equivalent issued by department or agency authorities.				
Post Disaster Recovery Plan	Yes	No	No	No
Comment: Annex to the Emergency Operations Master Plan, Recovery and Reconstruction Plan, June 2018				
Threat & Hazard Identification & Risk Assessment	Yes	No	No	Yes
Comment: Los Angeles / Long Beach Urban Area Security Initiative				
Resilience/Sustainability Plans				
Resilient Los Angeles (100RC Resilience Plan)	Yes	No	No	No
Comment: A plan that includes strategies to help the City fortify its infrastructure, protect its economy, and make the city safer. Plan developed pursuant to the 100RC program				
The Sustainable City pLAn 2019 (Green New Deal)	Yes	No	No	No
Comment: The City's commitment to the Paris Climate Agreement and to act urgently with a scientifically driven strategy for achieving a zero carbon grid, zero carbon transportation, zero carbon buildings, zero waste, and zero wasted water.				

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	Department of City Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Department of Building and Safety
Planners or engineers with an understanding of flooding hazards	Yes	Department of Public Works, Bureau of Engineering and Bureau of Sanitation Department of City Planning
Staff with training in benefit/cost analysis	Yes	Can contract for
Floodplain manager	Yes	Department of Public Works, City Engineer
Surveyors	Yes	City of Los Angeles Survey Division
Personnel skilled or trained in GIS applications	Yes	Various, including Bureau of Engineering and City Planning
Scientist familiar with flooding hazards in local area	Yes	Department of Public Works and Department of Planning
Emergency manager	Yes	Emergency Management Department, General Manager
Grant writers	Yes	Department of City Planning can assign planners to complete grant applications

Table 4-5. Fiscal Capability

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	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	08/19/2014
Building Code Effectiveness Grading Schedule	Yes	2/2	2014
StormReady	Yes	N/A	January 27, 2012
TsunamiReady	Yes	N/A	January 27, 2012

Table 4-7. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Department of Public Works, Bureau of Engineering
Who is your floodplain administrator? (department/position)	City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date of adoption of your flood damage prevention ordinance?	Ordinance No. 172081, Effective July 3, 1998
What is the date of your current Effective FIRM?	December 21, 2018
When was the most recent Community Assistance Visit or Community Assistance Contact?	December 4, 2019 by California DWR
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, please state what they are	Findings from December 2019 Community Assistance Visit were still pending as of this planning effort.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, please state why.....	No Current flood hazard maps may not have adequately addressed the flood risk within our jurisdiction especially for the area adjacent to the Los Angeles River according to recent studies by the U.S. Army Corps of Engineers. City is working with the Corps in filing a Los Angeles River letter of map revision (LOMR) with FEMA to update the current flood hazard maps in the Upper Los Angeles River near Glendale Narrow area. This LOMR was still being processed through coordination between FEMA Region IX and the City as of this plan update. All data associated with this LOMR is considered to be preliminary and will not be viewed as effective until accepted and approved by FEMA Region IX. Hillsides in the Santa Monica Mountains are also not adequately addressed, with repetitive loss areas not recognized by FEMA.
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?	Yes Annual refresher training courses are needed to help bring the flood management staff up to speed on the latest info and requirements in NFIP. Classes include but are not limited to "Floodplain Management and the Duties of the Local Administrator," "Elevation Certificate Review," "CRS Coordinator Manual Overview," "How to prepare for a Community Assistance Visit as well as a Cycle Verification Visit," etc.
Does your jurisdiction participate in the Community Rating System (CRS)? • If so, is your jurisdiction seeking to improve its CRS Classification?.....	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a]	9,801
What is the insurance coverage in force?	3,033,027,000
What is the premium in force?	$6,102,259
What is the average cost of a flood insurance policy?	$637
How many total loss claims have been filed in your jurisdiction?[a]	3,663
What were the total payments for losses?	$20,202,364
What is the average claim paid?	$5,515

a. According to FEMA statistics as of 7/31/2019 (https://www.fema.gov/policy-claim-statistics-flood-insurance)

Table 4-8. Adaptive Capacity for Climate Change

Adaptive Capacity Assessment Question	Jurisdiction Rating
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts	Medium
Comment: *This hazard mitigation plan has provided the City with a better understanding*	
Jurisdiction-level monitoring of climate change impacts	Low
Comment: *None provided.*	
Technical resources to assess proposed strategies for feasibility and externalities	Low
Comment: *None provided.*	
Jurisdiction-level capacity for development of greenhouse gas emissions inventory	Low
Comment: *None provided.*	
Capital planning and land use decisions informed by potential climate impacts	Low
Comment: *None provided.*	
Participation in regional groups addressing climate risks	Medium
Comment: *None provided.*	
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes	Medium
Comment: *None provided.*	
Identified strategies for greenhouse gas mitigation efforts	Medium
Comment: *None provided.*	
Identified strategies for adaptation to impacts	Medium
Comment: *None provided.*	
Champions for climate action in local government departments	Low
Comment: *None provided.*	
Political support for implementing climate change adaptation strategies	Medium
Comment: *None provided.*	
Financial resources devoted to climate change adaptation	Low
Comment: *None provided.*	
Local authority over sectors likely to be negative impacted	Low
Comment: *None provided.*	
Public Capacity	
Local residents knowledge of and understanding of climate risk	Low
Comment: *None provided.*	
Local residents support of adaptation efforts	Low
Comment: *None provided.*	
Local residents' capacity to adapt to climate impacts	Low
Comment: *None provided.*	
Local economy current capacity to adapt to climate impacts	Low
Comment: *None provided.*	
Local ecosystems capacity to adapt to climate impacts	Low
Comment: *None provided.*	

City of Los Angeles 2020 Floodplain Management Plan

PART 2—RISK ASSESSMENT

5. RISK ASSESSMENT METHODOLOGY

5.1 PURPOSE OF RISK ASSESSMENT

This part of the FMP2020 evaluates the risk of the flood hazard in the City of Los Angeles (CRS Step 5). 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 the potential damage from the natural hazard and associated costs.

The risk assessment describes the flooding hazard, the City'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
    - 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
    - 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.
- 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 City is preparing a separate Repetitive Loss Area Analysis in accordance with Section 512.b of the 2013 CRS Coordinators Manual. This document will be a companion document to this FMP2020.

At the request of the Steering Committee, risk assessment results for the FMP2020 were divided by Area Planning Commission (APC). APCs are defined and shown in Section 2.2.

5.2 RISK ASSESSMENT APPROACH

5.2.1 FEMA's Hazus Software

Overview

FEMA's standardized Hazards U.S. (Hazus) model estimates losses caused by earthquakes, hurricanes and floods. 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. The use of Hazus for floodplain management 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 floodplain management efforts evolve.
- Facilitates FEMA review of floodplain management 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.

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 results in this plan are not intended to be precise estimates of damage after a hazard event. They represent generalized estimates of damage that may occur as the result of a modeled scenario, based on the available data. The costs presented are sufficiently accurate for comparison among results in a planning document such as this floodplain management plan.

Levels of Detail for Evaluation

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.

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). Replacement cost is calculated using the RS Means square foot cost for a structure, which is based on the Hazus occupancy class (e.g., multi-family residential, commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. For single-family residential, the construction class and number of stories are also factored 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. The provisional analysis prepared by the Corps of Engineers in support of the City's request for a Letter of Map Revision (LOMR) on portions of the Los Angelese River in 2017 was used to augment the hazard mapping. This data is considered to be preliminary as of this plan update as it has not yet been accepted or approved by FEMA through the letter of map correction process. 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—2014-2018 American Community Survey 5-Year Estimates[a]	U.S. Census Bureau	2018	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
U.S. Army Corps of Engineers Analysis of LA River in support of LOMR request by the City (Preliminary Data)	Corps of Engineers	2017	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

a. Note that the population data used for the risk assessment is different from the 2019 State of California population estimate for Los Angeles that is presented in Chapter 3 of this plan. The 2018 U.S. Census data used for risk analysis is less current than the state estimate, but it provides more detailed data on the distribution of population across the planning area. The state's 2019 estimate is only a single value for the entire City.

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 the FMP2020, depth grids were prepared for multiple 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:

- **HEC-GeoRAS—**The most detailed flood mapping datasets were combined 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 base (100-year) flood elevations for a floodplain but had no other data available. These could be FEMA AE flood zones or A flood zones (100-year flood zones determined by approximate methods) or zones mapped by local districts. 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 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 flood zones with little or no mapping data. This includes FEMA A zones and 500-year zones. Flood zone boundaries were assumed to be accurate and were intersected with the ground surface. This approach assumed that the elevation along the flood zone boundary marked the water surface elevation edge. The boundary was interpolated to 3D and it was converted to a water surface grid. This grid was then intersected with the ground surface within the boundary to create flood depth grids. FEMA does not produce 500-year flood extents for all profiles mapped on a FIRM. To avoid a misrepresentation of the 500-year flood risk, this assessment assumed that the 500-year flood extent would be at least that represented by the 100-year flood extent, when 500-year profiles were not provided by FEMA.
- **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 hazard areas are included in the FMP2020 as a general indication of areas exposed to the flood hazard. Mapping in the FMP2020 does not provide enough accuracy to assess the hazard risk to individual properties, but such detailed mapping has been developed and is maintained by the City of Los Angeles as well as Los Angeles County. Flood inundation mapping can be accessed at the following websites:

- The City of Los Angeles' "Navigate LA" website (https://navigatela.lacity.org/navigatela/)
- The Los Angeles County website (http://dpw.lacounty.gov/wmd/floodzone/)

5.2.5 Limitations

Loss estimates, exposure assessments and hazard-specific 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 natural 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.

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. Flood Types and Areas in Los Angeles

Because of the diversity of factors that contribute to flooding, there is no single type of flood or single area most susceptible to the flood risk. Many types of flooding occur in Los Angeles and many areas of the City are affected, for a range of reasons. The following sections describe the primary flood types and flood hazard areas in the City of Los Angeles. Most flooding types and areas are discussed in the flood hazard profile and risk assessment in 7. A profile and a risk assessment of the dam failure hazard are provided in 8. A profile and a risk assessment of the tsunami hazard are provided in 9.

6.1 FEMA Special Flood Hazard Areas

Special flood hazard areas (SFHAs) are defined in the September 26, 2008 Digital Flood Insurance Rate Map for Los Angeles County. These areas include the following:

- **Areas of Shallow Flooding—**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.
- **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 event without increasing flood levels.
- **Alluvial Fan Flooding—**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—**SFHAs along coasts are subject to inundation by the 100-year flood with the additional hazards associated with storm waves.

6.2 Non-SFHA Hillside Areas

The City of Los Angeles has hillside areas (slopes of 6 percent or greater) that have not been mapped as SFHAs but are subject to flood hazards. These include water courses that may appropriately belong among the City's regulated water courses, as well as water courses and mud and debris flow areas that have yet to be mapped.

6.3 Non-SFHA Shallow Flooding Areas

Flooding records indicate non-hillside areas across the City that have experienced multiple occasions of shallow flooding. Such flooding may be caused by clogged or undersized drains, catch basins or water courses, or poor surface drainage patterns on streets or property.

6.4 Non-SFHA Urban Drainage Flood Areas

Pipes, roadside ditches, channels and roadways serve as drainage facilities in urbanized areas. Urban drainage flooding occurs when these conveyance systems lack the capacity to convey runoff to nearby creeks, streams and

rivers. The key factors that contribute to urban drainage flooding are rainfall intensity and duration and the design and maintenance of drainage facilities. Topography, soil conditions, urbanization and groundcover also play important roles. Many portions of the City are subject to this type of flooding. This type of flooding is the predominant contributor to repetitive flood loss in the City.

6.5 FLASH FLOODING

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 extreme heat. Such events usually include deposition of large amounts of sediment transported from the denuded hillsides.

6.6 NON-SFHA COAST AREAS

Coastal areas are susceptible to several flood hazards, regardless of whether they are within the SFHA:

- **Storm Surge Areas—**A storm surge occurs when the ocean level increases above the normal astronomical high tide due to wind, low barometric pressure, storms coinciding with astronomical high tide, or the configuration of the shoreline.
- **Coastal Erosion Areas—**Coastal erosion is generally associated with storm surges, hurricanes, windstorms, and flooding. It may be exacerbated by construction of seawalls, groins, jetties or navigation inlets, boat wakes, dredging and other interruption of physical processes.
- **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.

6.7 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 and earthquakes 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.

6.8 SYSTEM-FAILURE-RELATED FLOOD HAZARD AREAS

6.8.1 Dam and Storage Tank Inundation Areas

The failure of water-holding dams and storage tanks can cause inundation of downstream properties. 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.

6.8.2 Power-Failure-Induced Flooding Areas

Power-failure-induced flooding would result from a loss of power at the City's stormwater pump stations that drain low-lying areas. The City operates and maintains 18 stormwater pumping plants. The Bureau of Sanitation

maintains an updated inventory of the pumping plants with emergency generators. Most of the pumping plants have permanent backup power generators installed. For pumping plants that do not have permanent backup generators, portable generators located at the nearest District yards can be brought into service rapidly. Portable generators are strategically located at the six District yards (South, Harbor, North, Venice, West Los Angeles, and North Hollywood Districts).

6.8.3 Levee Failures

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. Seismic activity can impact levees as well, especially those constructed on the softer soils that are typical of floodplains. Lack of adequate and regular maintenance to correct these problems also contributes to levee failure. Most failures are composites of several of these factors.

Figure 6-1 shows the levees with greater than 25-year protection that would cause flooding in developed areas of the City of Los Angeles should they be overtopped. This map also shows levees that have been accredited by FEMA and therefore do not represent a flood hazard. There are 7.82 miles of levees in the City of Los Angeles that provide protection against floods of 25-year or greater magnitude. Fewer than half of these levee systems have been certified as meeting FEMA levee accreditation criteria. The Army Corps of Engineers has jurisdiction over 83 percent of the levee systems; the remainder are under the jurisdiction of the Los Angeles County Flood Control District. None of these levees are under the jurisdiction of the City.

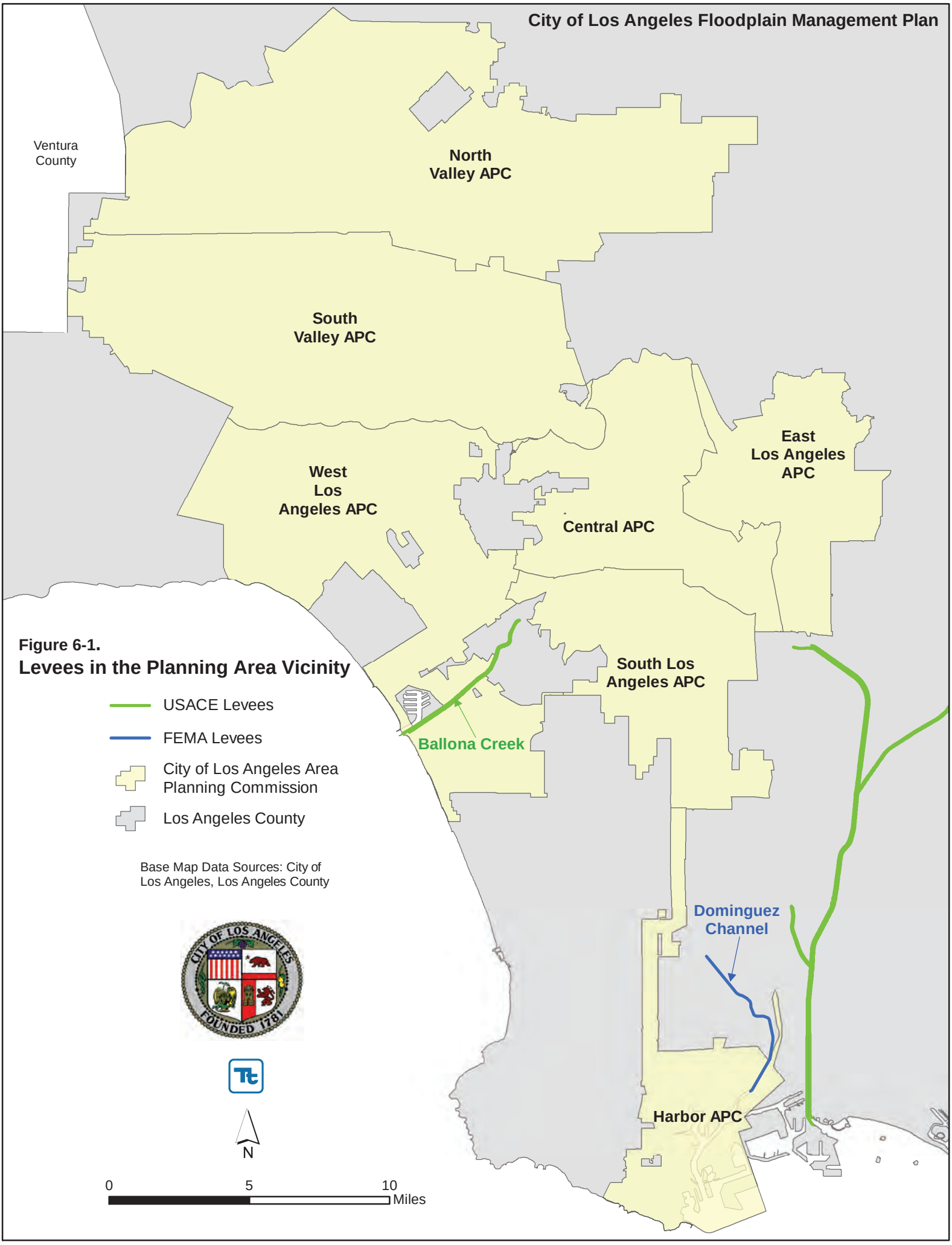

Figure 6-1.
Levees in the Planning Area Vicinity

7. Flood Profile and Risk Assessment

7.1 GENERAL BACKGROUND

7.1.1 What Is a Floodplain

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 unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Floodplain 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.

7.1.2 Measuring Floods and Floodplains

The frequency and severity of flooding are 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 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 same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used as the regulatory boundary by many agencies. Also referred to as the special flood hazard area

DEFINITIONS

Flood—The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Floodplain—The land area along the sides of a river that becomes inundated with water during a flood.

Flood Control System—A system of open channels, flood control basins, storm drains, catch basins, culverts, low-flow diversion structures, pump stations, debris basins, detention basins, and spreading grounds developed to protect the citizens of Los Angeles from flooding.

100-Year (1-Percent-Annual-Chance) Floodplain—The area flooded by the flood that has a 1-percent chance of being equaled or exceeded in a given year. The 1-percent-annual-chance flood is the standard used by most federal and state agencies.

500-Year (0.2-Percent-Annual-Chance) Floodplain —The area flooded by the flood that has a 0.2-percent chance of being equaled or exceeded in a given year.

Regulated Floodway—Channel of a river or other water course and adjacent land areas that must be reserved for discharge of the base flood without cumulatively increasing water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure no increases in upstream flood elevations.

Riparian Area—The area along the banks of a natural watercourse.

(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 base 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.

7.1.3 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate 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 valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

7.1.4 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.

7.2 HAZARD PROFILE

7.2.1 Principal Flooding Sources in Los Angeles

In southern California, most flooding is the result of heavy precipitation over one or two days. Short streams and steep watersheds emptying onto lowlands that may be heavily populated produce large volumes of water in 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 (Western Regional Climate Center, 2014).

Four primary watersheds cover the City of Los Angeles: the Los Angeles River, the Santa Monica Bay, Ballona Creek and the Dominguez Channel. The Los Angeles River is the major watercourse that drains the San Gabriel Mountains. Its watershed covers a land area of over 834 square miles, including the eastern portions of the Santa Monica Mountains and portions of the San Gabriel Mountains in the west. The Los Angeles River is 51 miles long from its headwaters to its mouth. The lowermost 32 miles of the river flow through the City of Los Angeles.

The Los Angeles River originates at the west end of the San Fernando Valley in the northwest corner of Los Angeles County. The river channel extends east to Glendale, where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, and debris collection basins built by the Los Angeles County Flood Control District and the U.S. Army Corps of Engineers to minimize flooding in the county. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence and then

passes through the cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach on the way to its terminus at the Pacific Ocean.

7.2.2 Major Flood Events

Federal Disaster Declarations

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 15 flooding events since 1969 for which federal disaster declarations were issued, as summarized in Table 7-1.

Table 7-1. History of Los Angeles County Flood Events With Federal Disaster Declarations

Date	Declaration #	Type of event
12/04/2017 – 01/31/2018	DR-4353	California wildfires, flooding, mudflows, and debris flows
1/18 – 1/23/2017	DR-4305	Severe winter storms, flooding, and mudslides
1/17 – 2/6/2010	DR-1884	Severe winter storms, flooding, and debris and mud flows
2/16 – 23/2005	DR-1585	Severe storms, flooding, landslides, and mud and debris flows
12/27/2004 – 1/11/2005	DR-1577	Severe storms, flooding, debris flows, and mudslides
2/2 – 4/30/1998	DR-1203	Severe winter storms, and flooding
2/13 – 4/19/1995	DR-1046	Severe winter storms, flooding landslides, mud flow
1/3 – 2/10/1995	DR-1044	Severe winter storms, flooding, landslides, mud flows
1/5 – 3/20/1993	DR-979	Severe winter storm, mud and landslides, and flooding
2/10-18/1992	DR-935	Rain/snow/wind storms, flooding, mudslides
1/17-22/1988	DR-812	Severe storms, high tides and flooding
1/21 – 3/30/1983	DR-677	Coastal storms, floods, slides and tornadoes
1/8/1980	DR-615	Severe storms, mudslides and flooding
2/15/1978	DR-547	Coastal storms, mudslides and flooding
1/26/1969	DR-253	Severe storms and flooding

Source: FEMA, 2020b

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. Still, many flood events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for flooding.

The planning area also has received at least 11 disaster declaration for wildfire since 1969. History has shown that the planning area's risk to flooding is increased in areas that have been burnt by wildfires. Several of the flood events depicted in Table 7-1 can be attributed to post-fire conditions.

Major Historical Events

January 2018 Winter Storms and Mudslides

A winter storm in January 2018 led to mudslides and debris flows that killed at least 17 people, according to the New York Times. Estimated rain and snow amounts in the southern part of the state between January 6 and 11

ranged from 150 to 400 percent of normal. Mudslide conditions were exacerbated by wildfires that had occurred in the region in December 2017.

January 18-23, 2017 Winter Storms

A series of storms pounded Southern California, including one that dropped nearly 2.5 inches of rain in 3 hours. It caused roads to be flooded, homes to be threatened by mudslides, and traffic to become clogged on many freeways and surface streets. According to the Los Angeles Department of Water and Power, at least 10,000 customers were without power.

Hurricane Marie (2014)

Hurricane Marie, which occurred in August 2014, is tied as the sixth-most intense Pacific hurricane on record, attaining a barometric pressure of 918 mbar. 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. Off the coast of Los Cabos, three people drowned after their boat capsized in rough seas. In Colima and Oaxaca, heavy rains from outer bands caused flooding, resulting in two fatalities. Similar effects were felt across Baja California Sur. Toward the end of August, 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

January 18-22, 2010 Winter Storms

A series of storms brought heavy rain, gusty winds and flash flooding to Southern California. Rainfall totals ranged from 4 to 8 inches over coastal areas. Water was chest high in places, which stranded many vehicles and flooded numerous businesses. A secondary impact attributed to these storm events was the Paseo del Mar landslide in November 2011. A build-up of water was largely blamed for the collapse of a stretch of Paseo del Mar after a heavy weekend rainstorm, according to a report from consulting firm Shannon & Wilson Inc.

2004-2005 Flooding Events

National Weather Service records show a total of 37.25 inches of rain at the downtown Los Angeles Civic Center during the rainy season of 2004-2005. This is the second highest recorded seasonal rainfall (the highest was 38.18 inches in 1883-1884). FEMA records indicate over 70 flood insurance claims filed by owners of structures within the city limits. The storms of January 7 - 11, 2005 and a February 17 - 23, 2005 prompted state and federal disaster declarations, with flooding throughout southern California. Widespread mud and debris flows, rock slides, and small stream and urban flooding caused considerable damage to roads and homes. Significant damage reported by the Bureau of Engineering included the following:

- 25th Street filled with mud and debris. Cars were trapped when drivers misjudged the level of the water.
- Approximately 20,000 cubic yards from Tujunga Avenue north of Strathern Street washed out into an adjacent gravel pit, resulting in a hole about 200 feet long, 100 feet wide, and 30 feet deep.
- Homeowners were evacuated when Laurel Canyon and Coldwater Canyon experienced debris and rock slides.

Approximately 80 homes in Los Angeles were red-tagged (no one was allowed back in). According to local newspaper accounts, nine people died, including two deaths caused by mud and rock slides and a City of Los Angeles employee who died responding to the Tujunga Avenue sinkhole.

2003-2004 Flooding Events

On November 12, 2003, 5.6 inches of precipitation fell during a 4-hour period over the Watts area of Los Angeles and portions of the City of Carson. According to the County of Los Angeles, the storm represented a 500-year storm event. Runoff far exceeded the design capacity of the storm drain system. The Watts area is not a FEMA-designated 100-year floodplain, so most property owners did not have flood insurance. According to the Los Angeles Department of Building and Safety, 496 buildings were affected and 57 were damaged—one building had structural damage and the others had content damage. In addition to the November 2003 Watts flood, eight FEMA flood claims were reported within the City for other events during the 2003-2004 fiscal year, mostly along hillsides.

1997-1998 El Niño

Noteworthy storm incidents that occurred 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.

7.2.3 Location

The December 21, 2018, Los Angeles County Digital Flood Insurance Rate Maps are FEMA's official delineation of special flood hazard areas for the City of Los Angeles (see Figure 7-1 through Figure 7-7). 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.

These maps are the basis for the exposure and vulnerability analyses presented in this chapter. They represent the best data available at the time of this analysis, but they are not representative of all sources of flood risk described in Chapter 6. Extent and location mapping is not currently available for all flood hazard areas identified; the need for such mapping is identified in the action plan for the FMP2020. Errors in the FEMA mapping were identified during the course of this project. It is not within the scope of the FMP2020 to correct errors in FEMA mapping. However, it does fall within the scope of the FMP2020 to identify corrections of these errors as a recommended mitigation action.

7.2.4 Frequency

The City of Los Angeles experienced significant flooding in 1914, 1916, 1927, 1934, 1938, 1941, 1943, 1952, 1956, 1969, 1978, 1980, 1983, 1993, 1995, 1998, 2005, 2017 and 2018. The historical record indicates that large floods occur infrequently in Los Angeles, but the magnitude of their destruction is enormous, especially as development in the floodplain has increased dramatically. U.S. Geological Survey records indicate that 100-year flood flow in the Los Angeles River Basin was exceeded at the Tujunga Canyon in March 1938 and Topanga and Malibu Creeks in January 1969.

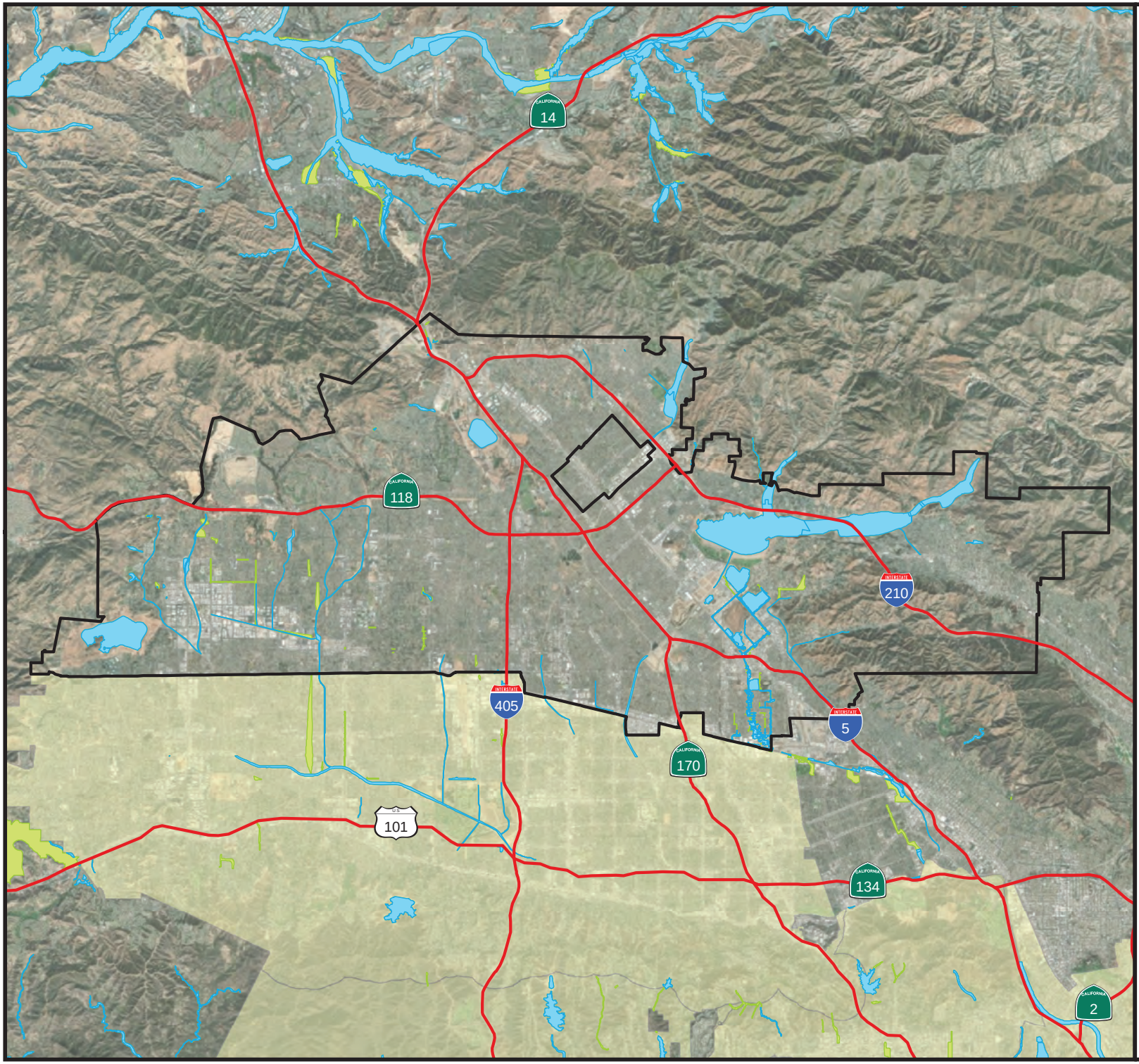

FIGURE 7-1.

Mapped Flood Hazard Areas in North Valley APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

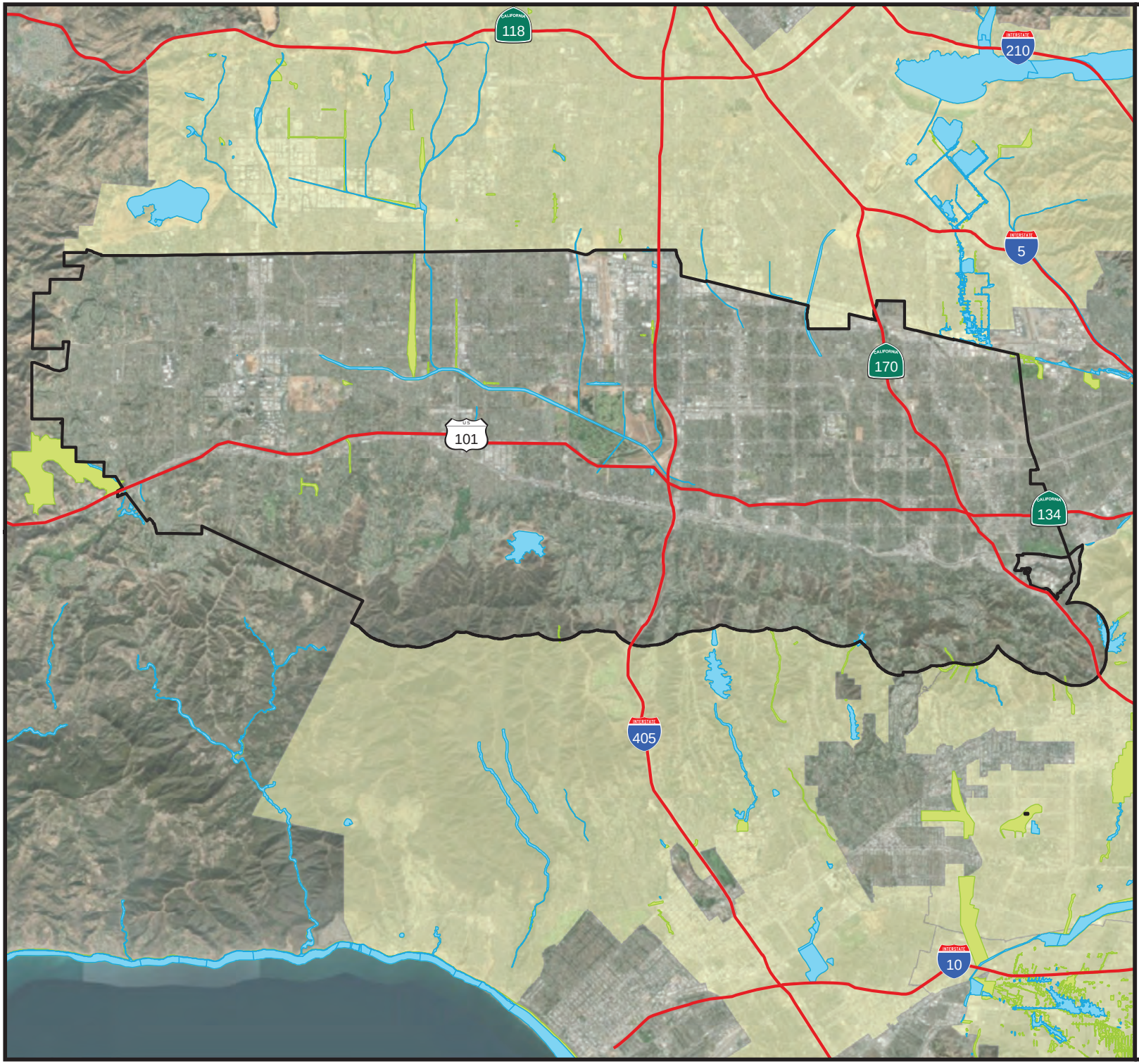

FIGURE 7-2.

Mapped Flood Hazard Areas in South Valley APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

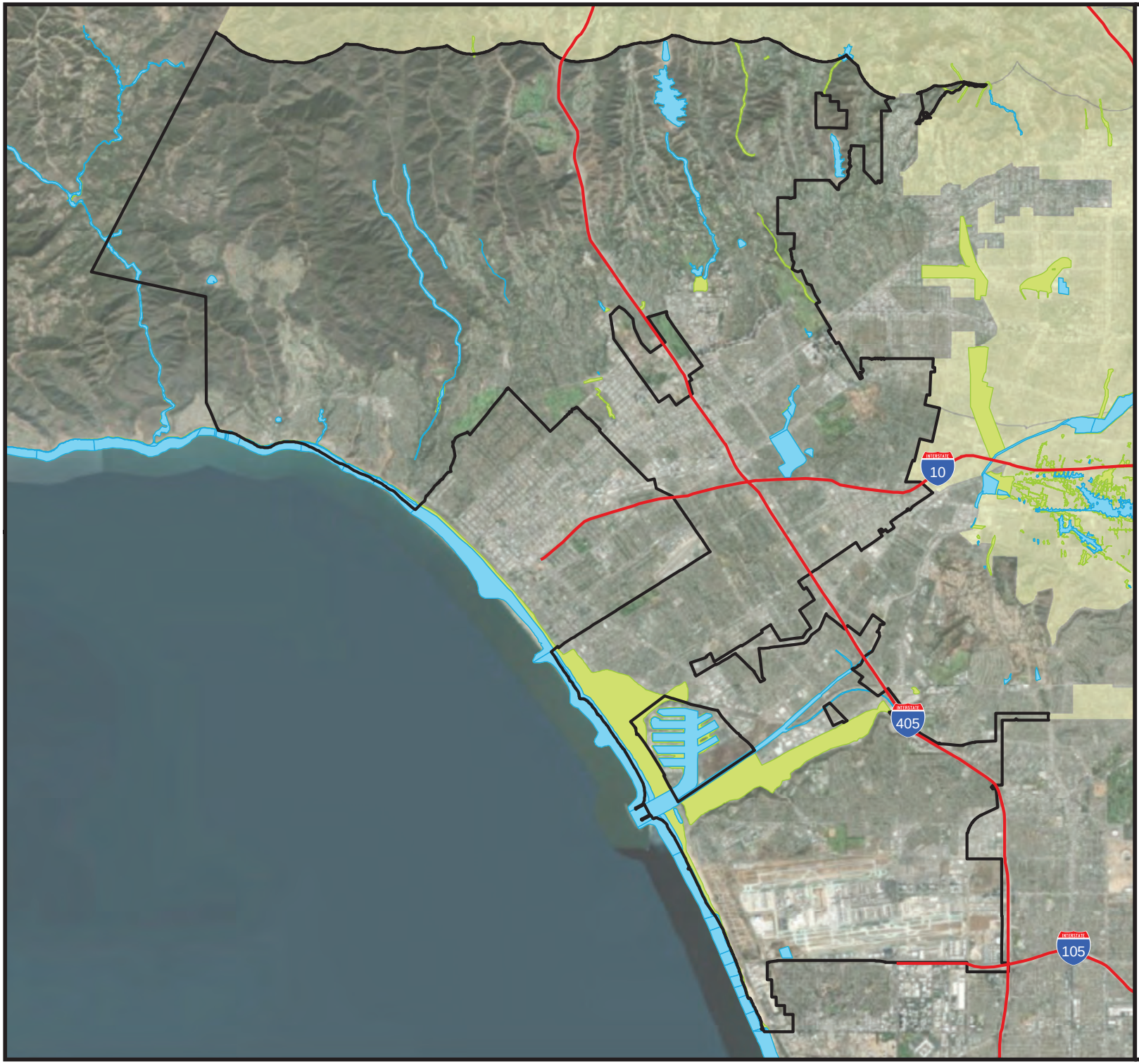

FIGURE 7-3.

Mapped Flood Hazard Areas in West Los Angeles APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

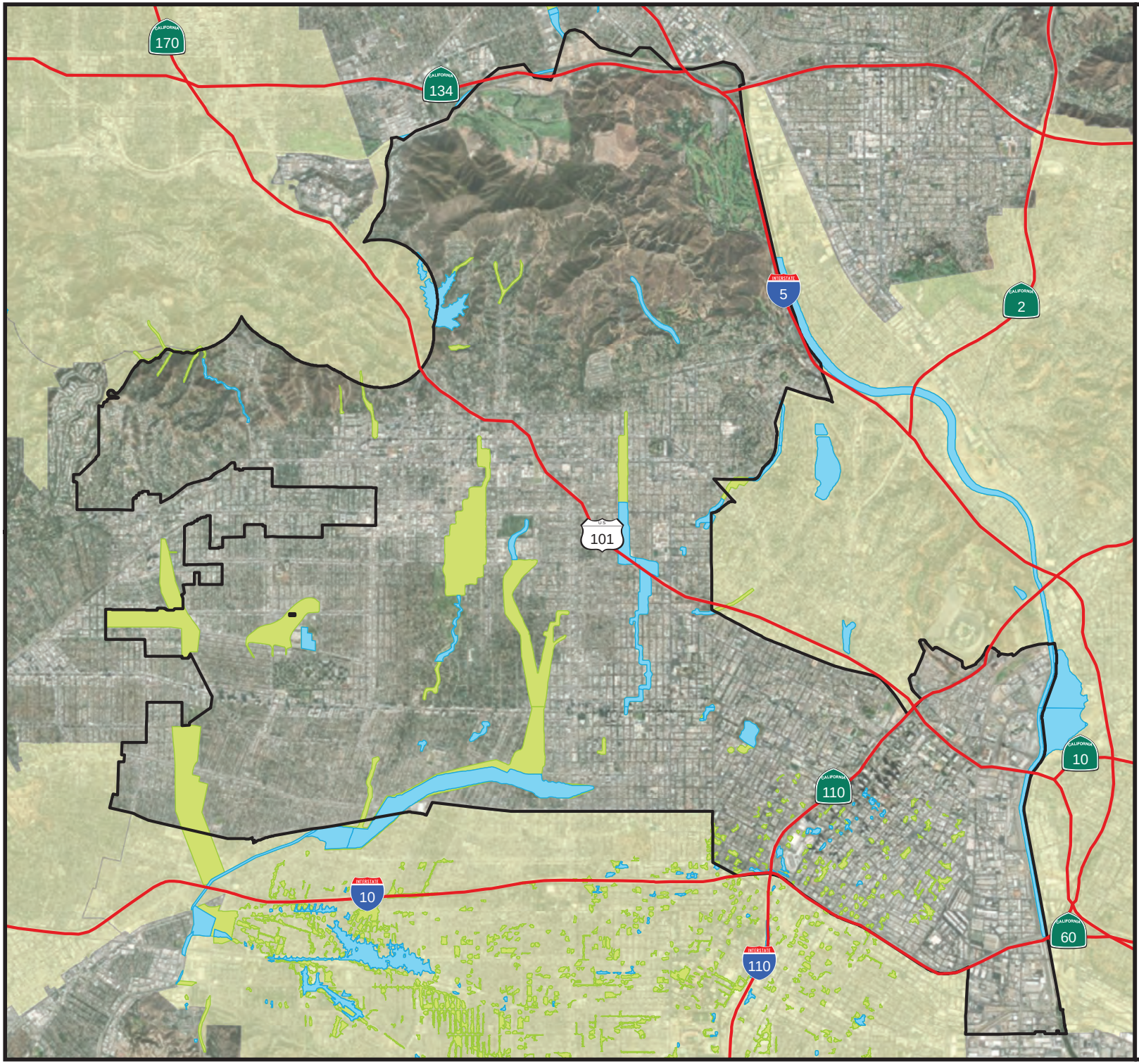

FIGURE 7-4.

Mapped Flood Hazard Areas in Central APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

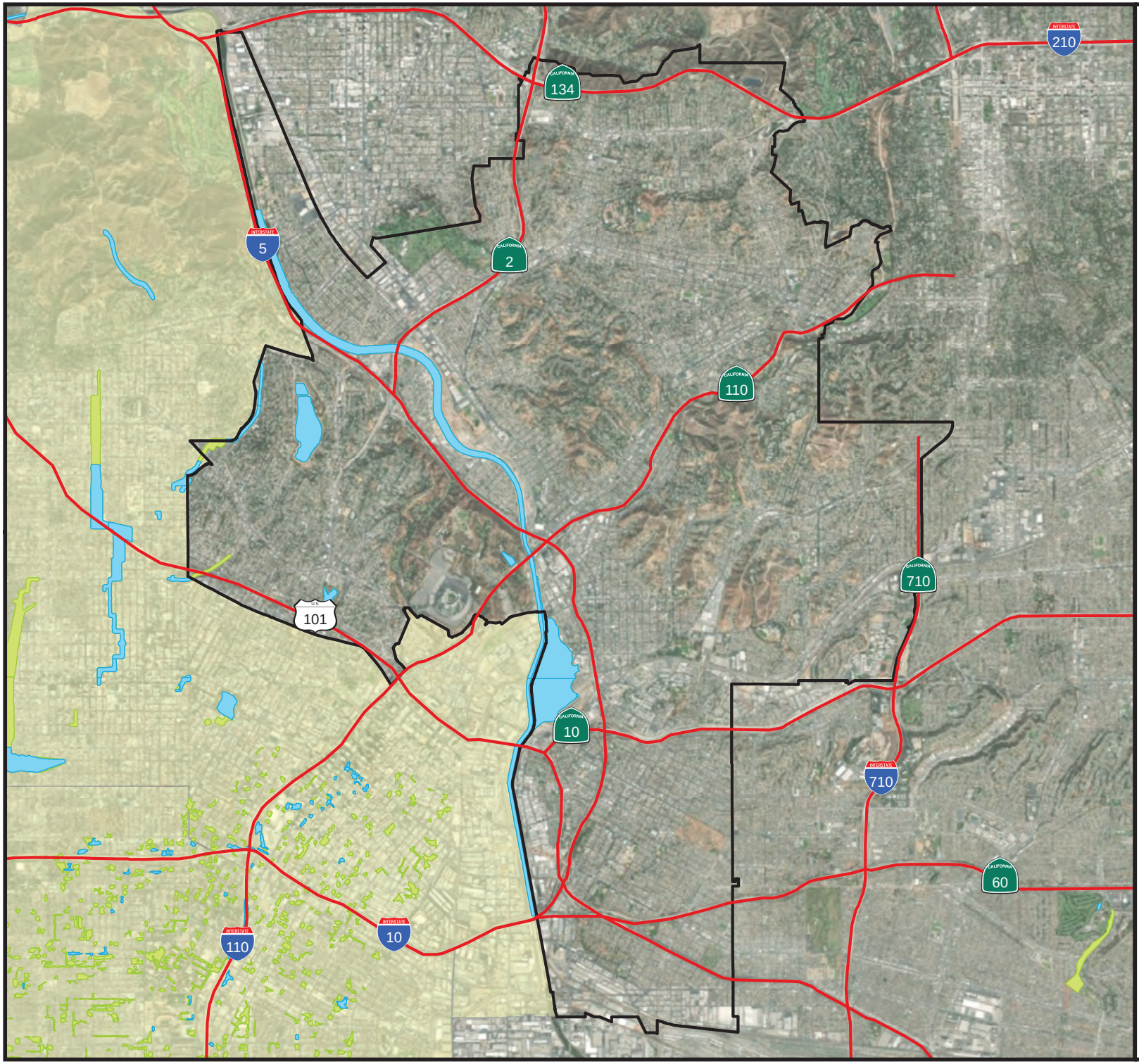

FIGURE 7-5.

Mapped Flood Hazard Areas in East APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,600 feet 1:91,200

Feet
0 5,500 11,000

Meters
0 1,375 2,750

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

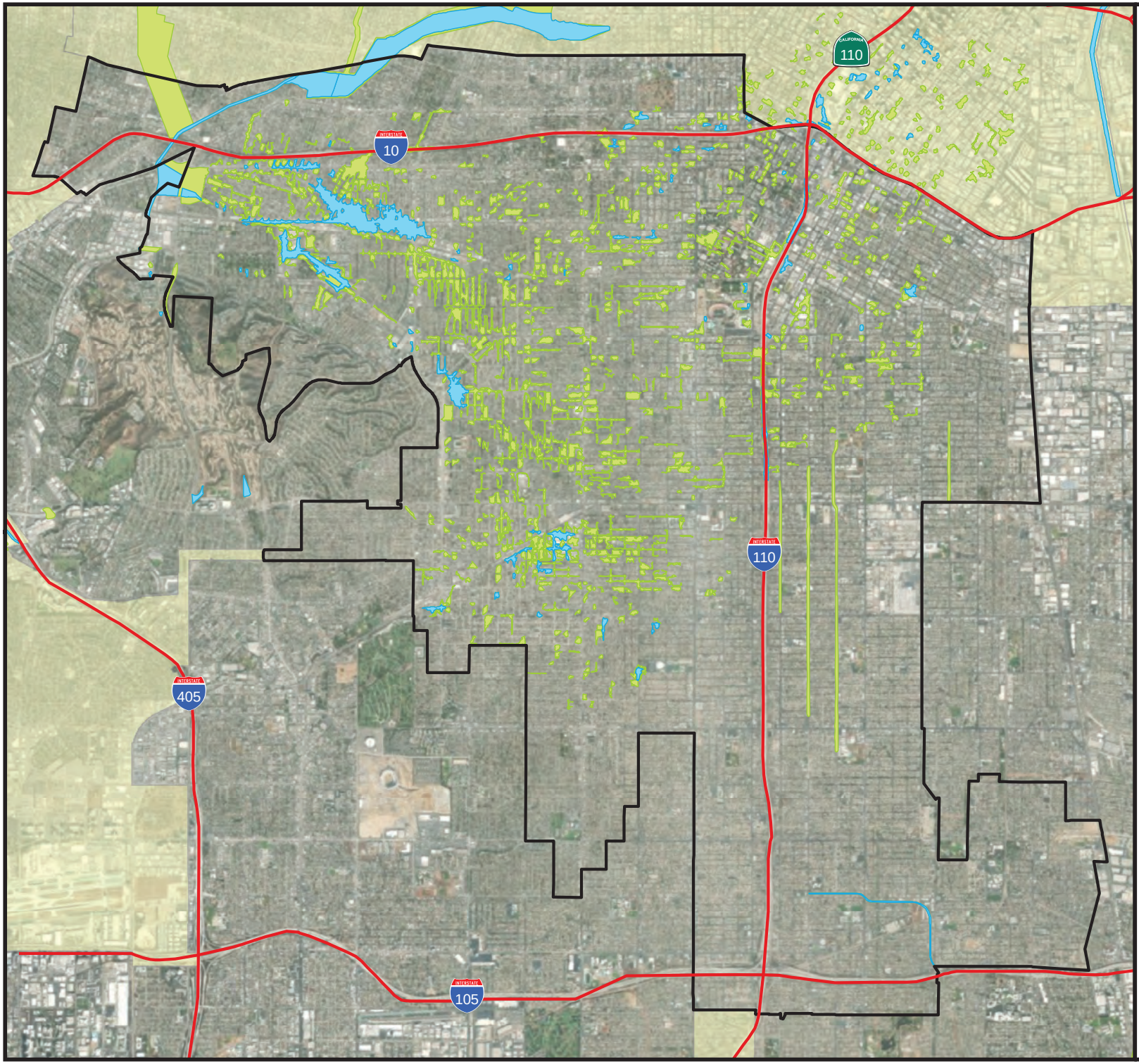

FIGURE 7-6.

Mapped Flood Hazard Areas in South Los Angeles APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 7,000 feet 1:84,000

Feet
0 5,000 10,000

Meters
0 1,250 2,500

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

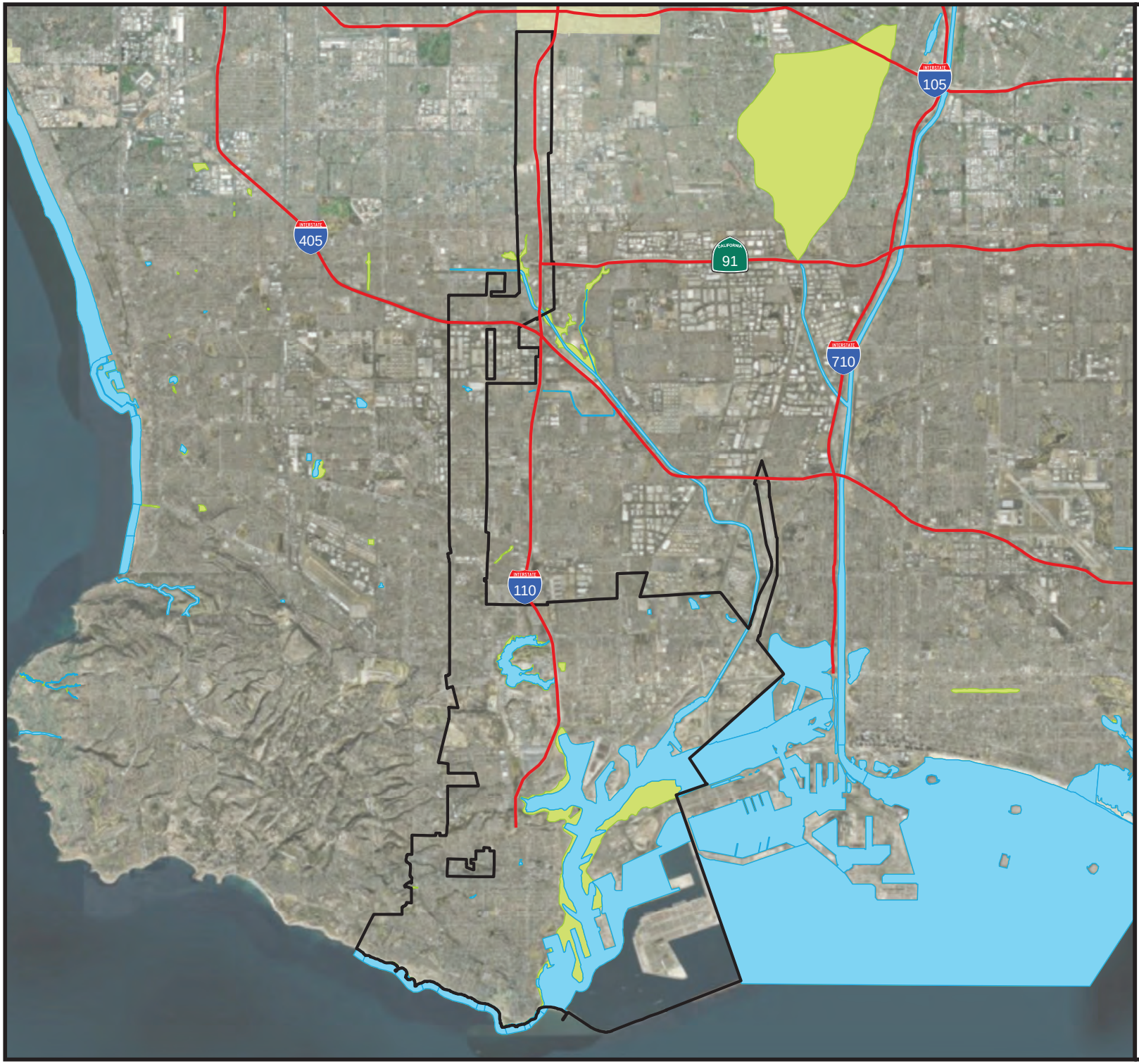

FIGURE 7-7.

Mapped Flood Hazard Areas in Harbor APC

Legend

- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

7.2.5 Severity

The magnitude of destruction from flooding in Los Angeles is significant, especially as development in the floodplain has increased dramatically. The principal factors affecting flood damage 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.

Although jurisdictions can implement mitigation and take preventative actions to significantly reduce severity and threat of flood events, some residual risk will always exist (i.e., risk of a hazard event occurring despite technical and scientific measures applied to reduce/prevent it). Threats associated with residual risk could include failure of a reservoir, a dam breach, or other infrastructure failure, or a severe flood event that exceeds flood design standards or drainage capacity.

The principal factors affecting flood damage are flood depth and velocity. Deeper and faster flood flows cause more damage. 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 7-2 lists peak flows used by FEMA to map floodplains in the City of Los Angeles.

Table 7-2. Summary of Peak Discharges Within the City of Los Angeles

Source/Location	Drainage area (sq. mi.)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Los Angeles River					
At Compton Creek	808	92,900	133,000	142,000	143,000
At Imperial Highway	752	89,400	126,000	140,000	156,000
At Fernwood Ave.	--	--	--	75,200	--
Left Overbank	--	--	--	57,000	--
Right Overbank	--	--	--	18,200	--
At Wardlow Rd	--	--	--	45,400	--
Left Overbank	--	--	--	14,200	--
Right Overbank	--	--	--	31,200	--
Rio Honda					
At Stuart and Gray Rd	132	35,600	41,000	39,300	40,200
At Beverly Blvd.	113	33,800	37,500	38,000	38,400
Outflow from Whittier Narrows Dam	110	33,500	36,500	36,500	36,500
At Beverley Blvd., Left overbank	--	--	--	13,700	--
Stewart/Gray Rd.	--	--	--	2,790	99
Left Overbank	--	--	--	1,395	--
Right Overbank	--	--	--	1,395	--
West Los Angeles					
Balsam Ave./Olympic Blvd.	1.19	290	550	660	940
Manning Ave./Tennessee	3.4	530	1,300	1,700	2,600
Westwood Blvd. and Overland At Exposition Blvd.	4.00	190	1,200	1,500	2,700
Roundtree Rd/ Manning Ave.	0.72	500	740	840	1,100
Harbor District					
Harbor Lake, SE of Vermont Ave.	18.97	3,200	7,000	8,900	14,000
Denker Ave./204th St.	0.28	60	130	170	260

Source/Location	Drainage area (sq. mi.)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Little Tujunga Wash					
3,000 feet upstream of Los Angeles City Limits	17.9	2,273	5,019	6,405	10,022
Hancock Park					
6th St. / Alexandria Ave.	8.09	2,100	4,600	5,900	9,200
Lucerne Blvd./Francis Ave.	0.26	70	160	200	320
Olympic Blvd./Hudson	0.56	130	290	370	570
Western Ave./11th St.	3.48	670	1,300	1,600	2,500
Bronson Ave./Country Club Dr.	18.07	3,700	7,900	9,600	14,000
West Blvd. / Dockweiler St.	18.76	3,600	7,600	9,300	13,600
San Vicente / Pico Blvd.	18.91	3,500	7,400	9,000	13,100
Chesapeake Ave. / Exposition Blvd.	7.97	1,100	2,400	3,000	3,700
Harcourt Ave./ Westhaven St.	0.53	160	350	450	700
Lakeview Terrace					
Little Tujunga Canyon upstream of Foothill Blvd.	20.29	2,700	6,000	7,700	12,200
Kagel Canyon, upstream of Osborne Ave.	2.04	490	1,100	1,400	12,200
Park La Brea					
Wilshire Blvd./Crescent Heights Ave.	6.62	1,500	3,300	4,200	6,600
Orange Dr./Pickford St.	24.67	4,400	9,500	11,800	17,700
Whitworth Dr./La Cienega Blvd.	17.13	3,400	7,600	9,700	15,200
Redondo Blvd./Santa Monica Freeway	1.16	300	670	860	1,300
Redondo Blvd./Roseland St.	14.53	2,000	4,400	5,700	9,100
Houser Blvd./ La Cienega Blvd.	14.76	1,900	4,300	5,500	8,800
Fairfax Ave./La Cienega Blvd.	16.67	2,100	4,700	6,000	9,600
Century City					
Santa Monic Blvd./ Avenue of the Stars	0.49	400	590	700	900
Bel Air Estates					
Stone Canyon Rd south of Somma Way	0.66	480	710	800	1,100
Stone Canyon Rd south of Bellagio Rd	1.02	630	940	1,100	1,400
Beverly Glen Blvd. north of Sunset Blvd.	1.18	700	1,000	1,200	1,600
Brentwood					
North of San Vicente, west of Westgate Ave.	0.21	60	140	180	280
Sunset Blvd./Barrington Ave.	0.24	230	340	390	520
Pacific Palisades					
Rustic Canyon, downstream of Sunset Blvd.	5.67	700	1,500	2,000	3,100
Westchester					
Sepulveda Blvd, north of 74th St	1.39	310	690	880	1,400
Sepulveda Blvd., south of the San Diego Freeway	1.39	310	690	880	1,400
Arizona Ave. north of Arizona Circle	1.65	340	740	950	1,500
Hyde Park					
Halldale Ave./65th St.	1.20	300	660	850	1,300
Wilton Pl/Gage Ave.	3.29	770	1,600	1,900	3,000
Southwest Dr./Van Ness Ave.	4.15	730	1,600	2,100	3,200

Source/Location	Drainage area (sq. mi.)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Sunland					
Big Tujunga Canyon, upstream of Foothill Blvd.	34.57	8,100	24,700	36,500	62,600
Big Tujunga Canyon, upstream of Wheatland Ave.	43.25	9,300	26,800	38,900	66,000
Sylmar					
East side of Golden State Freeway, south of Sierra Hwy	0.22	50	120	150	240
Weldon Canyon, downstream of Sierra Hwy	1.47	410	900	1,150	1,800
Van Nuys					
Victory Blvd./Hayvenhurst Ave.	0.73	90	200	250	390
Porter Ranch					
Mayerling St./Shoshone Ave.	0.19	40	100	120	190
Vicinity of Senson Blvd.	0.10	30	60	70	120
Granada Hills					
Superior St./Paso Robles Ave.	0.53	90	200	260	400
Sepulveda					
Haskell Ave., north of Union Pacific Railroad	1.0	230	500	640	1,000
Chatsworth					
Chatsworth St./Corbin Ave.	0.85	220	480	610	960
Variel Ave./ Chatsworth Ave.	13.43	2,100	4,700	6,000	9,300
Canoga Ave./ Devonshire St.	0.77	230	510	650	1,000
Valley Circle/Lassen St.	0.75	220	480	600	950
Topanga Canyon Blvd./Lassen St.	0.25	50	120	150	230
Santa Susana Pass Rd/Santa Susana Ave.	1.46	450	990	1,300	2,000
Woodland Hills					
Mulholland Dr./Ventura Freeway	2.27	490	1,100	1,400	2,200
Saltillo St./Canoga Ave.	0.32	100	250	300	500
Sherman Oaks					
Magnolia Blvd./Haskell Ave.	1.23	360	800	1,000	1,600

Source: FEMA, 2018

7.2.6 Warning Time

The warning time that a community has to take action to protect lives and property from a flooding threat is a function of the time between the first predictions of heavy rainfall, the first rainfall, and the first occurrence of flooding. Each watershed has unique qualities that affect its response to rainfall. A hydrograph, which is a graph or chart of stream flow in relation to time (see Figure 7-8 and Figure 7-9), 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. At this peak, the stream stage remains at a constant level until it begins to fall and eventually subside to a level below flooding stage. The length of time that floodwaters remain above flood stage is an important characteristic of the flood hazard.

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 river and stream floods can be between 24 and 48 hours. Flash flooding can be less predictable, but communities can be warned in advance of the potential for flash flooding to occur.

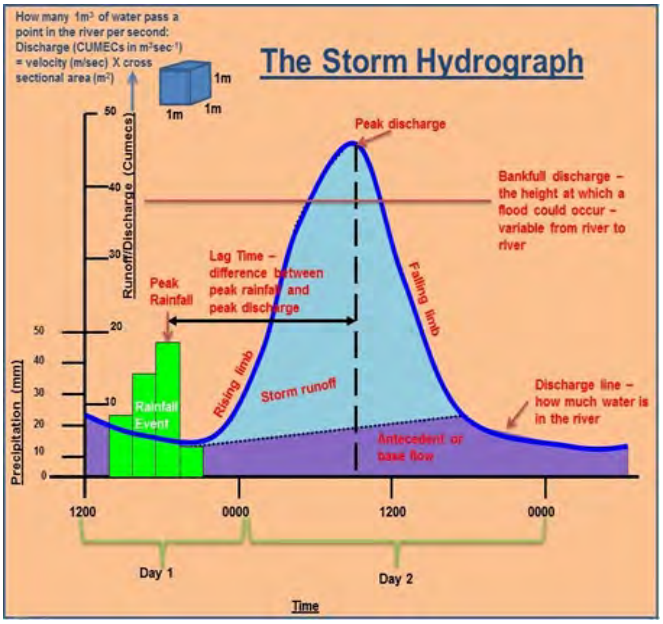

Figure 7-8. Example Hydrograph

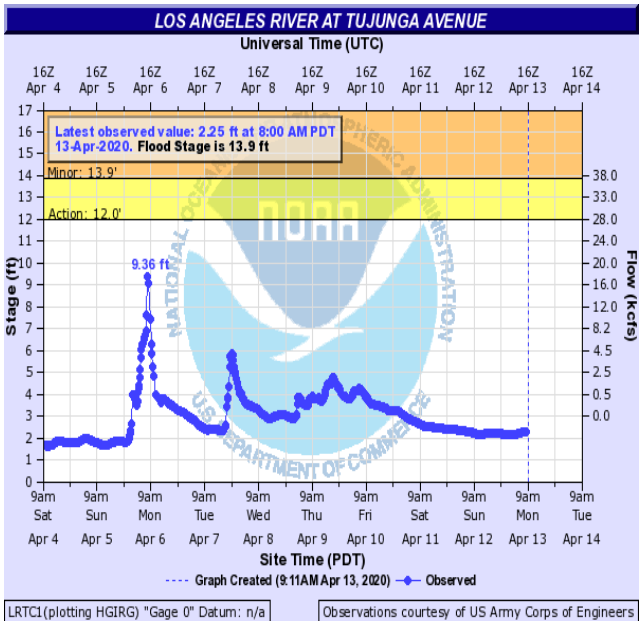

Figure 7-9. Los Angeles River Hydrograph

The National Weather Service (NWS) issues watches and warnings when forecasts indicate rivers may approach bank-full levels. 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.

Los Angeles County is responsible for dissemination of flood warnings to all municipalities within the County. The County's 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 fed into a U.S. Geological Survey forecasting program, which assesses the flood threat based on the amount of flow in the stream (measured in cubic feet per second) (see Figure 7-9). In addition to this program, data and flood warning information is provided by the NWS. All of this information is analyzed to evaluate the flood threat and possible evacuation needs.

7.3 FLOOD CONTROL SYSTEM

As the City of Los Angeles began to grow rapidly in the 1920s and 1930s, rainwater that was once absorbed by miles of undeveloped land began to run off newly paved and developed areas, leading to an increased amount of water flowing into local rivers and creeks. These waterways could not contain the increased amount of water and the region experienced extensive flooding. In response, the U.S. Army Corps of Engineers lined the Los Angeles River and Ballona Creek with concrete and initiated the development of an underground urban drainage system. As the City continued to grow, a complex drainage system developed.

The City of Los Angeles today has an extensive drainage system to protect its citizens and property from flood damage. The primary agencies responsible for flood control in the City are the U.S. Army Corps of Engineers, the Los Angeles County Flood Control District, the City of Los Angeles, and Caltrans. Each agency exercises jurisdiction over its own flood control facilities, which include open flood control channels, flood control basins, storm drains, debris basins, detention basins and spreading grounds.

Typically, City and County storm drains are designed according to criteria identified in a design criteria manual to carry flow from design storms. The combination of storm drain pipe and street conveyance of stormwater typically strives to provide capacity for up to a 25-year storm. Army Corps facilities are typically designed for a 100-year storm (City of Los Angeles, 2010).

7.3.1 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 Mountain, flood channel modifications, and construction of debris basins to trap sediment. In 1936, federal legislation made the Army Corps a participant in Los Angeles County's flood protection program. The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects included the construction of five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties.

These two agencies are responsible for all the major flood control facilities that protect the City of Los Angeles. 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, found at the mouth of canyons, trap debris carried by floodwaters, leaving relatively clean water to flow unimpeded in downstream channels.
- 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
    - Lopez Dam—441 acre-feet
    - Santa Fe Dam—30,887 acre-feet
    - Sepulveda Dam—17,425 acre-feet
    - Whittier Narrows Dam—34,947 acre-feet

  Locally operated facilities include 15 flood control and water supply reservoirs in the upper watershed areas of the LACDA basin. Combined, these local reservoirs have a maximum combined capacity of 109,146 acre-feet. The City of Los Angeles has built recreational facilities at the Hansen Dam and Sepulveda Dam (including golf courses, riding and hiking trails, picnic etc.)

- Improved channels speed the passage of flood flows through local communities and into the main stem river system. Improved tributary channels include Arroyo Seco and Compton Creek.
- Main channel improvements pass the controlled or partially controlled flows to the ocean. The Los Angeles River is improved along most of the reach below Sepulveda Dam; its sides and bottom are generally lined with concrete or grouted rock, except for the natural-bottomed reach between Griffith Park and downtown Los Angeles. Sepulveda and Hansen Dams regulate flows to the main channel of the Los Angeles River.

In total, the LACDA system has over 100 miles of main stem channel, over 370 miles of tributary channels, 129 debris basins, 15 flood control and water conservation dams, and five flood control dams.

7.3.2 City Drainage System

The City of Los Angeles has complemented the LACDA drainage system with a comprehensive network of underground pipes and open channels to prevent local flooding. These local drains collect runoff and carry it

rapidly to the main stem river channels. Most of the storm drain system receives no treatment or filtering and is completely separate from Los Angeles' sewer system.

Runoff drains from streets to gutters and enters the system through catch basins. From there, it flows into underground tunnels that empty into flood control channels that are not under the City's jurisdiction such as Ballona Creek or the Los Angeles River.

7.3.3 Summary

There are more than 2,000 miles of stormwater conveyance network identified in the City. Table 7-3 provides an inventory of all flood control facilities in the City. Eighty-seven percent of the identified stormwater conveyance network is currently operated and maintained by one of four public agencies. Caltrans and the Corps of Engineers are generally responsible for stormwater conveyance systems within their rights-of-way.

Table 7-3. Flood Control System Features in the City of Los Angeles

	City of Los Angeles	Los Angeles County	Caltrans	Corps of Engineers	Private Developer	Unknown
Storm Drains Length (miles)	1,215	619	153	<1	21	284
Open Channels Length (miles)	57	123	3	20	1	27
Number of Lift Stations	11	5	0	0	0	0
Number of Low Flow Diversions	14	28	0	0	0	0
Number of Debris Basins	85	138	0	0	0	0
Number of Dams	0	1	0	3	0	0

Source: DWP, 2018

On average, 764 million gallons per day of stormwater enters the City's drainage area in typical year. After accounting for losses and diversions from streams and channels, 353 million gallons enters the storm drain system for ultimate discharge into the ocean, 353 million gallons is evaporated or is infiltrated into unusable aquifers, and 58 million gallons is infiltrated through permeable areas or in centralized spreading grounds. In the wettest years, the total is 1.64 billion gallons, with the storm drain system discharging 1.04 billion gallons to the ocean. The total is 359 million gallons in the driest years, with 105 million gallons traveling through the storm system to the ocean (DWP, 2018).

7.4 SECONDARY HAZARDS

The most problematic secondary hazard associated with 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 property 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 a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or storm drains. Some other secondary hazards of a flood are:

- Disruption of services:
  - Sewers, septic systems, and wastewater treatment plants can be flooded, allowing the release of untreated sewage.
  - Drinking water supplies may become polluted, especially if sewage treatment plants are flooded. This may result in disease and other health effects.
  - Gas and electrical service may be disrupted.
  - Transportation systems may be disrupted.

- Long-term effects (tertiary effects):
  - Location of river channels may change as the result of flooding. New channels develop, leaving the old channels dry.
  - Jobs may be lost due to the disruption of services, destruction of business, etc. (although jobs may be gained in the construction industry to help rebuild or repair flood damage).
  - Insurance rates may increase.
- Destruction of wildlife habitat.
  - Slope failure can be exacerbated by wildfire, landslide susceptibility and flooding, which can lead to loss of vegetation critical for wildlife habitat.
  - Soil loss associated with flooding in hillsides can damage trees and vegetation leading to a potential decline in biodiversity.

7.5 EXPOSURE

The Level-2, user-defined Hazus protocol for general building stock was used to assess exposure and vulnerability to flooding in the planning area. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the Hazus default data was enhanced using local GIS data from local, state and federal sources.

7.5.1 Population

Counts of population living in the floodplain were generated for each APC by estimating the percent of residential buildings located in the floodplain in that APC and multiplying the total estimated population for the APC by this percentage. Using this approach, it was estimated that the population within each floodplain is as follows:

- 10-year floodplain—15 (less than 0.1 percent of the City population)
- 50-year floodplain—62 (less than 0.1 percent of the City population)
- 100-year floodplain—31,244 (0.8 percent of the City population)
- 500-year floodplain—147,818 (3.7 percent of the City population)

7.5.2 Property

Structures in the Floodplain

The Hazus model identified the following exposure of structures in the 10- and 50-year floodplains:

- Eight exposed structures within the 10-year floodplain:
  - Three in the North Valley APC
  - Five in the West Los Angeles APC
  - 50 percent are residential.
  - All other APCs had no structures identified at risk to 10-year flood depths
- 23 exposed structures within the 50-year floodplain:
  - Six in the North Valley APC
  - 17 in the West Los Angeles APC
  - 70 percent are residential.
  - All other APCs had no structures identified at risk to 50-year flood depths

Table 7-4 and Table 7-5 summarize the total area and number of structures in the 100-year and 500-year floodplains by area planning commission. The Hazus model determined that there are 6,551 structures within the 100-year floodplain; about 78 percent are residential, and 16 percent are commercial or industrial uses. The Hazus model determined that there are 30,430 structures within the 500-year floodplain; about 84 percent are residential, and 13 percent are commercial or industrial uses.

Table 7-4. Area and Structures in the 100-Year Floodplain

Area Planning Commission	Area in Floodplain (acres)	Number of Structures in Floodplain							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Central	1,097	1,529	197	6	0	11	27	6	1,776
East	1,075	1,571	191	193	2	6	87	0	2,050
Harbor	2,845	29	10	19	0	0	20	0	78
North Valley	3,464	164	53	63	0	3	156	3	442
South Los Angeles	416	1,198	140	104	0	5	23	5	1,475
South Valley	496	21	7	0	0	0	52	0	80
West Los Angeles	1,802	644	51	0	0	0	55	0	750
Total	11,194	5,156	649	385	2	25	420	14	6,651

Table 7-5. Area and Structures in the 500-Year Floodplain

Area Planning Commission	Area in Floodplain (acres)	Number of Structures in Floodplain							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Central	2,306	6,354	1,254	192	0	35	79	32	7,946
East	1,093	1,655	206	193	2	6	87	0	2,149
Harbor	3,558	94	28	82	0	0	31		235
North Valley	3,695	414	66	70	0	3	159	3	715
South Los Angeles	1,868	8,084	1,005	285	2	92	56	61	9,585
South Valley	704	636	97	3	2	0	54	0	792
West Los Angeles	3,355	8,441	428	20	0	5	112	2	9,008
Total	16,579	25,678	3,084	845	6	141	578	98	30,430

Exposed Value

The analysis estimated $72.4 million of building-and-contents exposure to the 10-year flood, and $90.8 million of building-and-contents exposure to the 50-year flood, both representing less than 0.1 percent of the total replacement cost of the City.

Table 7-6 and Table 7-7 summarize the estimated value of exposed buildings in the 100-year and 500-year floodplains by area planning commission. The analysis estimated $13.03 billion of building-and-contents exposure to the 100-year flood, representing 1.5 percent of the total replacement cost of the City of Los Angeles and $47.71 billion of building and contents exposure to the 500-year flood, representing 5.4 percent of the total replacement cost value of the City of Los Angeles.

Table 7-6. Value of Structures in 100-Year Floodplain

Area Planning Commission	Value Exposed			% of Total Replacement Cost
	Structure	Contents	Total	
Central	$2,485,743,280	$1,884,291,761	$4,370,035,041	2.1%
East	$1,552,100,059	$1,521,657,472	$3,073,757,531	4.3%
Harbor	$251,276,857	$278,436,094	$529,712,952	1.1%
North Valley	$754,140,603	$796,407,463	$1,550,548,066	1.1%
South Los Angeles	$987,091,016	$845,347,330	$1,832,438,346	1.8%
South Valley	$196,334,482	$183,460,714	$379,795,196	0.2%
West Los Angeles	$706,438,180	$584,556,662	$1,290,994,842	1.0%
Total	$6,933,124,477	$6,094,157,496	$13,027,281,972	1.5%

Table 7-7. Value of Structures in 500-Year Floodplain

Area Planning Commission	Value Exposed			% of Total Replacement Cost
	Structure	Contents	Total	
Central	$11,088,769,595	$9,652,283,520	$20,741,053,115	9.8%
East	$1,602,691,175	$1,557,058,041	$3,159,749,216	4.5%
Harbor	$611,026,240	$758,426,723	$1,369,452,962	2.9%
North Valley	$977,285,363	$965,209,965	$1,942,495,328	1.3%
South Los Angeles	$5,719,087,744	$4,757,984,395	$10,477,072,139	10.4%
South Valley	$502,479,551	$386,647,235	$889,126,786	0.5%
West Los Angeles	$5,427,242,197	$3,702,971,899	$9,130,214,096	6.9%
Total	$25,928,581,864	$21,780,581,778	$47,709,163,642	5.4%

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 lands and open space. Figure 7-10 shows the existing land use of all parcels in the 100-year and 500-year floodplains. Open space uses make up about two-thirds of the 100-year floodplain. This represents favorable, lower-risk use of the floodplain. Open space makes up a much smaller percentage of the 500-year floodplain, with higher-risk residential and commercial uses taking up larger portions.

7.5.3 Critical Facilities and Infrastructure

Critical facilities are buildings and infrastructure that must remain operable during hazard events to maintain essential services. Critical facilities and infrastructure in the 10-year, 50-year, 100-year and 500-year floodplains of the City of Los Angeles are summarized in Table 7-8.

Source: City of Los Angeles. 2018

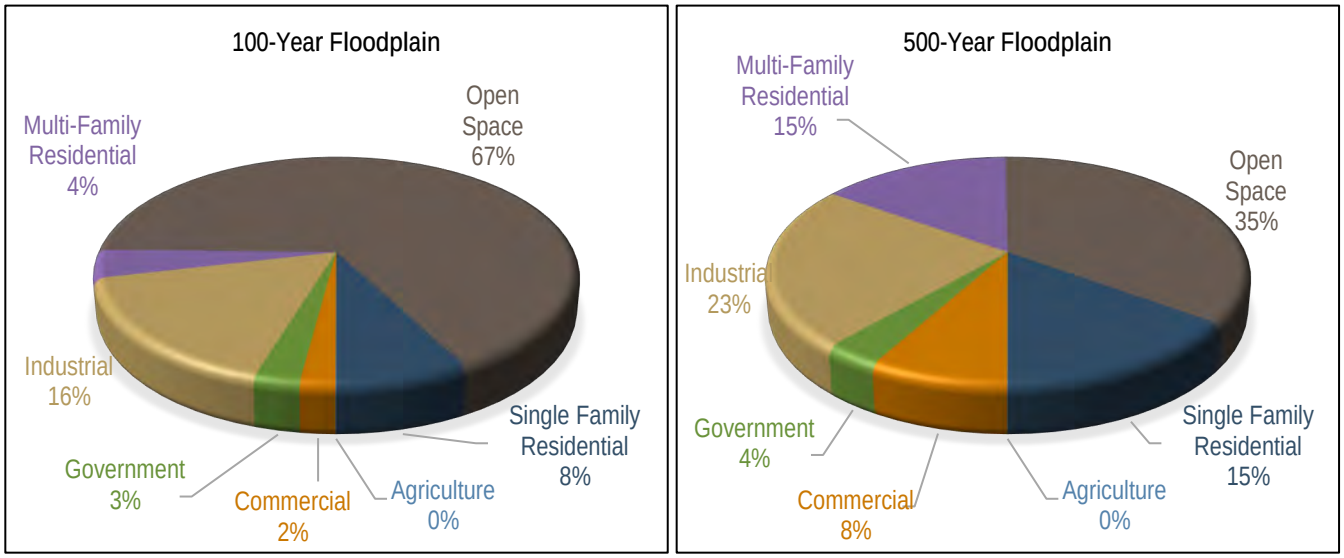

Figure 7-10. Present Land Use Within the Floodplain

Table 7-8. Critical Facilities Subject to Flood Risk

Lifeline	Number of Facilities in the Floodplain							
	Central APC	East Los Angeles APC	Harbor APC	North Valley APC	South Los Angeles APC	South Valley APC	West Los Angeles APC	Total
10-Year Floodplain								
Safety and Security	0	0	0	0	0	0	0	0
Food, Water and Sheltering	0	0	0	0	0	0	0	0
Health and Medical	0	0	0	0	0	0	0	0
Energy	0	0	0	0	0	0	0	0
Communications	0	0	0	0	0	0	0	0
Transportation	0	0	0	2	0	0	1	3
Hazardous Materials	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	1	3
50-Year Floodplain								
Safety and Security	0	0	0	0	0	0	0	0
Food, Water and Sheltering	0	0	0	0	0	0	0	0
Health and Medical	0	0	0	0	0	0	0	0
Energy	0	0	0	0	0	0	0	0
Communications	0	0	0	0	0	0	0	0
Transportation	0	0	0	2	0	0	1	3
Hazardous Materials	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	1	3

Lifeline	Number of Facilities in the Floodplain							
	Central APC	East Los Angeles APC	Harbor APC	North Valley APC	South Los Angeles APC	South Valley APC	West Los Angeles APC	Total
100-Year Floodplain								
Safety and Security	1	0	3	1	0	0	1	6
Food, Water and Sheltering	4	5	0	0	0	1	1	11
Health and Medical	0	0	0	0	0	0	0	0
Energy	0	0	2	1	0	0	0	3
Communications	0	0	0	1	0	0	0	1
Transportation	23	10	16	30	25	9	3	116
Hazardous Materials	0	10	0	7	1	1	0	19
Total	28	25	21	40	26	11	5	156
500-Year Floodplain								
Safety and Security	2	0	4	1	0	0	1	8
Food, Water and Sheltering	15	5	5	2	13	1	13	54
Health and Medical	1	0	0	0	0	0	0	1
Energy	0	0	7	1	0	0	0	8
Communications	0	0	0	1	1	0	1	3
Transportation	26	11	36	34	30	9	11	157
Hazardous Materials	0	10	5	7	3	1	0	26
Total	44	26	57	46	47	11	26	257

Hazardous Materials Facilities

During a flood event, containers holding hazardous materials can rupture and leak into the surrounding area, having a disastrous effect on the environment and residents. Nineteen businesses in the City of Los Angeles that report having hazardous materials under the Environmental Protection Agency's Toxic Release Inventory program are inside the 100-year floodplain.

Utilities and Infrastructure

The following sections describe potential impacts of flooding on specific types of critical infrastructure.

Roads

Roads or railroads that are blocked or damaged can isolate residents and prevent travel, including for emergency service providers. The following major roads in the City 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
- El Camino Real
- Glendale Freeway
- Hollywood Freeway
- Marina Freeway
- US 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

- Pacific Coastal Highway
- Ronald Reagan Freeway
- San Diego Freeway
- Topanga Canyon Blvd
- W Pomona 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

Bridges washed out or blocked by floods or debris can cause isolation. There are dozens of bridges that are in or cross over the 100-year floodplain in the City of Los Angeles.

Water and Sewer Infrastructure

Water distribution and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts 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.

7.5.4 Environment

Flooding can impact the environment in negative ways. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development within flow channels can increase stream bank erosion if not carefully designed and mitigated, causing rivers and streams to migrate into non-natural courses.

7.6 VULNERABILITY

This section assesses flood vulnerability (likely damage) for the 10-, 50-, 100- and 500-year flood events, based on flood depth projections from the current effective FEMA FIRMs for the City of Los Angeles. The flood depths used for the 100-year and 500-year events are shown in Figure 7-11 through Figure 7-24.

7.6.1 Population

Vulnerable Populations

A geographic analysis of demographics using the Hazus model identified populations vulnerable to the flood hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 58 percent of the households within the 100-year floodplain are economically disadvantaged, defined as having household incomes of $50,000 or less.
- **Population over 65 Years Old**—It is estimated that 10 percent of the population in the census blocks that intersect the 100-year floodplain are over 65 years old.
- **Population under 16 Years Old**—It is estimated that 26 percent of the population within census blocks located in or near the 100-year floodplain are under 16 years of age.

Impacts on Persons and Households

Impacts on persons and households in the planning area were estimated through the Level 2 Hazus analysis. The results are summarized in Table 7-9 and Table 7-10.

Table 7-9. Estimated 100-Year Flood Impact on Persons and Households

APC	Number of Displaced Persons	Number of Persons Requiring Short-Term Shelter
Central	2,992	331
East Los Angeles	3,250	295
Harbor	11	0
North Valley	54	2
South Los Angeles	1,466	118
South Valley	4	0
West Los Angeles	489	24
Total	8,266	771

Table 7-10. Estimated 500-Year Flood Impact on Persons and Households

APC	Number of Displaced Persons	Number of Persons Requiring Short-Term Shelter
Central	13,030	1,366
East Los Angeles	3,263	289
Harbor	43	2
North Valley	138	5
South Los Angeles	4,143	189
South Valley	234	9
West Los Angeles	12,329	758
Total	33,179	2,617

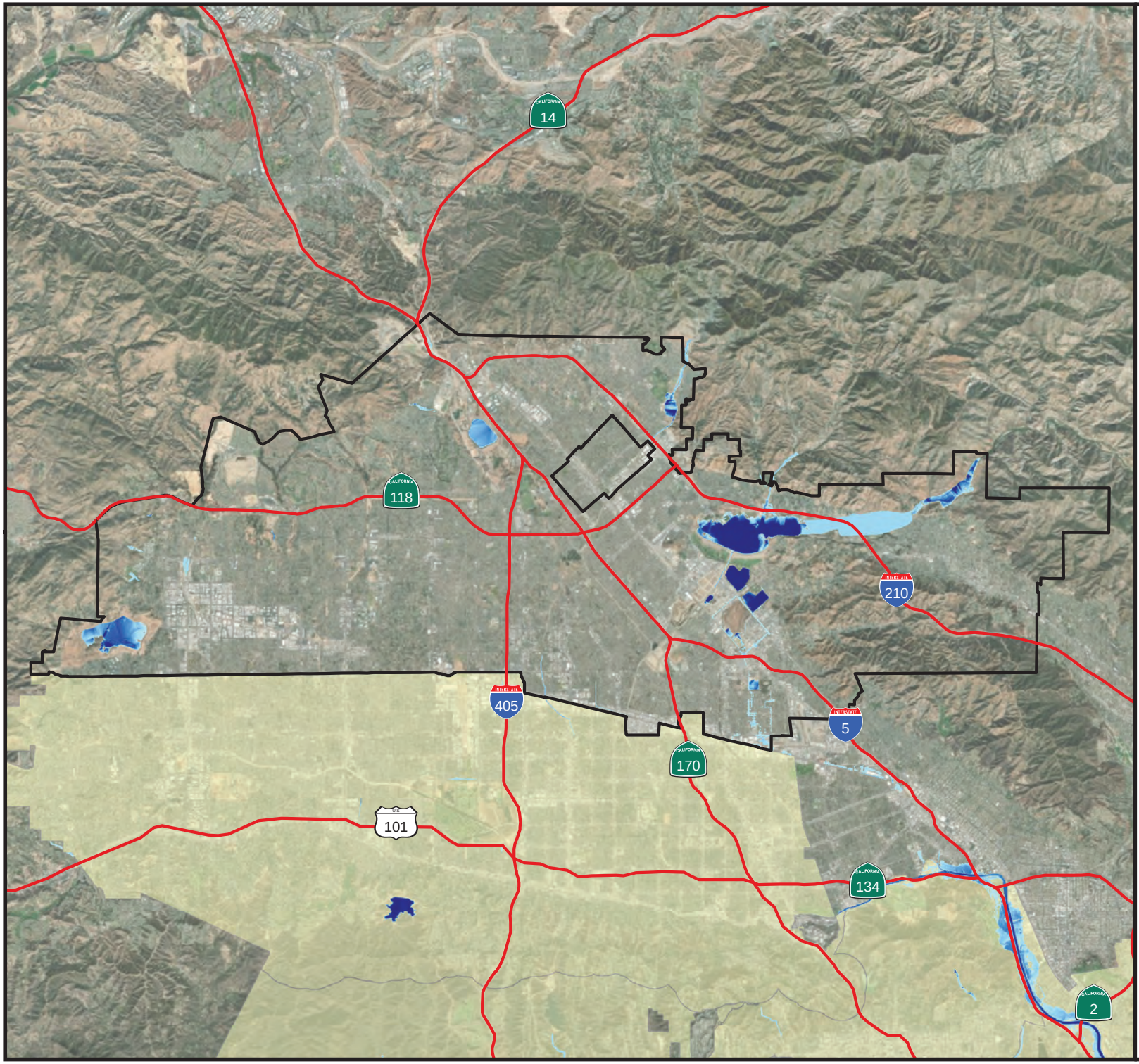

FIGURE 7-11.

North Valley APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

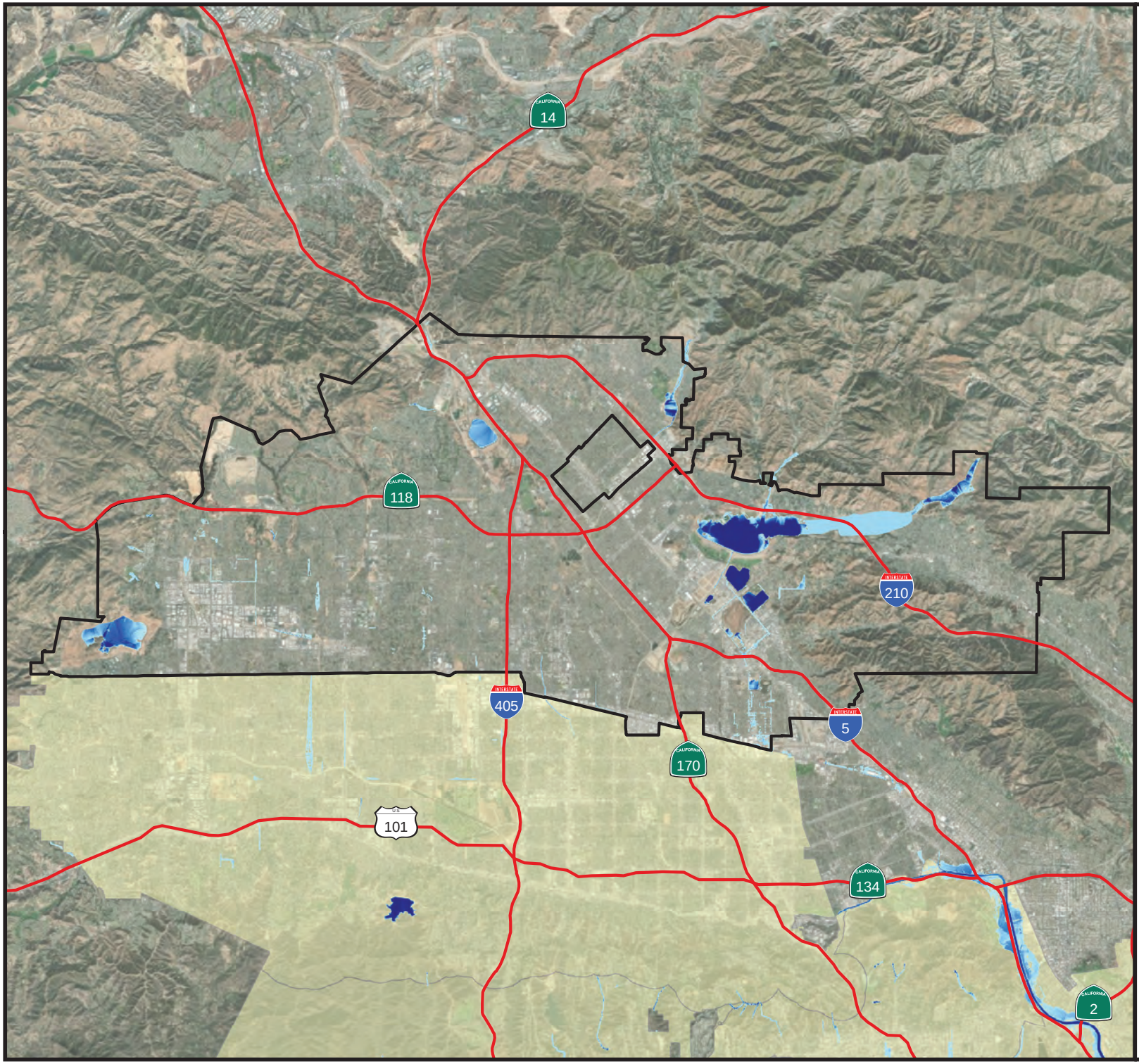

FIGURE 7-12.

North Valley APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

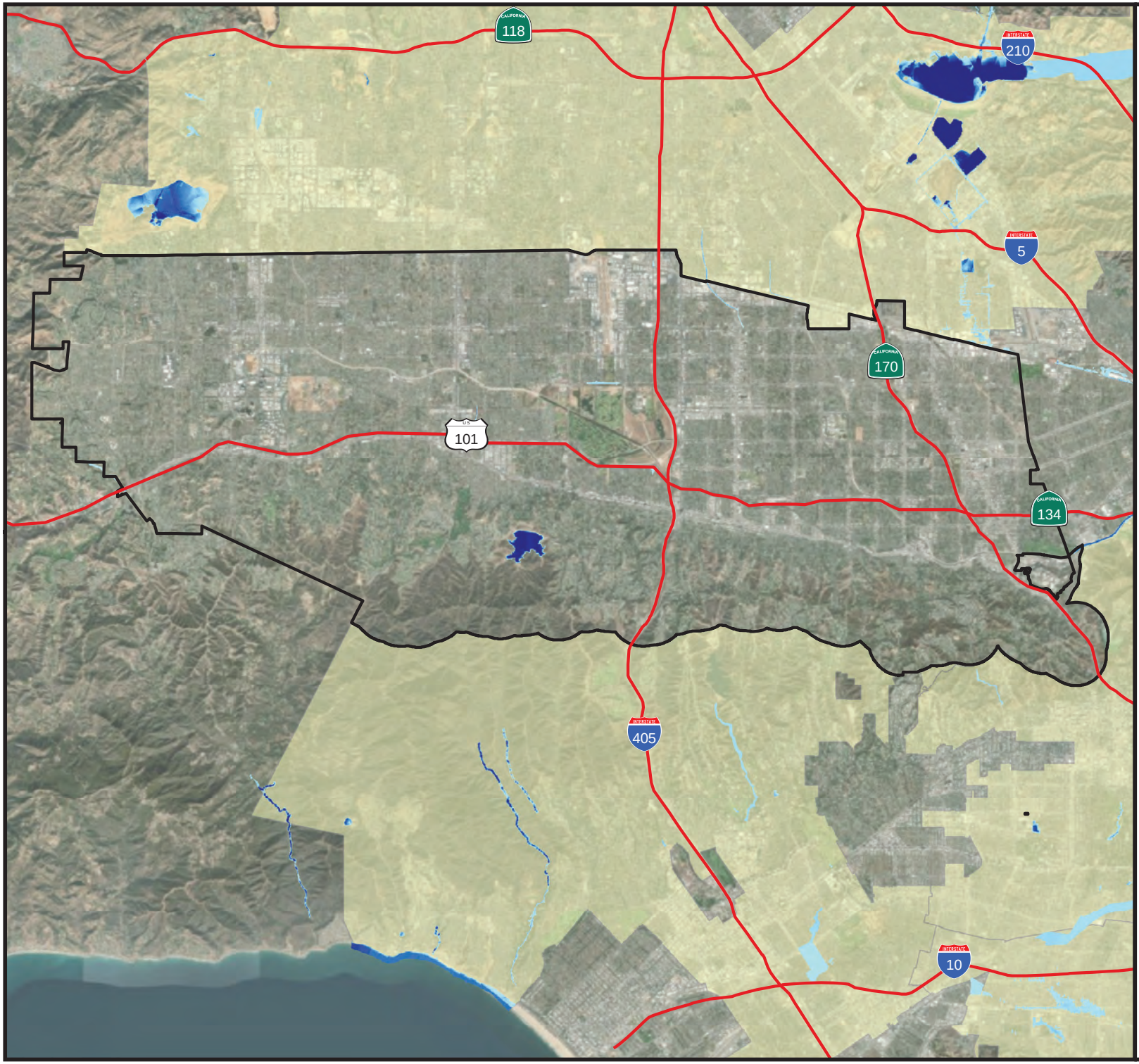

FIGURE 7-13.

South Valley APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

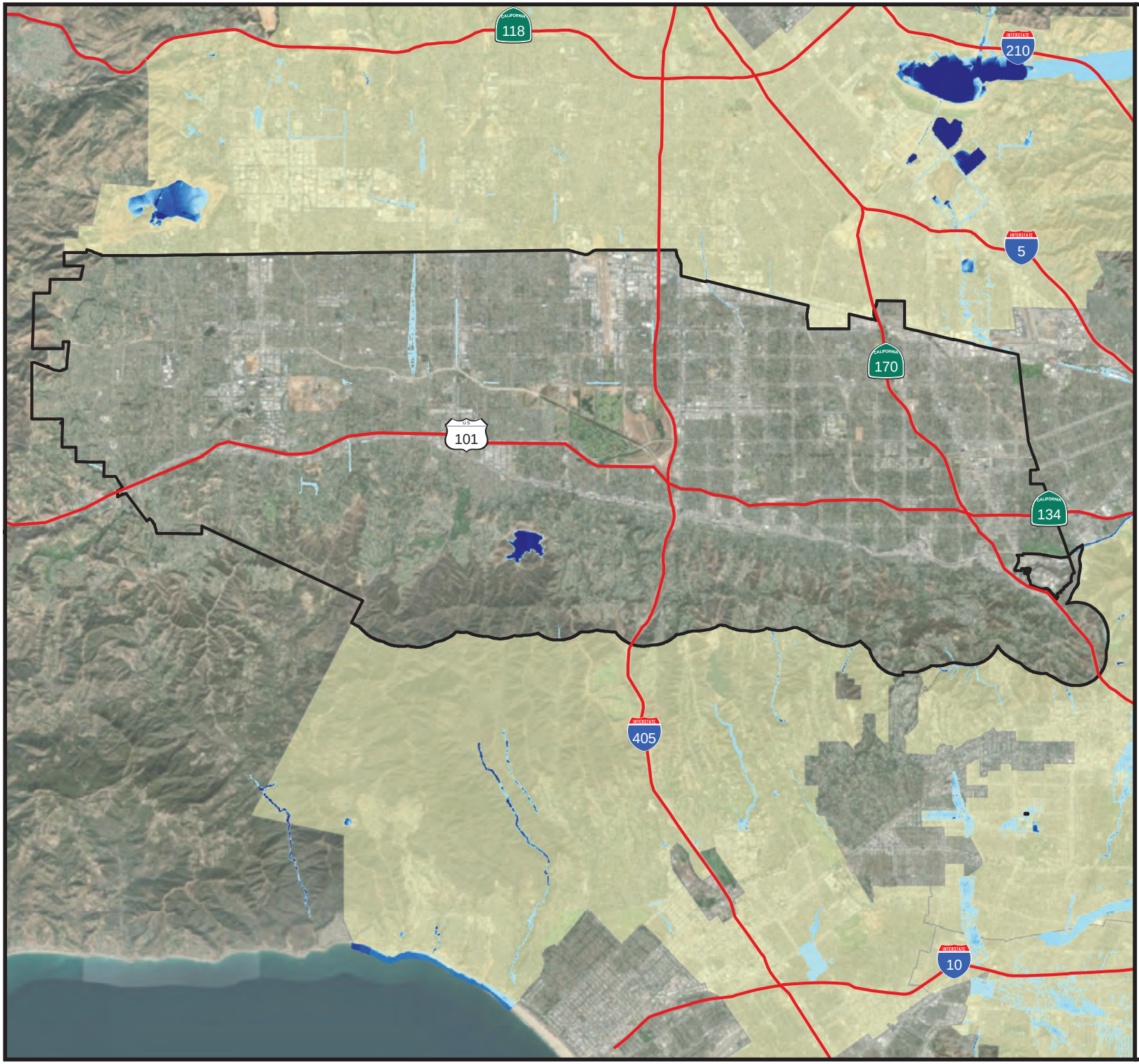

FIGURE 7-14.

South Valley APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

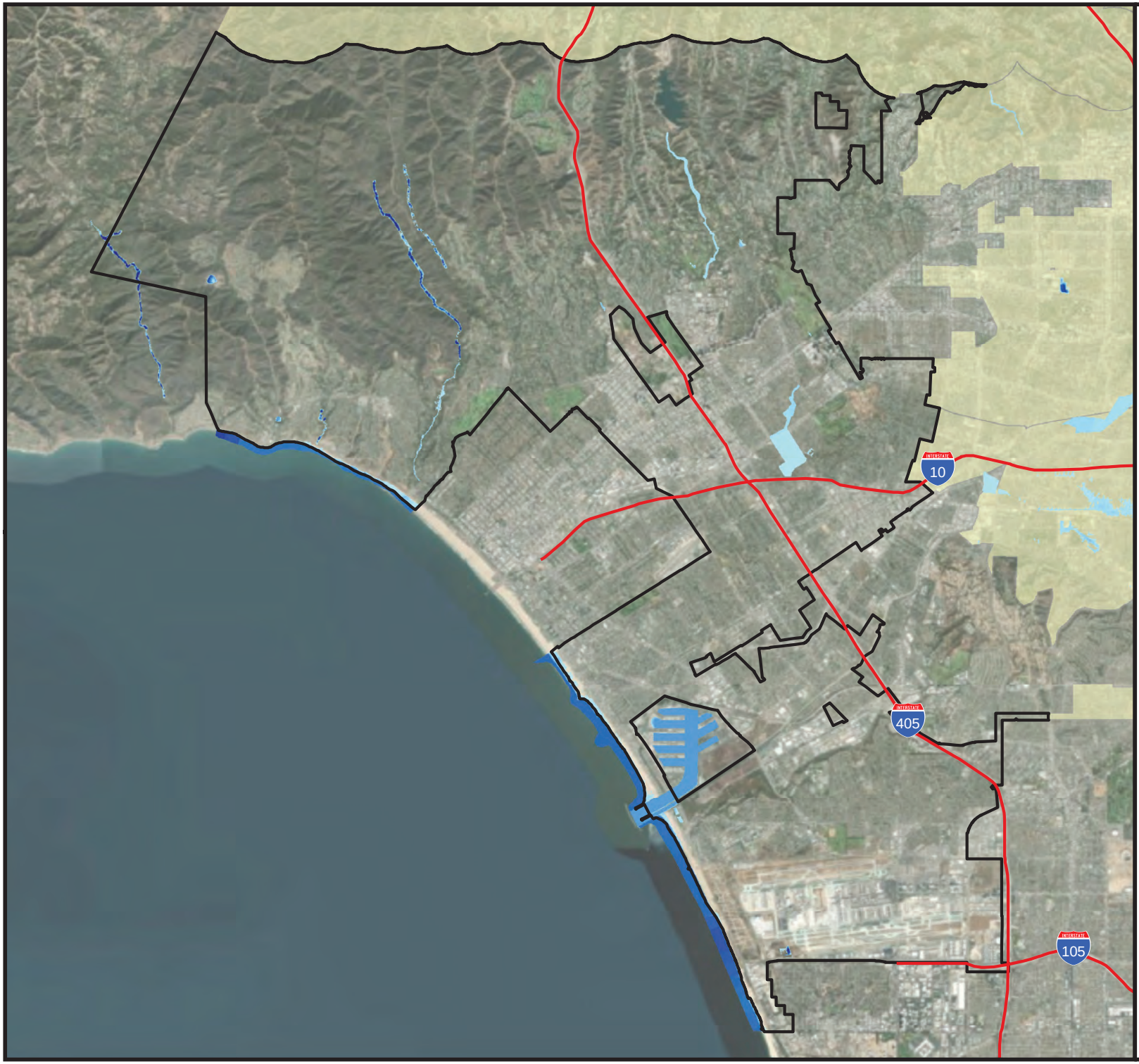

FIGURE 7-15.

West Los Angeles APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

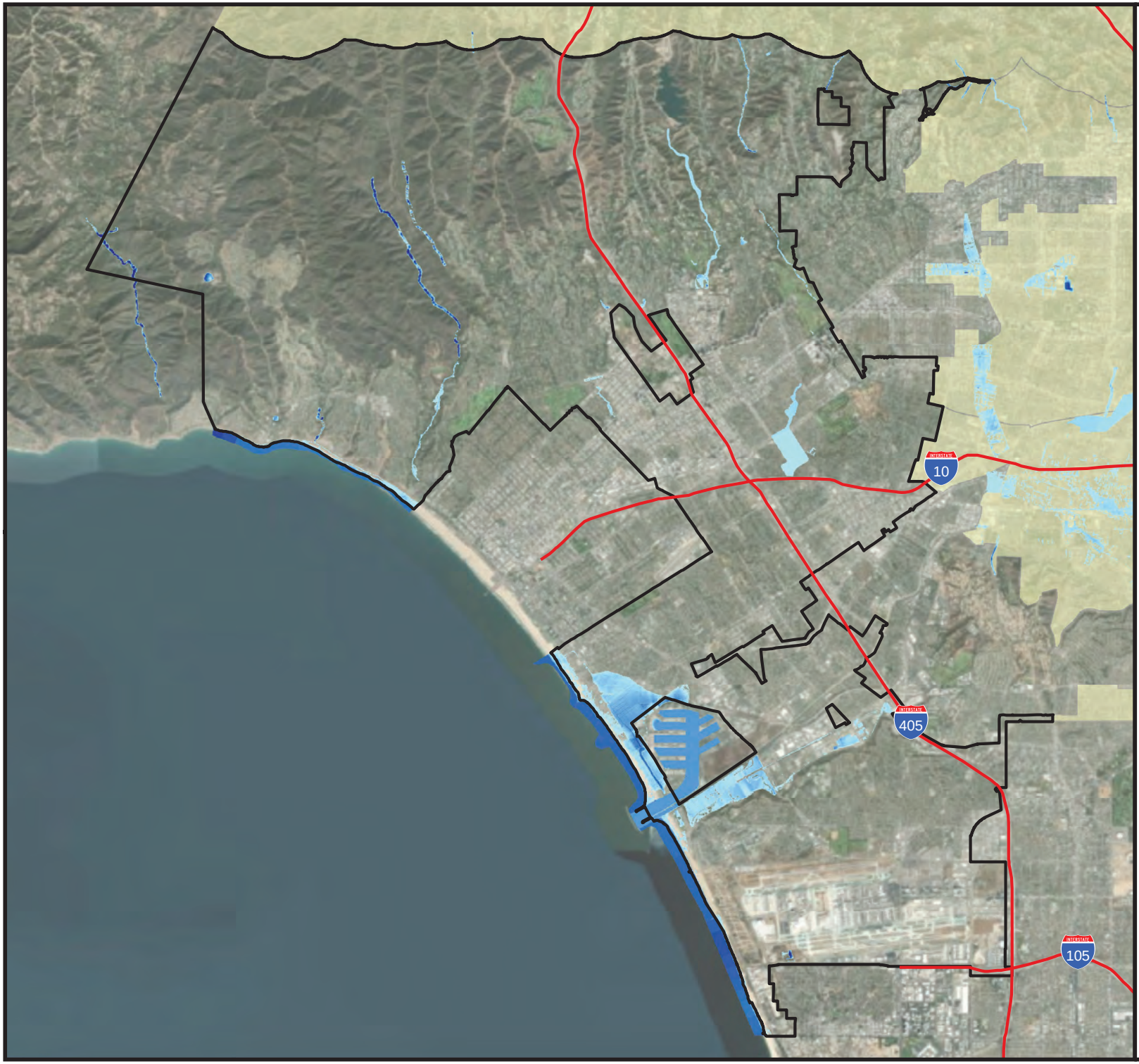

FIGURE 7-16.

West Los Angeles APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 11,200 feet 1:134,400

Feet
0 8,000 16,000

Meters
0 2,000 4,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

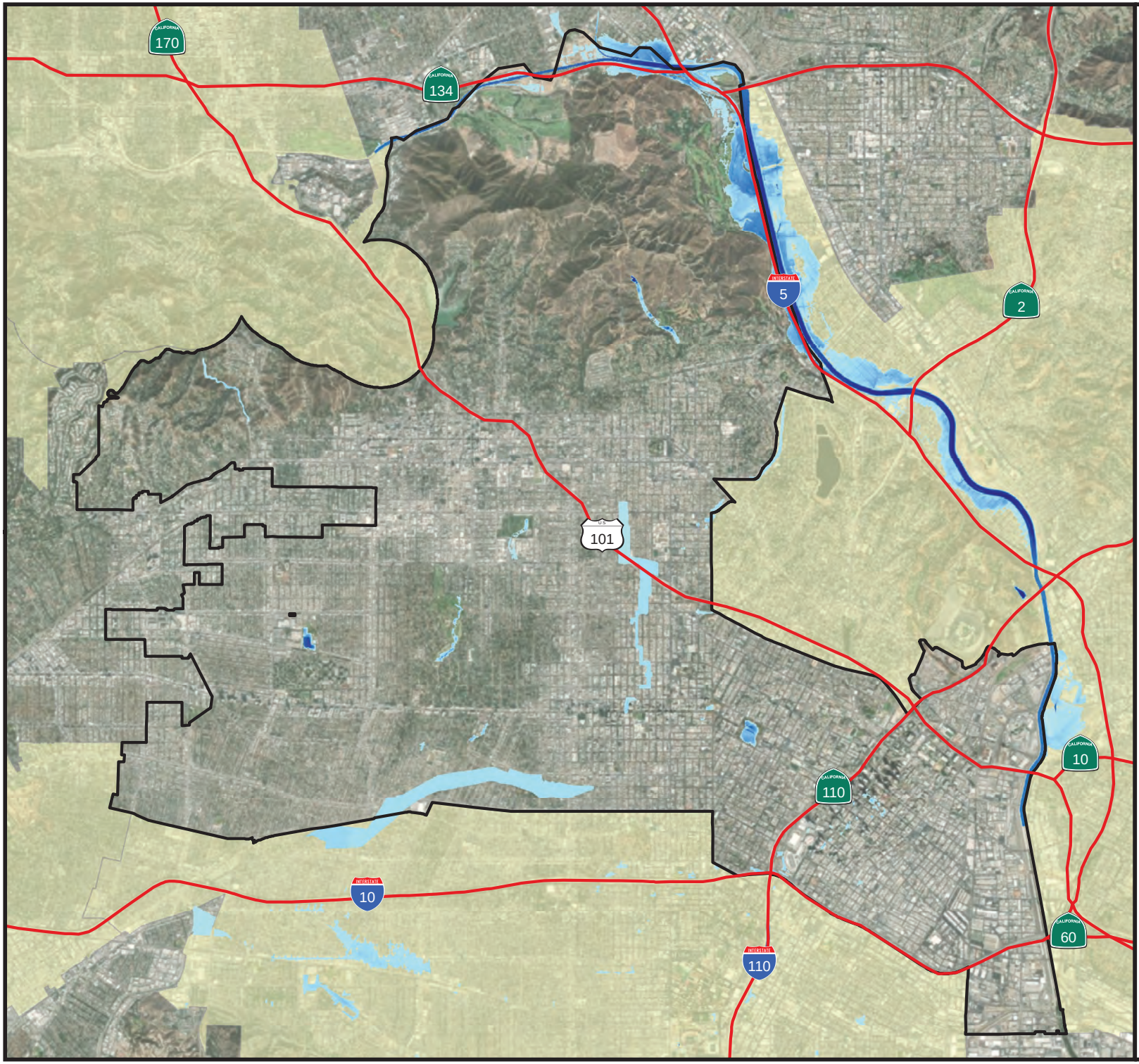

FIGURE 7-17.

Central APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

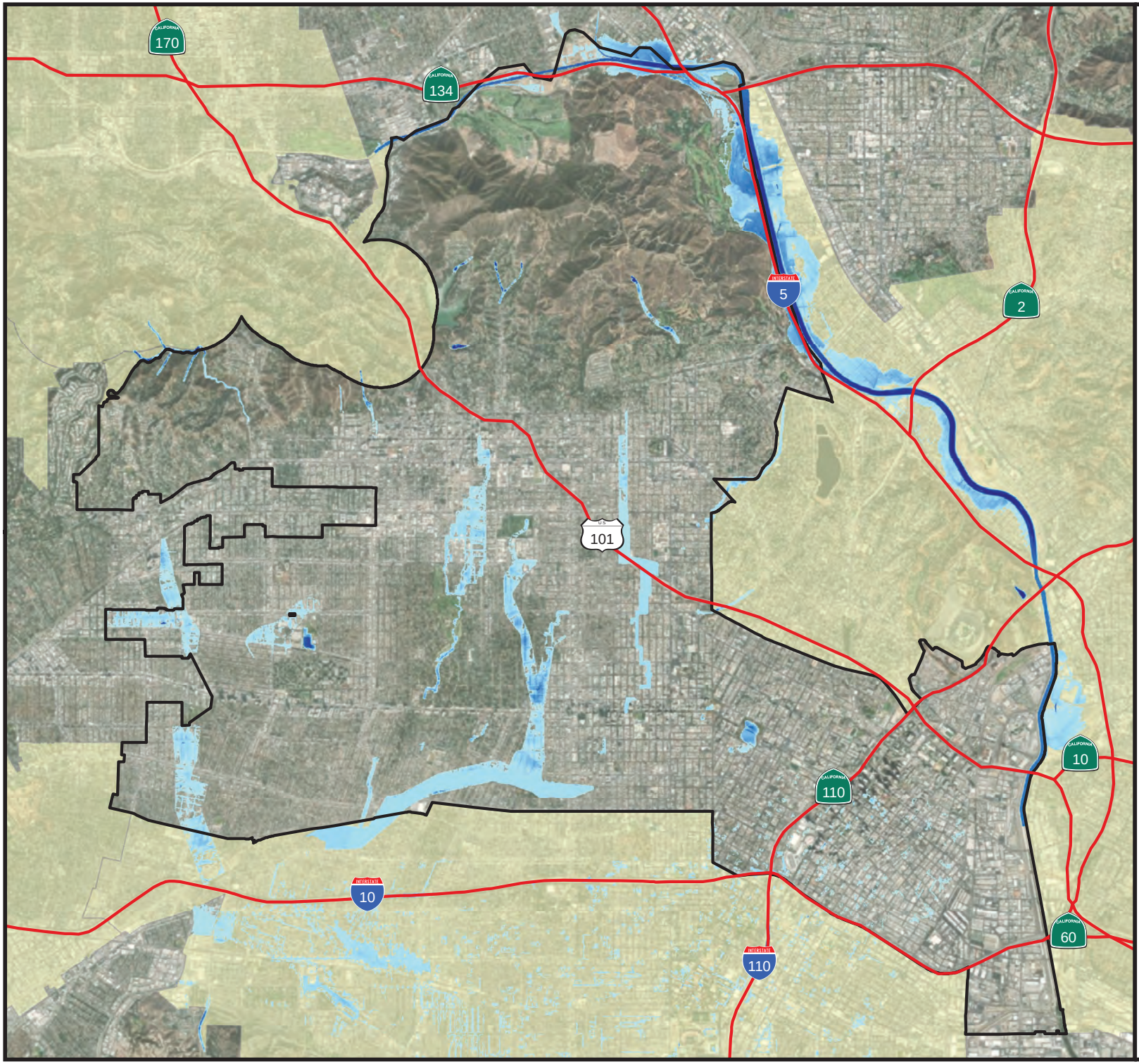

FIGURE 7-18.

Central APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

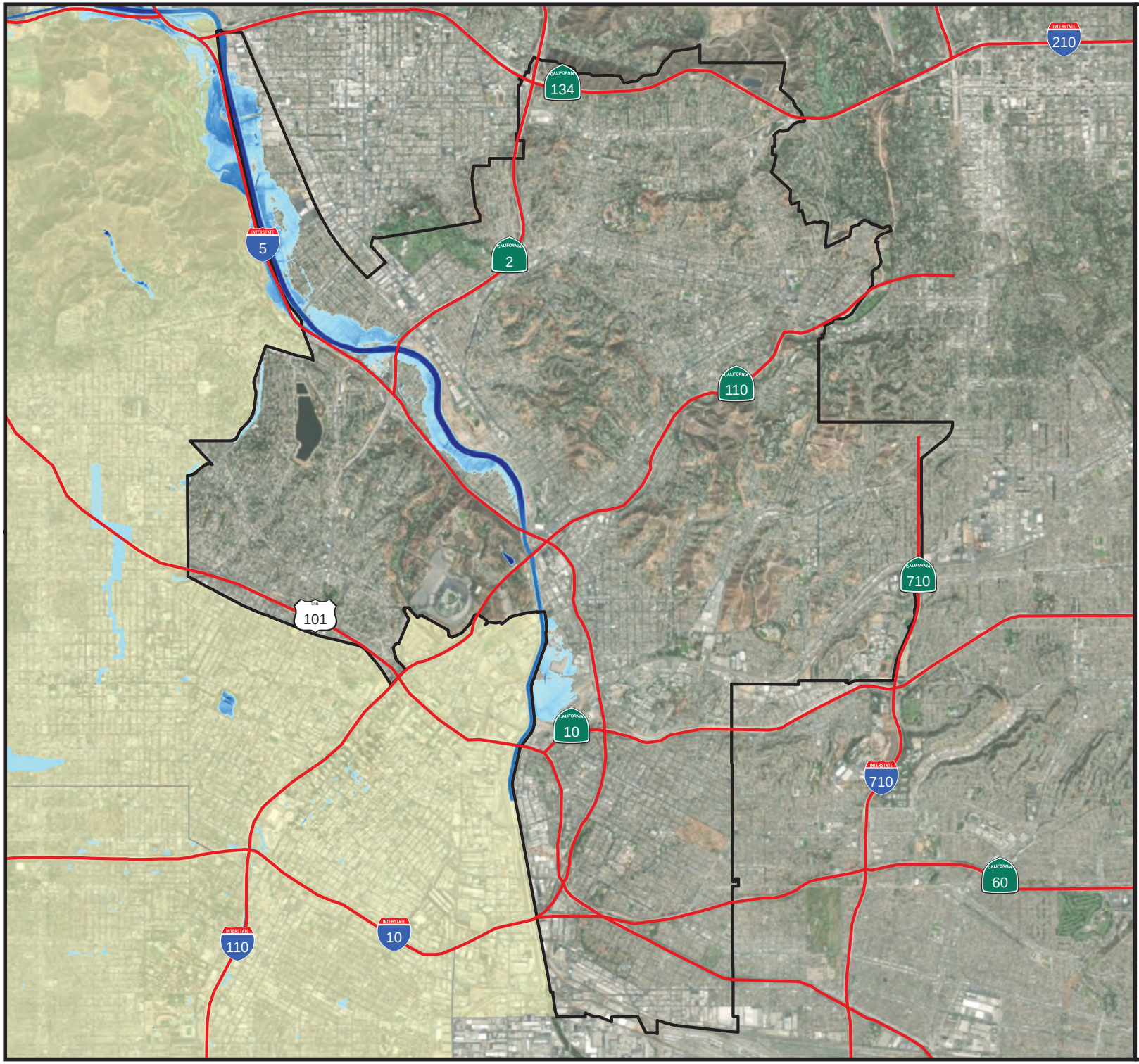

FIGURE 7-19.

East APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth

High : >25 ft

Low : 0 ft

Highways

Selected APC

City of Los Angeles

N

1 inch = 7,600 feet 1:91,200

Feet
0 5,500 11,000

Meters
0 1,375 2,750

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

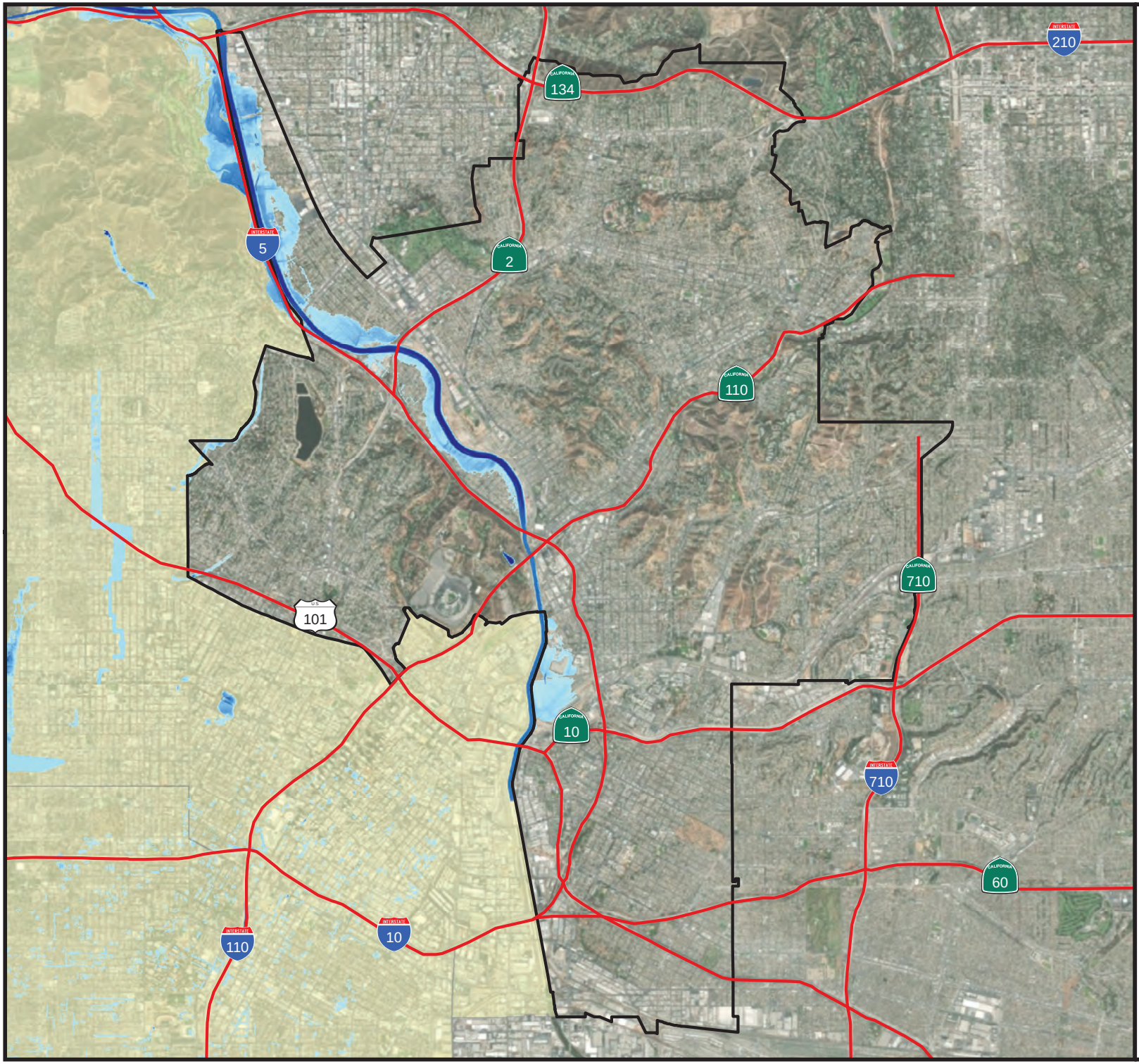

FIGURE 7-20.

East APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 7,600 feet 1:91,200

Feet
0 5,500 11,000

Meters
0 1,375 2,750

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

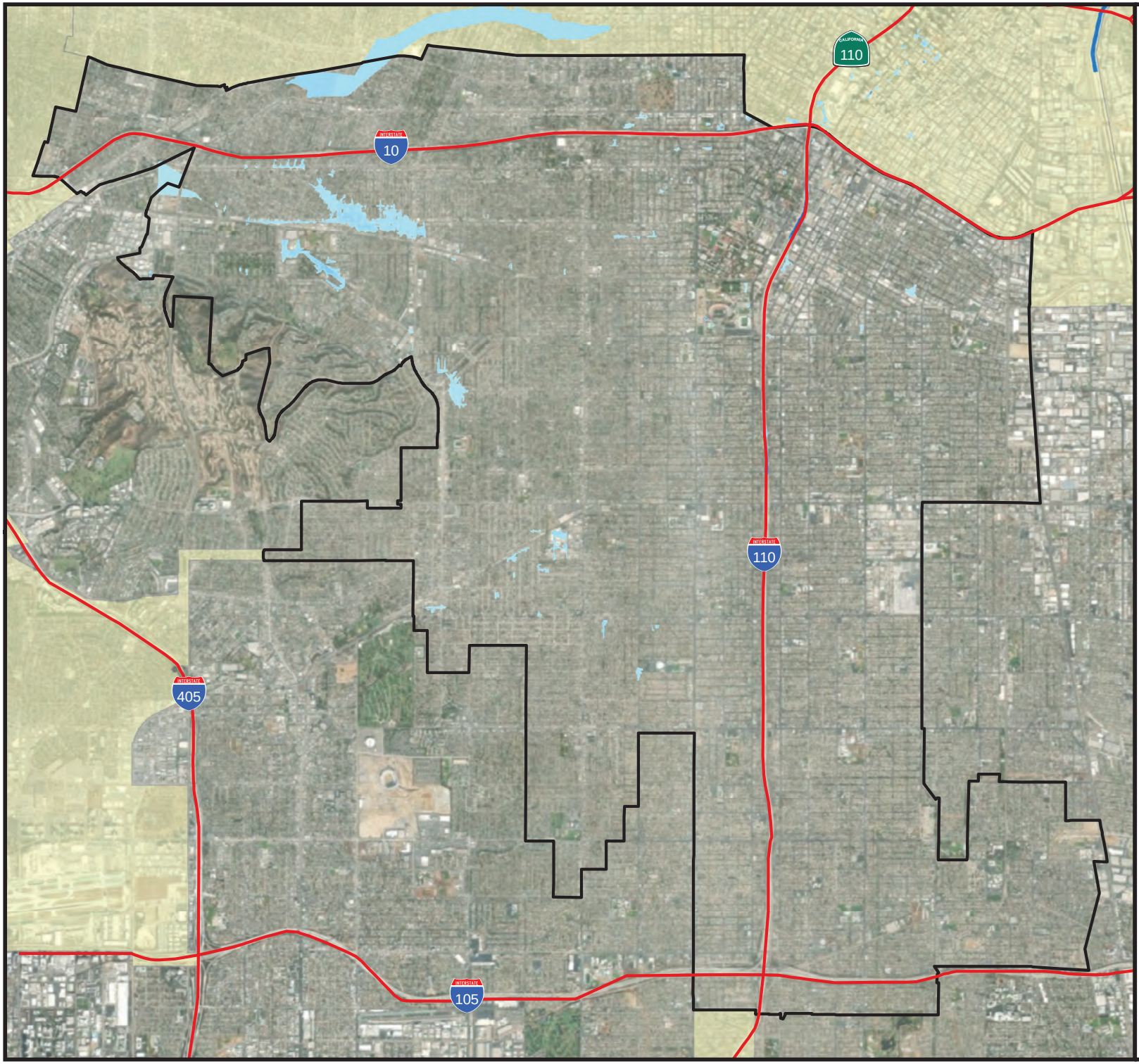

FIGURE 7-21.

South Los Angeles APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 7,000 feet 1:84,000

Feet
0 5,000 10,000

Meters
0 1,250 2,500

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

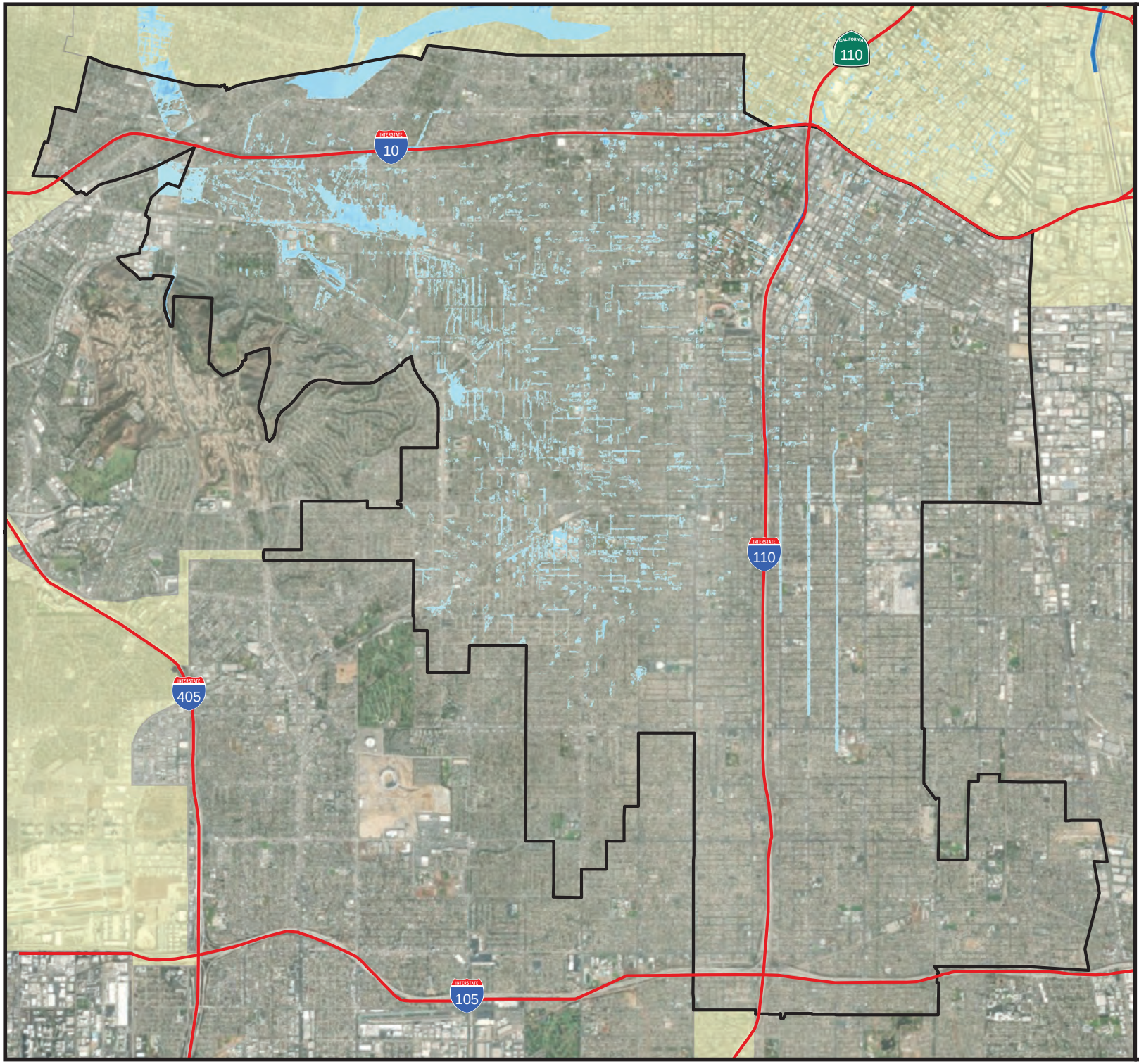

FIGURE 7-22.

South Los Angeles APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 7,000 feet 1:84,000

Feet
0 5,000 10,000

Meters
0 1,250 2,500

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

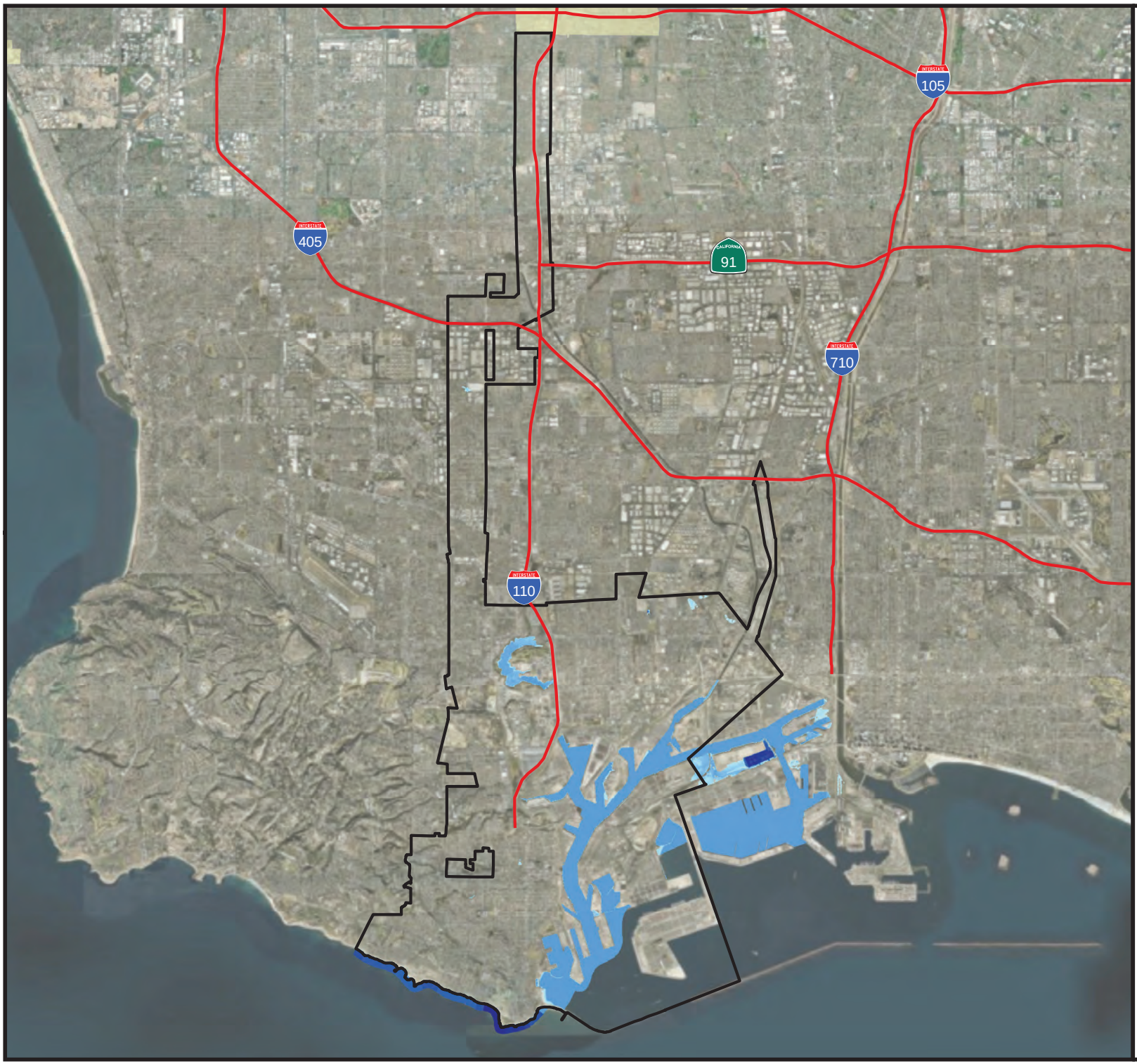

FIGURE 7-23.

Harbor APC

FEMA 100-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Bing Maps

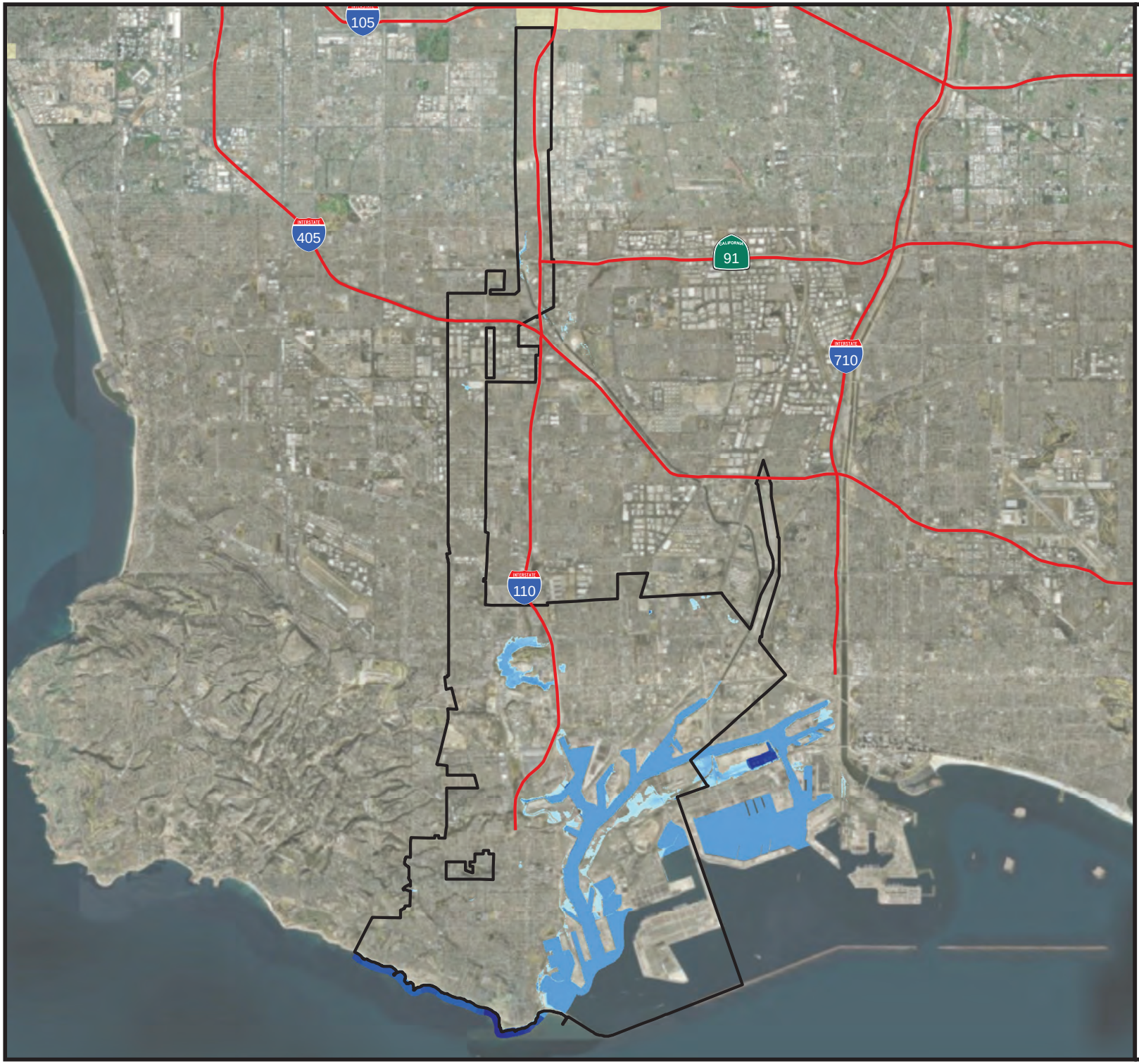

FIGURE 7-24.

Harbor APC

FEMA 500-Year Flood Depth Grid

Legend

Flood Depth
High : >25 ft
Low : 0 ft

Highways
Selected APC
City of Los Angeles

N

1 inch = 11,800 feet 1:141,600

Feet
0 8,500 17,000

Meters
0 2,125 4,250

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri

Public Health and Safety

Floods and their aftermath present threats to public health and safety. Floodwater is often contaminated by pollutants such as sewage, human and animal feces, pesticides, 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 industrial chemicals. They carry away whatever lies on the ground inundated by the flood. Their contact with food items 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, elderly people 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.

7.6.2 Property

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 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 7-11 through Table 7-14.

The differences in loss estimations between the more frequent events (10- and 50-year) and the less frequent events (100-, 500-year) suggest that there is a significant jump in flood depths between these scenarios. This makes sense because much of the mapped flood area on the current FIRM consists of AO/AH zones, which depict sheet-flow flooding with depths typically below 3 feet. The amount of increased damage between the 100- and 500-year events suggests significant increases in flood depths.

Much of the flood risk in the City of Los Angeles associated with urban drainage is not mapped. Any overstatement of flood risk in areas that are subject to urban flooding may represent a portion of the risk not accounted for due to the lack of mapping of that risk.

Table 7-11. Loss Estimates for 10-Year Flood Event

Area Planning Commission	Structures Impacted[a]	Estimated Loss Associated with Flood			% of Total Replacement Cost
		Structure	Contents	Total	
Central	0	$0	$0	$0	0
East	0	$0	$0	$0	0
Harbor	0	$0	$0	$0	0
North Valley	2	$3,475,163	$5,425,763	$8,900,926	Less than 1
South Los Angeles	0	$0	$0	$0	0
South Valley	0	$0	$0	$0	0
West Los Angeles	2	$343,502	$1,376,451	$1,719,954	Less than 1
Total	4	$3,818,665	$6,802,214	$10,620,880	Less than 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

Table 7-12. Loss Estimates for 50-Year Flood Event

Area Planning Commission	Structures Impacted[a]	Estimated Loss Associated with Flood			% of Total Replacement Cost
		Structure	Contents	Total	
Central	0	$0	$0	$0	0
East	0	$0	$0	$0	0
Harbor	0	$0	$0	$0	0
North Valley	3	$4,999,724	$7,943,397	$12,943,120	Less than 1
South Los Angeles	0	$0	$0	$0	0
South Valley	0	$0	$0	$0	0
West Los Angeles	10	$783,542	$2,038,516	$2,822,058	Less than 1
Total	13	$5,783,266	$9,981,913	$15,765,178	Less than 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

Table 7-13. Loss Estimates for 100-Year Event

Area Planning Commission	Structures Impacted[a]	Estimated Loss Associated with Flood			% of Total Replacement Cost
		Structure	Contents	Total	
Central	1,119	$109,217,062	$112,643,687	$221,860,748	0.1%
East	1,758	$240,298,349	$455,061,314	$695,359,663	1.0%
Harbor	31	$4,426,237	$13,654,056	$18,080,293	0.0%
North Valley	154	$53,813,998	$102,871,478	$156,685,476	0.1%
South Los Angeles	1,187	$54,459,005	$49,524,078	$103,983,084	0.1%
South Valley	12	$1,876,112	$1,895,471	$3,771,583	0.0%
West Los Angeles	619	$35,391,436	$46,508,004	$81,899,441	0.1%
Total	4,880	$499,482,200	$782,158,089	$1,281,640,289	0.1%

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 significant damage in a 100-year flood event

Table 7-14. Loss Estimates for 500-Year Event

Area Planning Commission	Structures Impacted[a]	Estimated Loss Associated with Flood			% of Total Replacement Cost
		Structure	Contents	Total	
Central	3,495	$499,405,451	$583,750,768	$1,083,156,219	0.5%
East	1,807	$245,234,315	$459,370,661	$704,604,976	1.0%
Harbor	104	$15,223,486	$39,765,553	$54,989,039	0.1%
North Valley	233	$57,127,533	$109,142,318	$166,269,851	0.1%
South Los Angeles	2,258	$62,232,307	$54,073,217	$116,305,524	0.1%
South Valley	171	$4,014,456	$3,639,438	$7,653,894	0.0%
West Los Angeles	4,941	$567,469,069	$429,932,135	$997,401,204	0.8%
Total	13,009	$1,450,706,616	$1,679,674,091	$3,130,380,707	0.4%

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 significant damage in a 500-year flood event

Flood-Caused Debris

Hazus estimates of debris resulting from building damage for the 100-year and 500-year flood events are shown in Table 7-15.

Table 7-15. Estimated Flood-Caused Debris

Area Planning Commission	Debris to Be Removed Because of Flood Event (tons)	
	100-Year Event	500-Year Event
Central	8,641	35,420
East Los Angeles	41,452	42,761
Harbor	4,556	5,336
North Valley	26,974	27,734
South Los Angeles	6,652	9,072
South Valley	871	2,662
West Los Angeles	4,779	82,603
Total	93,925	205,588

Repetitive Loss

As part of this floodplain management plan, the City of Los Angeles has prepared a repetitive loss area analysis in compliance with the requirements of CRS Activity 510 (Section 512.b). The analysis represents an enhanced look at FEMA-identified repetitive loss properties and identifies strategies for addressing them. The repetitive loss area analysis is considered to be a functional annex to FMP2020 and can be found in Appendix F to this plan.

7.6.3 Critical Facilities and Infrastructure

Hazus was used to estimate the level of potential damage to critical facilities exposed to the flood risk, using depth/damage function curves to estimate the percent of damage to the building and contents of critical facilities. Table 7-16 summarizes the Hazus critical facility results by flood scenario (10-, 50-, 100- and 500-year flood events).

7.6.4 Environment

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. Loss estimation platforms such as Hazus are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment was not available at the time of this plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates. Understanding the impact of flooding on open spaces and natural and constructed water courses will be important for efforts to maintain and enhance the region's biodiversity.

7.7 FUTURE DEVELOPMENT TRENDS

According to the California Department of Finance, the population of the greater Los Angeles region is expected to increase over the next 45 years. The City of Los Angeles has limited potential for expansion through annexation, as it is surrounded by other incorporated cities. It is anticipated that future growth in the City will be managed through redevelopment, which creates an opportunity to correct past land use decisions, especially with regards to development within floodplains.

Table 7-16. Estimated Damage to Critical Facilities from Flood Scenarios

	Number of Facilities Impacted	Average % of Total Value Damaged	
		Structure	Content
10-Year Flood			
Safety and Security	0	N/A	N/A
Food, Water and Sheltering	0	N/A	N/A
Health and Medical	0	N/A	N/A
Energy	0	N/A	N/A
Communications	0	N/A	N/A
Transportation	3	0.13	N/A
Hazardous Materials	0	N/A	N/A
Total/Average	3	0.13	N/A
50-Year Flood			
Safety and Security	0	N/A	N/A
Food, Water and Sheltering	0	N/A	N/A
Health and Medical	0	N/A	N/A
Energy	0	N/A	N/A
Communications	0	N/A	N/A
Transportation	3	0.63	N/A
Hazardous Materials	0	N/A	N/A
Total/Average	3	0.63	N/A
100-Year Flood			
Safety and Security	2	8.26	13.73
Food, Water and Sheltering	3	4.97	26.90
Health and Medical	0	N/A	N/A
Energy	1	0.00	0.38
Communications	1	8.00	27.00
Transportation	60	1.72	9.41
Hazardous Materials	15	17.20	29.45
Total/Average	82	6.69	17.81
500-Year Flood			
Safety and Security	3	7.45	11.37
Food, Water and Sheltering	23	16.62	36.58
Health and Medical	0	N/A	N/A
Energy	3	4.49	10.64
Communications	2	4.00	13.57
Transportation	85	2.56	4.23
Hazardous Materials	21	12.52	21.26
Total/Average	137	7.94	16.28

The City has the capacity to manage growth in floodplains with codes and standards contained in its flood damage prevention ordinance, its building code, and the safety element of its General Plan. The scope and application of these codes and standards can be enhanced as the City increases its knowledge about flood risk. Proper

application of these tools will require accurate hazard mapping. More accurate mapping can inform future land use by understanding the following:

- What lands that interface flood hazard areas are developable
- What standards are appropriate to manage that increase in risk
- The economic impacts of developing these areas
- What lands can provide natural and beneficial floodplain functions that can attenuate flood risk
- Where emergency management resources may be needed if these lands are developed.

This should be taken into account as future land use decisions are made for areas impacted by flooding.

7.8 SCENARIO

The major flooding causes in the City of Los Angeles are short-duration, high-intensity storms. Water courses in the City can flood in response to a succession of intense winter rainstorms, usually between early November and late March. A series of such weather events can cause severe flooding in the City due to the large percentage of impervious area and the age and capacity of the drainage system.

The worst-case scenario is a series of storms that flood numerous drainage basins in a short time such as those projected in the U.S. Geological Survey's ARkStorm Scenario (U.S. Geological Survey, 2013). This could overwhelm response and floodplain management capabilities within the City. 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, floodplain management resources would not be able to make repairs quickly enough to restore critical facilities and infrastructure. Additionally, as the grounds become saturated, groundwater flooding issues typical for the City would be significantly enhanced.

7.9 ISSUES

Important issues associated with flooding in the City of Los Angeles include but are not limited to the following:

- The currently effective flood hazard mapping does not accurately reflect the true flood risk in the City.
- The stormwater/urban drainage flooding risk is not mapped, which makes it difficult to assess this hazard, other than looking at historical loss data.
- Planning tools whose use depends on flood hazard mapping are less effective due to the deficiencies in the currently available mapping.
- There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- City codes, such as the flood ordinance, zoning ordinance and safety element of the General Plan, are dated and in need of updating.
- Ongoing floodplain management will require funding from multiple sources.
- There needs to be a coordinated floodplain management effort between jurisdictions affected by flood hazards across Los Angeles County.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- A lack of concern regarding flood risk by property owners can translate to the lack of political will to make changes.
- The potential impact of climate change on flood conditions needs to continue to be studied so that its impacts can be better understood.
- The City is not adequately prepared for the probable increase in flood risk due to a changing climate.

- The capability for flood threat recognition and warning 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 City's existing level of floodplain management.
- Floodplain management actions require interagency coordination.
- With the large percentage of pre-FIRM flood insurance policies in force, the City can expect to see significant increases in the costs of flood insurance within the City. This will create challenges in the promotion of flood insurance.
- Open spaces (infiltration) have decreased substantially, with no plans to reverse this trend. More impervious surface leads to more runoff.
- Demographic studies to better understand social equity impacts from flooding are needed.
- Hazard disclosure laws are not being consistently applied within the city as it pertains to flood hazards.

8. Dam Failure Profile and Risk Assessment

8.1 GENERAL BACKGROUND

8.1.1 Causes of Dam Failure

Dam failures can be catastrophic to human life and property downstream. Dam failures in the United States typically occur in one of four primary ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures nationwide, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent are due to other causes, such as earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage, foundation failures, and sabotage.

The most likely disaster-related causes of dam failure in the Los Angeles vicinity are earthquakes, heavy rainfall, and landslides. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable with regular inspections. Terrorism and vandalism are serious threats under continuous review by public safety agencies.

8.1.2 Regulatory Oversight

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Safety Act (Public Law 92-367). The National

DEFINITIONS

Dam—Any artificial barrier, together with appurtenant works, that does or may impound or divert water, and that either (a) is 25 feet or more high from the natural bed of the watercourse at the downstream toe of the barrier (or from the lowest elevation of the outside limit of the barrier if it is not across a watercourse) to the maximum water storage elevation; or (b) has an impounding capacity of 50 acre-feet or more. (California Water Code, Division 3.)

Dam Failure—An uncontrolled release of impounded water due to structural deficiencies in dam.

Emergency Action Plan—A formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency.

High Hazard Dam—Dams where failure or improper operation will probably cause loss of human life.

Significant Hazard Dam—Dams where failure or improper operation will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure.

Dam Safety Program requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

California Division of Safety of Dams

California's Division of Safety of Dams (DSOD; a division of the Department of Water Resources) monitors the National Dam Safety Program at the state level. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam on an annual basis to ensure that it is performing as intended and is not developing problems. Roughly a third of these inspections include in-depth instrumentation reviews. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. Over 1,200 dams are inspected by DSOD engineers on a yearly schedule to ensure performance and maintenance of dams (California DWR, 2007).

As required by California Water Code Section 6161, the DSOD reviews and approves inundation maps prepared by licensed civil engineers and submitted by dam owners for dams with hazard ratings of extremely high, high, and significant. Owners of dams under DSOD jurisdiction use DSOD-approved inundation maps to develop emergency action plans and to provide general information for emergency planning. Actual evacuation zones and timing are determined by local emergency managers who are responsible for specific evacuation procedures in an emergency event. Available inundation mapping approved by DSOD can be viewed at: https://fmds.water.ca.gov/maps/damim/.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of federal and non-federal dams in the United States that meet size and storage limitations specified in the National Dam Safety Act. The Corps of Engineers has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams that contains information about a dam's location, size, purpose, type, last inspection and regulatory facts (U.S. Army Corps of Engineers, 2017). Table 8-1 provides the most recent inspection dates for the dams in Los Angeles County and in City of Los Angeles that can impact the city.

Table 8-1. Los Angeles County Dam Inspection Dates

Dam Name	Inspection Date	Dam Name	Inspection Date
10th and Western	09/04/2014	Lopez[a]	03/04/2014
Big Tujunga	02/13/2018	Los Angeles Reservoir[a]	07/20/2017
Devils Gate	02/06/2018	Lower Franklin #2[a]	07/26/2017
Diederich Reservoir	03/29/2018	Lower Van Norman Bypass	07/20/2017
Eagle Rock[a]	07/21/2017	Mulholland[a]	07/13/2017
Elysian[a]	07/13/2017	Pacoima	1/25/2018
Encino[a]	07/26/2017	Palos Verdes Reservoir	03/16/2018
Glen Oaks 968	03/29/2018	Riviera Reservoir[a]	05/25/2018
Green Verdugo	07/20/2017	Santa Ynez Canyon[a]	07/27/2017
Greystone	06/27/2018	Sepulveda	02/12/2015
Hansen Rec Lake[a]	06/28/2018	Silver Lake[a]	08/29/2017
Ivanhoe	Not Available	Solano	03/27/2018
Laguna Reg. Basin	12/7/2017	Stone Canyon[a]	07/26/2017
		Upper Franklin Dam	07/27/20/06

a. Dams located within Los Angeles city limits

Source: National Inventory of Dams, https://catalog.data.gov/dataset/national-inventory-of-dams, 2020

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. The FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. The FERC Dam Safety Program covers 3,036 dams that are part of regulated hydroelectric projects. Two-thirds of these dams are more than 50 years old. As dams age, concern about their safety and integrity grows, and oversight and a regular inspection program are extremely important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet, or with a total storage capacity of more than 2,000 acre-feet.

FERC staff monitors and evaluates seismic research in geographic areas such as California where there are concerns about possible seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects in these areas. FERC staff also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC staff visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

The FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure or accident. The plans include operational procedures that may be used, such as

reducing reservoir levels or reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

8.2 HAZARD PROFILE

8.2.1 Past Events

According to the 2018 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.

The state's most recent dam emergency occurred in February 2017 when the Oroville Dam in Butte County was on the verge of overflow. The dam's concrete spillway was damaged by erosion and a massive hole developed. The auxiliary spillway was used to prevent overtopping of the dam, and it experienced erosion problems also. Evacuation orders were issued in advance of a potential large uncontrolled release of water from Lake Oroville, but such a release did not occur. After this incident, state officials ordered that flood-control spillways be re-inspected on 93 California dams with potential geologic, structural or performance issues that could jeopardize their ability to safely pass a flood event.

The sections below describe significant dam failure events directly relevant to the City of Los Angeles.

St. Francis Dam, 1928

The most catastrophic dam failure in California's history was that of the St. Francis Dam in Los Angeles County 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 DSOD came into existence as a direct result of this catastrophe.

Baldwin Hills Reservoir Collapse, 1963

On December 14, 1963, the dam at the head of Cloverdale Road broke in the Baldwin Hills section of Los Angeles. Lost homes, ruined property, and even death resulted from a river of rushing water from the broken dam. Automobiles, fragments of houses, and chunks of concrete were carried along the flood's path and deposited on the ruins of Village Green. Eighteen persons were rescued by helicopter and flown out to a safety.

1971 Earthquake

In 1971, a magnitude 6.7 earthquake had the following impacts on dams in the Los Angeles area:

- Perched above the densely populated San Fernando Valley, the 142-foot-high, 2,100-foot-long Lower San Fernando Dam held a reservoir 1.6 miles long and as much as 130 feet deep and supplied 80 percent of the City's water supply. The quake shook loose a massive slide in the upstream slope of the Lower San Fernando Dam that lowered the crest about 30 feet and carried away much of upstream concrete facing of the dam. Resulting severe damage of the dam forced 80,000 residents to evacuate homes in an 11-square-mile area down the valley while the water behind the earthen dam was lowered over a three-day period. The damage was so heavy that the dam could not be repaired to safely hold its water supply in the event of another large earthquake. The $33 million Los Angeles Dam and Reservoir was built in 1975-76 about

3,000 feet up the valley from the old Lower San Fernando Dam, and the old dam was reconstructed to provide a holding basin for stormwater and to back up the new dam.

- Several thousand people were evacuated from homes south of Van Norman Dam in Mission Hills when Van Norman Lake reportedly sank 1 foot. A 60-foot section of the concrete dam at the lake's southern edge collapsed, and portions were reported as still crumbling during the evacuation. The dam holds back more than 6 billion gallons of water and is the largest in the City's water system.
- Cracks were reported in the Hansen Dam on Sepulveda Boulevard in Lakeview Terrace.

1994 Northridge Earthquake

Thirteen dams in the greater Los Angeles area moved or cracked during the 1994 Northridge Earthquake. The most seriously damaged was the Pacoima Dam, about 8 miles from the epicenter. However, none were severely damaged, in part due to completion of retrofitting pursuant to the 1972 State Dam Safety Act. The Los Angeles Dam showed only minor deformation and superficial cracking.

8.2.2 Location

According to the California DSOD, there are 90 dams in Los Angeles County. Table 8-2 lists the dams that have the potential to impact the City of Los Angeles should they fail. Dam locations are shown in Figure 8-1. Over one third of the land area and population in the City is potentially threatened by dam failure. Inundation maps have been developed for all of these dams, but the maps are not available to the public and are not included in the FMP2020 for security purposes. These maps are the basis for the dam failure risk analysis contained in this chapter. City emergency management officials have access to the data to support response or recovery from a dam failure event. Questions regarding probable exposure to dam failure inundation should be directed to the City of Los Angeles Emergency Management Department.

8.2.3 Frequency

Dam failure events are infrequent and usually coincide with the events that cause them, such as earthquakes, landslides and excessive rainfall and snowmelt. There is a "residual risk" associated with dams; residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of occurrence of any type of dam failure event is considered to be low in today's regulatory and dam safety oversight environment.

8.2.4 Severity

Dam failure can be catastrophic to all life and property downstream. The U.S. Army Corps of Engineers developed the classification system shown in Table 8-3 for the hazard potential of dam failures.

8.2.5 Warning Time

Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, it is possible that there would be no warning time. A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until either the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach as one or more monolith sections formed during dam construction are forced apart by the escaping water. The time for breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers, 1997). The City has established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan.

Table 8-2. Dams in Los Angeles County With Potential to Impact City of Los Angeles

Name	Hazard Class[a]	Water Course	Owner	Year Built	Dam Type[d]	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
10th and Western	1A	Off stream	City of Glendale	1924	ERTH	725	28	46	1.03
Big Tujunga	1A	Big Tujunga Creek	Los Angeles County	1931	VARA	505	220	5,750	81.7
Devils Gate	1A	Arroyo Seco	Los Angeles County	1920	GRAV	252	108	2,600	29.7
Diederich Res	1A	Off stream	City of Glendale	1950	ERTH	100	60	174	0
Eagle Rock[b]	1A	Off Stream	City of Los Angeles	1953	ERTH	495	113	254	0
Elysian[b]	1A	Los Angeles River Tributary	City of Los Angeles	1943	ERTH	480	71	167	0.08
Encino[b]	1A	Encino Creek	City of Los Angeles	1924	ERTH	1,850	168	9789	1.4
Glen Oaks 968	1A	Off Stream	City of Glendale	1949	ERTH	220	62	28	0
Green Verdugo	1A	Tujunga Wash Tributary	City of Los Angeles	1953	ERTH	452	118	99	0.04
Greystone	1A	Off Stream	City of Beverley Hills	1970	RECT	1,140	75	60	0
Hansen Rec Lake[b]	1A	Off Stream	City of Los Angeles	1999	ERTH	3,600	50	85	0.01
Ivanhoe[c]	N/A	Off stream	City of Los Angeles	1906	ERTH	430	458	180	N/A
Laguna Reg. Basin	1A	Laguna Wash	Los Angeles County	1970	ERTH	380	43	310	5.55
Lopez[b]	1A	Arroyo Grande Creek	San Luis Obispo County	1969	ERTH	1,120	166	52,500	70
Los Angeles Res[b]	1A	San Fernando Creek	City of Los Angeles	1977	ERTH	3,415	130	10,000	9
Lower Franklin No. 2[b]	1A	Franklin Canyon	City of Los Angeles	1982	ERTH	410	49	920	1.12
Lower Van Norman Bypass[c]		Off stream	City of Los Angeles	1970	ERTH	600	78	240	0.03
Mulholland[b]	1A	Weid Canyon	City of Los Angeles	1924	GRAV	933	195	4,036	1
Pacoima	1A	Pacoima Creek	Los Angeles County	1929	VARA	640	365	3,777	27.8
Palos Verdes Res	1A	Los Angeles Harbor Tributary	Metropolitan Water District	1939	ERTH	2,150	82	1,100	1
Riviera Res. [b]	1A	Off Stream	City of Santa Monica	1962	RECT	1,280	40	76	0
Santa Ynez Canyon[b]	1A	Santa Ynez Canyon Tributary	City of Los Angeles	1968	ERTH	455	157	356	0.23
Sepulveda	1A	Los Angeles River	Corps of Engineers	1941	CONC	15,270	57	--	--
Silver Lake[b]	1A	Ballona Creek Tributary	City of Los Angeles	1906	ERRK	760	43	2,020	0.12
Solano[c]	N/A	Off stream	City of Los Angeles	1904	ERTH	915	620	17	0.99
Stone Canyon[b]	1A	Stone Canyon Creek	City of Los Angeles	1924	ERTH	1,150	188	10,372	1.4
Upper Franklin	N/A	N/A	National Park Service	1915	ERTH	260	40	150	N/A

a. Downstream Hazard Class 1A: > 300 lives at risk, 1B: 31 to 300 lives at risk, 1C: 7 to 30 lives at risk.
b. Dams located within Los Angeles city limits
c. No inundation mapping available for these dams
d. Dam Type: ERTH = earth fill; VARA = arch; GRAV = gravity; RECT = reinforced concrete tank; CONC = concrete; ERRK = rock fill

Source: California DWR, 2015.

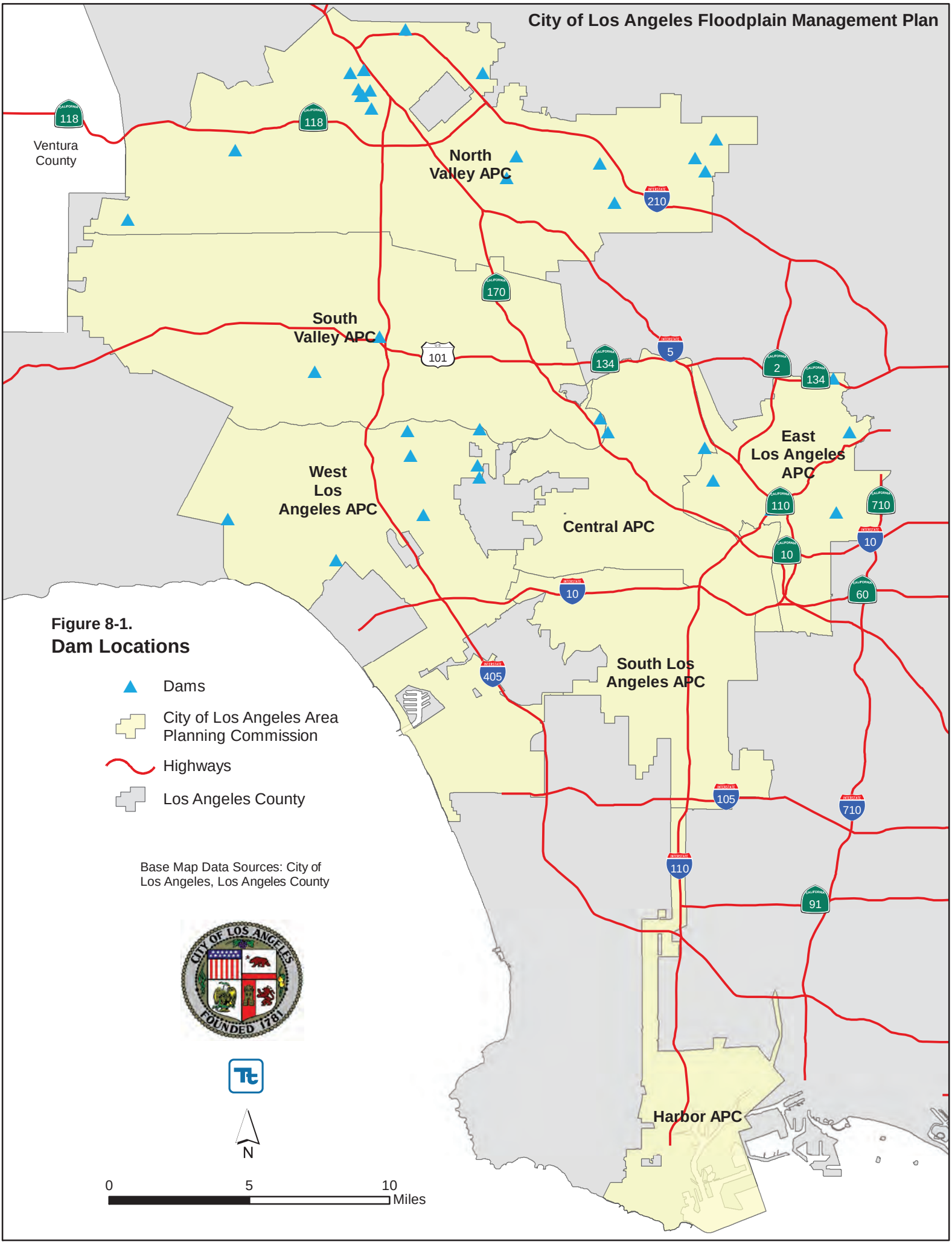

Figure 8-1.
Dam Locations

Table 8-3. Hazard Potential Classification

Hazard Category[a]	Direct Loss of Life[b]	Lifeline Losses[c]	Property Losses[d]	Environmental Losses[e]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers, 1997

8.3 SECONDARY HAZARDS

Dam failure can cause severe downstream flooding depending on the magnitude of the failure. Other potential secondary hazards of dam failure include landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

8.4 EXPOSURE

Hazus analysis of the dam failure hazard was conducted for the most recent City of Los Angeles hazard mitigation plan (City of Los Angeles, 2018). For that analysis, dam inundation areas for which inundation mapping was available were combined into a single inundation area. The following dams and reservoirs were included:

- Big Tujunga No. 1
- Devils Gate
- Eagle Rock
- Elysian
- Encino
- Green Verdugo
- Greystone Reservoir
- Hansen Rec Lake
- Lopez
- Los Angeles Reservoir
- Lower Franklin No. 2
- Mulholland
- Pacoima
- Palos Verdes Reservoir
- Riviera Reservoir
- Santa Ynez Canyon
- Sepulveda
- Silver Lake
- Stone Canyon
- Upper Franklin

8.4.1 Population

All populations in a dam failure inundation zone would be exposed to the risk of a dam failure. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation. The hazard mitigation plan analysis estimated that the population living in the mapped inundation area within the planning area is 1.55 million, 39.8 percent of the total planning-area population.

8.4.2 Property

Structures

The number and value of buildings within the combined dam failure inundation area, based on the Hazus analysis from the hazard mitigation plan, is summarized in Table 8-4.

Table 8-4. Exposure and Value of Structures in Dam Failure Inundation Areas

Area Planning Commission	Number of Buildings Exposed	Value of Structures Exposed	Value of Contents Exposed	Total (Structure and Contents) Exposed	% of Total Value Exposed
Central	39,314	$54,215,144,986	$43,066,508,136	$97,281,653,123	50.9%
East Los Angeles	8,285	$8,718,646,162	$7,929,448,885	$16,648,095,048	25.1%
Harbor	584	$1,125,941,991	$1,203,290,913	$2,329,232,904	5.7%
North Valley	58,199	$25,981,401,490	$19,728,119,922	$45,709,521,412	39.5%
South Los Angeles	79,092	$41,294,490,165	$31,497,066,083	$72,791,556,249	73.9%
South Valley	77,847	$45,352,442,478	$30,253,996,760	$75,606,439,238	52.0%
West Los Angeles	28,550	$17,984,324,642	$12,555,856,543	$30,540,181,185	27.8%
Total	291,871	$194,672,391,915	$146,234,287,243	$340,906,679,158	44.4%

Land Use

Some land uses are more vulnerable to dam failure inundation, such as residential uses, while others are less vulnerable, such as agricultural land or parks. Figure 8-2 shows the existing land use of all parcels in the combined dam inundation area for the planning area, as determined in the hazard mitigation plan. Open space uses make up about 12 percent of the combined dam inundation area. These are favorable, lower-risk uses for dam inundation areas. Higher-risk residential uses make up more than half the inundation area.

Source: City of Los Angeles. 2018

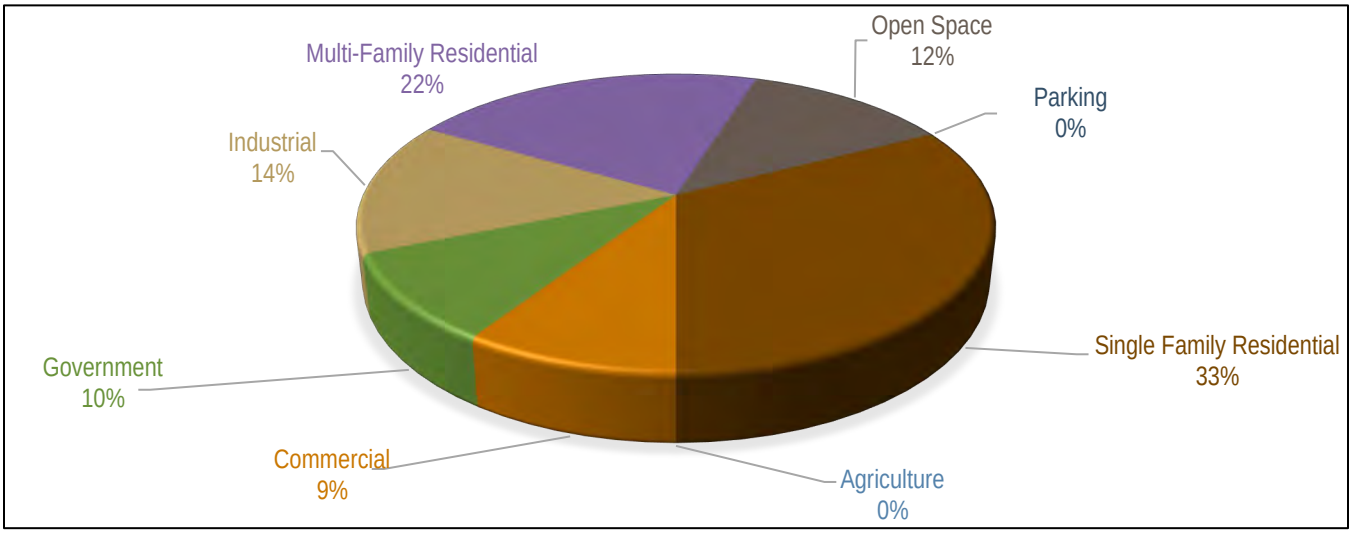

Figure 8-2. Present Land Use Within the Combined Dam Failure Inundation Area

8.4.3 Critical Facilities

GIS analysis was used to determine the number of critical facilities in the combined dam inundation areas, as shown in Table 8-5.

Table 8-5. Critical Facilities in Aggregate Dam Failure Areas

Area Planning Commission	Central	East	Harbor	North Valley	South Los Angeles	South Valley	West Los Angeles	Total
Safety and Security	13	0	0	5	13	13	8	52
Food, Water and Sheltering	53	20	5	70	115	86	36	385
Health and Medical	4	3	0	4	2	4	2	19
Energy	1	0	2	4	1	1	0	9
Communications	0	0	0	3	4	3	2	12
Transportation	69	80	11	125	86	138	49	558
Hazardous Materials	27	34	5	70	44	39	8	227
Total	167	137	23	281	265	284	105	1,262

8.4.4 Environment

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals.

8.5 VULNERABILITY

8.5.1 Population

Vulnerable Communities

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly and young who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television or radio emergency warning system. The Hazus analysis for the hazard mitigation plan identified populations vulnerable to the dam failure hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 55 percent of the households within the combined dam inundation areas are economically disadvantaged, defined as having household incomes of $50,000 or less.
- **Population over 65 Years Old**—It is estimated that 9 percent of the population in the census blocks that intersect the combined dam inundation areas are over 65 years old.
- **Population under 16 Years Old**—It is estimated that 24 percent of the population within census blocks located in or near the combined dam inundation areas are under 16 years of age.

Impacts on Persons and Households

Table 8-6 summarizes estimated impacts on persons and households within the combined inundation area, as determined in the Hazus analysis completed for the hazard mitigation plan.

8.5.2 Property

Vulnerable properties are those closest to the dam inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Table 8-7 summarizes the loss estimates for dam failure as developed for the hazard mitigation plan. Debris impacts also were estimated in Hazus, as shown in Table 8-8.

Table 8-6. Estimated Dam Failure Impact on Persons and Households in The City of Los Angeles

Area Planning Commission	Number of Displaced Households	Number of Persons Requiring Short-Term Shelter
Central	243,267	240,900
East	24,657	24,104
Harbor	860	798
North Valley	257,174	256,158
South Los Angeles	485,484	483,681
South Valley	327,881	326,701
West Los Angeles	84,893	84,058
Total	1,424,216	1,416,400

Table 8-7. Loss Estimates for Dam Failure

Area Planning Commission	Buildings Impacted	Value of Structures Damaged	Value of Contents Damaged	Total Value (Structure and Contents) Damaged	% of Total Value Damaged
Central	23,496	$11,764,854,423	$16,104,622,969	$27,869,477,392	14.6%
East Los Angeles	6,022	$2,033,175,464	$2,448,366,240	$4,481,541,704	6.8%
Harbor	454	$84,369,803	$132,082,642	$216,452,445	0.5%
North Valley	36,582	$5,787,154,365	$6,162,016,744	$11,949,171,110	10.3%
South Los Angeles	75,892	$15,432,886,043	$18,745,359,132	$34,178,245,175	34.7%
South Valley	60,165	$11,133,349,064	$9,737,597,319	$20,870,946,383	14.3%
West Los Angeles	17,907	$4,636,020,393	$4,300,107,899	$8,936,128,292	8.1%
Total	220,518	$50,871,809,556	$57,630,152,946	$108,501,962,501	14.1%

Table 8-8. Estimated Debris

Area Planning Commission	Debris to Be Removed (tons) from Combined Dam Inundation
Central	1,712,077
East Los Angeles	336,748
Harbor	4,376
North Valley	949,319
South Los Angeles	3,448,095
South Valley	1,717,866
West Los Angeles	893,068
Total	9,061,549

8.5.3 Critical Facilities

Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam inundation. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas. Hazus estimated damage to critical facilities and critical infrastructure in the dam failure inundation zone as summarized in Table 8-9.

Table 8-9. Potential Damage to Critical Facilities in Dam Failure Inundation Area

	Number of Facilities Affected	Average % of Total Value Damaged		Days to 100% Functionality
		Structure	Content	
Safety and Security	43	0.9 – 88.0	1.0 – 100.0	480 – 900
Food, Water and Sheltering	300	0.1 – 94	1.9 – 100	480 – 900
Health and Medical	11	0.0 – 60.0	0.0 – 96.0	360 – 900
Energy	7	1.0 – 40.0	89.2 – 100.0	N/A
Communications	11	11.0 – 76.0	55.0 – 96.0	N/A
Transportation	378	0.3 – 78.6	N/A	N/A
Hazardous Materials	170	0.0 – 58.0	0.0 – 75.0	N/A
Total/Average	920			

8.5.4 Environment

The environment vulnerable to the dam failure Hazard is the same as the environment exposed to the hazard. The principal environmental impact from inundation is loss of aquatic habitat. The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species such as the Santa Ana sucker and arroyo chub.

8.6 FUTURE DEVELOPMENT TRENDS

Dam failures are low-probability, high-consequence events. Because of this, it is not typically practical for local governments to regulate development based on dam failure inundation mapping. Land use will be directed by the City of Los Angeles general plan and zoning ordinance adopted under state law. The Safety Element of the General Plan establishes standards and plans for the protection of the community from hazards. Dam failure is currently not addressed as a stand-alone hazard in the Safety Element, but flooding is. The City of Los Angeles has established comprehensive policies regarding sound land use in identified flood hazard areas. Most of the areas vulnerable to the more severe impacts from dam failure intersect the mapped flood hazard areas. Flood-related policies in the General Plan and implementation programs in hazard mitigation and floodplain management plans will help to reduce the risk associated with the dam failure hazard for future development in the City.

Any new development outside of a flood hazard area will most likely not include provisions that would mitigate the impacts from a dam failure. The amount of the dam inundation area that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of the dam inundation area.

While probability of dam failure is low, probability of flooding associated with changes in dam operational parameters in response to extreme rainfall events is higher. Dam designs and operations are developed based on hydrographs from historical records. If these hydrographs change significantly over time due to effects of climate change, current dam designs and operations may become overwhelmed. Specified release rates and impound thresholds may have to be changed, which could result in increased discharges downstream of these facilities, thus increasing probability and severity of flooding.

8.7 SCENARIO

An earthquake in the region could lead to liquefaction of soils around a dam. This could occur without warning during any time of the day. Human activity such as a terrorist attack also could trigger a catastrophic failure of a dam that impacts the planning area.

8.8 ISSUES

Flooding as a result of a dam failure would significantly impact properties and populations in the inundation zones. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Important issues associated with dam failure hazards include the following:

- California's AB 2800 enacts legislation that will require engineers and climate scientists to collaborate to help the state design and build infrastructure that will withstand the unavoidable impacts of a changing climate.
- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.
- Mapping for federally regulated dams is already required and available; however, mapping for non-federal-regulated dams that estimates inundation depths is needed to better assess the risk associated with dam failure from these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For non-federal-regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can indicate areas potentially impacted by more frequent events; such information can support emergency response and preparedness actions.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

9. TSUNAMI PROFILE AND RISK ASSESSMENT

9.1 GENERAL BACKGROUND

9.1.1 Tsunami Behavior

A tsunami consists of a series of high-energy waves that radiate outward like pond ripples from an area where a generating event occurs. The waves arrive at shorelines over an extended period.

Tsunamis are typically classified as local or distant. Locally generated tsunamis have minimal warning times, leaving few options except to run to high ground. They may be accompanied by damage resulting from the triggering earthquake due to ground shaking, surface faulting, liquefaction or landslides.

Distant tsunamis may travel for hours before striking a coastline, giving a community a chance to implement evacuation plans. In the open ocean, a tsunami may be only a few inches or feet high, but it can travel with speeds approaching 600 miles per hour. Tsunami waves arrive at shorelines over an extended period.

As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. The first wave usually is not the largest. Several larger and more destructive waves often follow the first one. As tsunamis reach the shoreline, they may take the form of a fast-rising tide, a cresting wave, or a bore (a large, turbulent wall-like wave). The bore phenomenon resembles a step-like change in the water level that advances rapidly (from 10 to 60 miles per hour).

The configuration of the coastline, the shape of the ocean floor, and the characteristics of advancing waves play important roles in the destructiveness of the waves. Offshore canyons can focus tsunami wave energy and islands can filter the energy. The orientation of the coastline determines whether the waves strike head-on or are refracted from other parts of the coastline. A wave may be small at one point on a coast and much larger at other points. Bays, sounds, inlets, rivers, streams, offshore canyons, islands, and flood control channels may cause various effects that alter the level of damage. It has been estimated, for example, that a tsunami wave entering a flood control channel could reach a mile or more inland, especially if it enters at high tide.

The first visible indication of an approaching tsunami may be recession of water (draw down) caused by the trough preceding the advancing, large inbound wave crest. Rapid draw down can create strong currents in harbor inlets and channels that can severely damage coastal structures due to erosive scour around piers and pilings. As the water's surface drops, piers can be damaged by boats or ships straining at or breaking their mooring lines. The vessels can overturn or sink due to strong currents, collisions with other objects, or impact with the harbor bottom.

Conversely, the first indication of a tsunami may be a rise in water level. The advancing tsunami may initially resemble a strong surge increasing the sea level like the rising tide, but the tsunami surge rises faster and does not stop at the shoreline. Even if the wave height appears to be small, 3 to 6 feet for example, the strength of the accompanying surge can be deadly. Waist-high surges can cause strong currents that float cars, small structures, and other debris. Boats and debris are often carried inland by the surge and left stranded when the water recedes.

At some locations, the advancing turbulent wave front will be the most destructive part of the wave. In other situations, the greatest damage will be caused by the outflow of water back to the sea between crests, sweeping all before it and undermining roads, buildings, bulkheads, and other structures. This outflow action can carry enormous amounts of highly damaging debris with it, resulting in further destruction. Ships and boats, unless moved away from shore, may be dashed against breakwaters, wharves, and other craft, or be washed ashore and left grounded after the withdrawal of the seawater.

9.1.2 Tsunami Causes

Earthquakes can create large sea waves that can inundate coastal areas. The earth's surface is made up of crustal plates that contain large sections of continents and ocean basins. These plates may pull apart from, slide past, override, or under-ride (i.e., "subduct") one another. Plate boundaries coincide with faults that produce earthquakes as stress accumulated from the relative movement of the plates is relieved. The earthquakes, in turn, may produce displacements of the sea floor that can set the overlying column of water in motion, initiating a tsunami. However, not all submarine earthquakes produce tsunamis. It depends on the magnitude of the earthquake and type of faulting that has occurred.

The most active plate boundaries rim the Pacific Ocean and the Caribbean Sea. Consequently, this is where most tsunami activity is expected. Most tsunamis originate in the Pacific "Ring of Fire," which is the most active seismic region on earth. It is estimated that almost 500 cities in Alaska, California, Hawaii, Oregon, and Washington are susceptible to tsunamis. Almost a million residents of these cities could be inundated by a 50-foot tsunami. In addition, millions of tourist that visit these regions each year could be impacted by tsunami events along the Pacific coast.

Landslides on the ocean floor and volcanic activity also have the potential to create large sea waves that can inundate coastal areas.

9.2 HAZARD PROFILE

9.2.1 Past Events

Eighty-two possible or confirmed tsunamis have been observed or recorded in California in the past 150 years. Statewide, most recorded tsunami events were small and detected only by tide gages. Eleven events were large enough to cause damage, and four caused deaths. The following is a summary of major tsunami events that have affected Los Angeles County (Los Angeles County, 2015):

- March 11, 2011—A magnitude 9.0 in Japan generated tsunami waves that caused extensive damage in Japan. The tsunami reached Los Angeles County, where waves capsized vessels berthed near the Santa Catalina Island and caused minor damage in Marina del Rey, Redondo Beach and Santa Monica. This was the most damaging tsunami to hit California since 1964.
- February 27, 2010—A tsunami originating off Chile created rapid water level fluctuations and strong currents in harbors and along beaches in California.
- September 29, 2009—Following a magnitude 8.0 to 8.3 earthquake 120 miles from America Samoa, a tsunami brought strong currents and dangerous waves to the San Pedro and Santa Monica Bay areas.
- November 29, 1975—A magnitude 7.2 earthquake in Hawaii caused a tsunami that reached Santa Catalina Island.
- March 27, 1964—A magnitude 9.2 earthquake in Alaska triggered a tsunami that caused damage in Alaska, British Columbia, Washington, California and Hawaii. The hardest hit was Crescent City, California, where waves destroyed half of the waterfront business district. There was also extensive damage in San Francisco Bay, marinas in Marin County and the Los Angeles and Long Beach harbors.

- May 22-24, 1960—A magnitude 8.5 earthquake in Chile caused a tsunami that contributed to a scuba diver death and $1 million in damage.
- April 1, 1946—A magnitude 7.8 earthquake in Alaska's Aleutian Island chain caused a tsunami whose effects were felt along the United States coastline, especially in Los Angeles and Long Beach harbor areas.
- 1927—A tsunami hit Southern California, raising the ocean's water surface level by 6 feet.

Nearly two-thirds of California's tsunami events and all but one damaging event were generated by distant sources. Most tsunamis affecting California have originated in the Gulf of Alaska in the Aleutian Subduction Zone. The worst event was the 1964 tsunami generated by the Magnitude-9.2 Alaska earthquake, which killed 12 in Northern California and caused over $15 million in damage. The 1960 Chilean earthquake produced a great tsunami that impacted the entire Pacific basin. Damage was reported in California ports and harbors from San Diego to Crescent City and losses exceeded $1 million.

Local tsunamis have the potential to cause locally greater wave heights. The largest historical local-source tsunami on the west coast was caused by the 1927 Point Arguello, California, earthquake (Magnitude 7.1), which produced 7-foot waves in the nearby coastal area. There is geological evidence of significant impacts from tsunamis originating along the Cascadia subduction zone, which extends from Cape Mendocino in California to the Queen Charlotte Islands, British Columbia, and lies only a short distance off the coast.

9.2.2 Location

Depending upon the magnitude of the tsunami, coastal areas of the City could be inundated, most notably in the San Pedro and Los Angeles Harbor areas, and in neighboring Santa Monica. Continued development in areas exposed to coastal inundation has increased the risk of property damage and loss of life from future tsunamis. While historic and geologic evidence suggests a threat of tsunami is greater in Alaska, Hawaii and the northern coastal areas of California, some evidence indicates a potential for events impacting Southern California.

Figure 9-1 and Figure 9-2 show tsunami inundations areas in the West Los Angeles and Harbor APCs, as mapped by the California Office of Emergency Services. These are the only APCs in the City that have structures exposed to tsunamis. The modeling used for this map allows for wave evolution over a variable seabed and accounts for topography in its inundation mapping. The map does not represent inundation from a single scenario. It was created by combining inundation results for multiple source events affecting a given region, representing realistic local and distant earthquakes and hypothetical extreme undersea and near-shore landslides.

9.2.3 Frequency

The frequency of tsunamis is related to the frequency of the events that cause them, so it is similar to the frequency of seismic or volcanic activities or landslides. Generally four or five tsunamis occur every year in the Pacific Basin, and those that are most damaging are generated in the Pacific waters off South America rather than in the northern Pacific.

9.2.4 Severity

Tsunamis are a threat to life and property to anyone living near the ocean. According to the International Tsunami Warning Center, over 1,000 tsunamis were recorded globally from 1950 to 2019. Over 50 of these events caused fatalities, to a total of over 308,000 coastal residents. The overwhelming majority of these events occurred in the Pacific basin. Recent tsunamis have struck Nicaragua, Indonesia, and Japan, killing several thousand people. Property damage due to these waves exceed $1 billion. Historically, tsunamis originating in the northern Pacific and along the west coast of South America have caused more damage on the west coast of the United States than tsunamis originating in Japan and the Southwest Pacific.

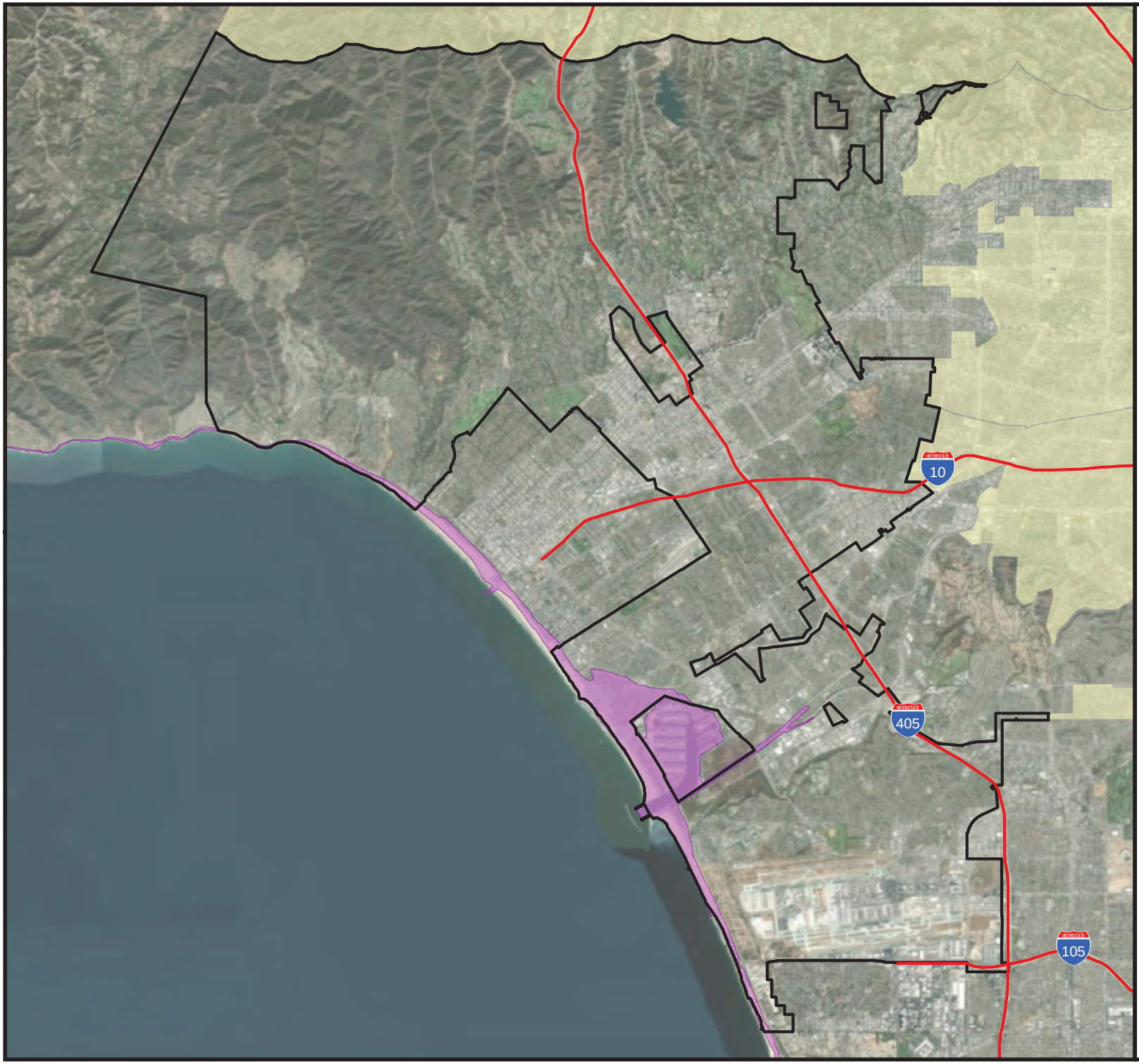

FIGURE 9-1.

Mapped Tsunami Inundation Area in the West Los Angeles APC

Legend

- Tsunami Inundation Area
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, CA Dept of
Conservation

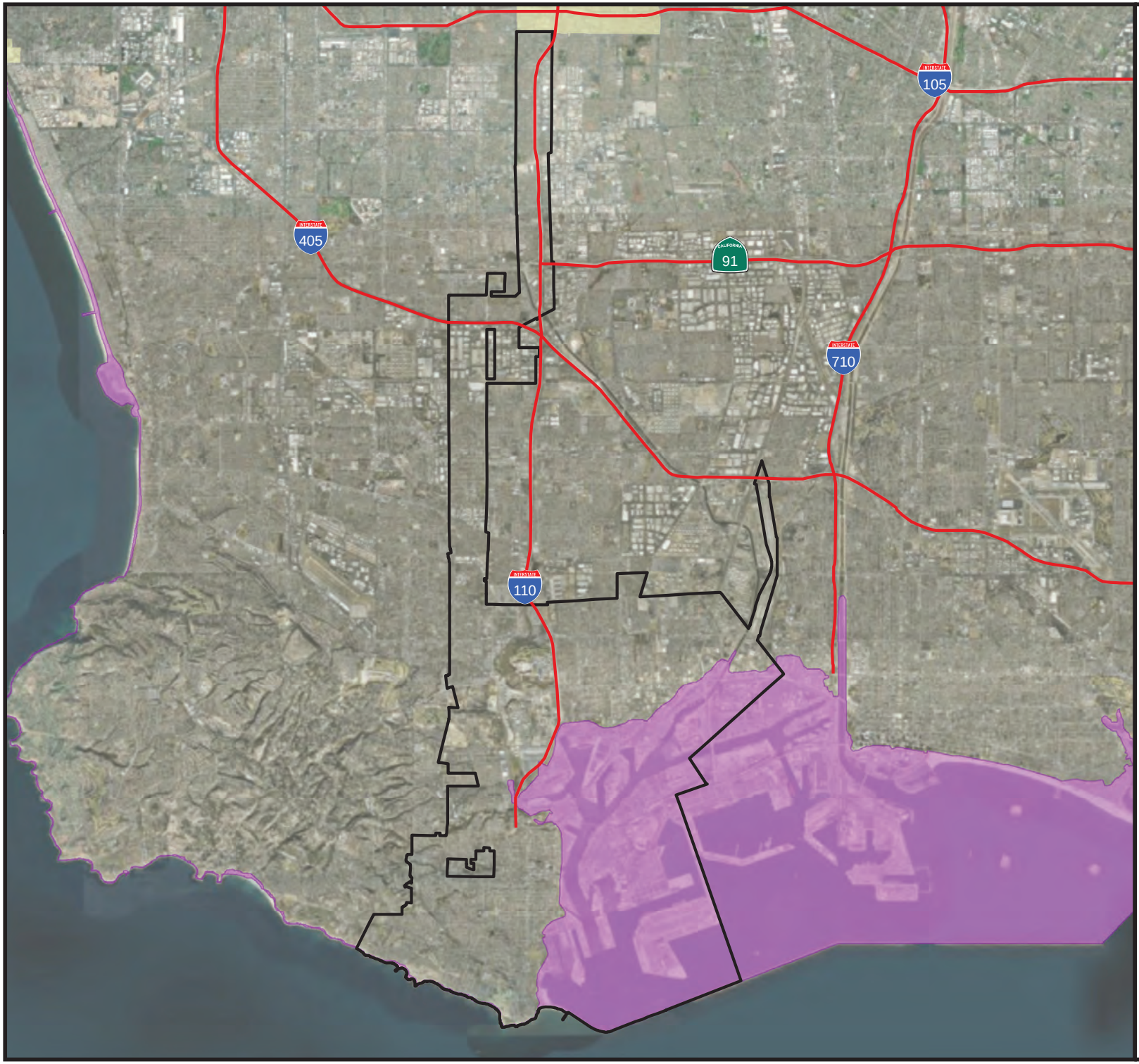

FIGURE 9-2.

Mapped Tsunami Inundation Area in the Harbor APC

Legend

- Tsunami Inundation Area
- Highways
- Selected APC
- City of Los Angeles

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, CA Dept of
Conservation

The Cascadia subduction zone will produce the state's largest tsunami. The Cascadia subduction zone is similar to the Alaska-Aleutian trench that generated the Magnitude-9.2 1964 Alaska earthquake and the Sunda trench in Indonesia that produced the Magnitude-9.3 December 2004 Sumatra earthquake. Native American accounts of past Cascadia earthquakes suggest tsunami wave heights on the order of 60 feet, comparable to water levels in Aceh Province Indonesia. Water heights in Japan produced by the 1700 Cascadia earthquake were over 15 feet, comparable to tsunami heights observed on the African coast after the Sumatra earthquake. The Cascadia subduction zone last ruptured January 26, 1700, creating a tsunami that left markers in the geologic record from Humboldt County to Vancouver Island, Canada and is noted in written records in Japan. At least seven ruptures of the Cascadia subduction zone have been observed in the geologic record.

9.2.5 Warning Time

Typical signs of a tsunami hazard are earthquakes and/or sudden and unexpected rise or fall in coastal water. The large waves are often preceded by coastal flooding and followed by a quick recession of the water. Tsunamis are difficult to detect in the open ocean; with waves less than 3 feet high. The tsunami's size and speed, as well as the coastal area's form and depth, affect the impact of a tsunami; wave heights of 50 feet are not uncommon. In general, scientists believe it requires an earthquake of at least a magnitude 7 to produce a tsunami. Figure 9-3 shows likely travel times across the Pacific Ocean for a tsunami.

NOAA, 2017

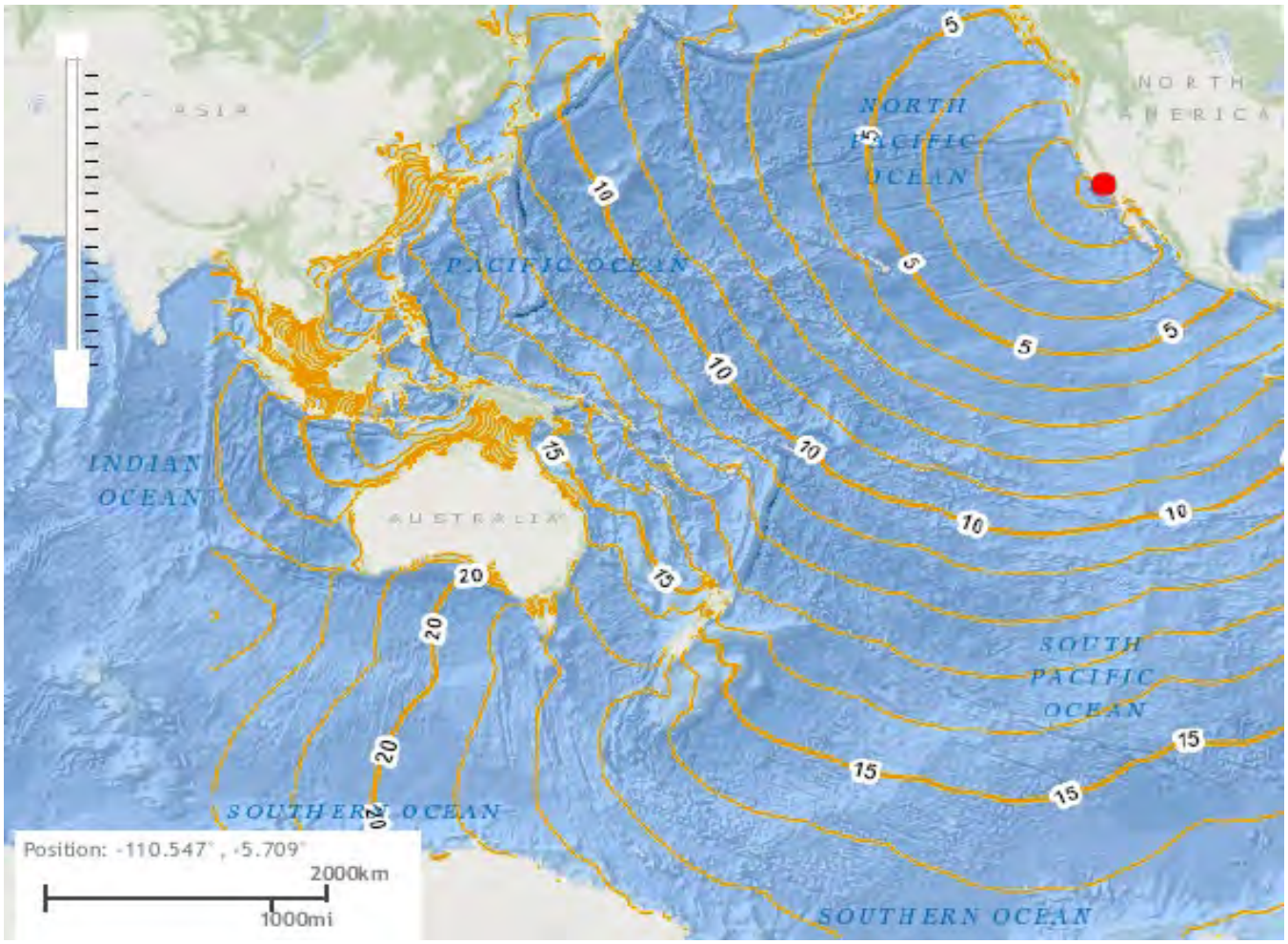

Figure 9-3. Historical Tsunami Travel Times in the Pacific Ocean

Pacific Tsunami Warning System

The Pacific tsunami warning system evolved from a program initiated in 1946. It is a cooperative effort involving 26 countries along with numerous seismic stations, water level stations and information distribution centers. The National Weather Service operates two regional information distribution centers. One is located in Ewa Beach, Hawaii, and the other is in Palmer, Alaska. The Ewa Beach center also serves as an administrative hub for the Pacific warning system.

The warning system only begins to function when a Pacific basin earthquake of magnitude 6.5 or greater triggers an earthquake alarm. When this occurs, the following sequence of actions occurs:

- Data is interpolated to determine epicenter and magnitude of the event.
- If the event is magnitude 7.5 or greater and located at sea, a TSUNAMI WATCH is issued.
- Participating tide stations in the earthquake area are requested to monitor their gages. If unusual tide levels are noted, the tsunami watch is upgraded to a TSUNAMI WARNING.
- Tsunami travel times are calculated, and the warning is transmitted to the disseminating agencies and thus relayed to the public.
- The Ewa Beach center will cancel the watch or warning if reports from the stations indicate that no tsunami was generated or that the tsunami was inconsequential.

This system is not considered to be effective for communities located close to the tsunami because the first wave would arrive before the data were processed and analyzed. In this case, strong ground shaking would provide the first warning of a potential tsunami.

Information provided by this system is monitored and evaluated by National Oceanic and Atmospheric Administration (NOAA) scientists who assess the risk and issue a tsunami warning if indicated by the data. Warnings are transmitted to state agencies via the National Warning System. In California, the California Office of Emergency Services Warning Center receives the information from the National Warning System and immediately transmits it to local operational areas using the California Law Enforcement Telecommunications System, California Warning System, and Emergency Digital Information System. The information is simultaneously transmitted to designated local response agencies such as the Los Angeles Police Department, Los Angeles Fire Department, and Harbor Department.

9.3 SECONDARY HAZARDS

Aside from the tremendous hydraulic force of tsunami waves, floating debris carried by a tsunami can endanger human lives and batter inland structures. Ships moored at piers and in harbors often are swamped and sunk or are left battered and stranded high on the shore. Breakwaters and piers collapse, sometimes because of scouring actions that sweep away their foundation material and sometimes because of the sheer impact of the waves. Railroad yards and oil tanks situated near the waterfront are particularly vulnerable. Oil fires frequently result and are spread by the waves.

Port facilities, naval facilities, fishing fleets and public utilities are often the backbone of the economy of the affected areas, and these are the resources that generally receive the most severe damage. Until debris can be cleared, wharves and piers rebuilt, utilities restored, and fishing fleets reconstituted, communities may find themselves without fuel, food and employment. Wherever water transport is a vital means of supply, disruption of coastal systems caused by tsunamis can have far-reaching economic effects.

9.4 EXPOSURE

9.4.1 Population

The City's 2018 hazard mitigation plan used GIS to evaluate tsunami exposure by APC, based on the number of residential buildings within the mapped tsunami inundation zone. This analysis estimated that exposed population is 18,149 people (0.5 percent of the planning area total): 18,093 in the West Los Angeles APC and 56 in the Harbor APC.

9.4.2 Property

Structures

The number and value of exposed buildings in the tsunami hazard zone within the planning area as estimated in the hazard mitigation plan is summarized in Table 9-1. The estimates include the value of both the buildings and their contents.

Table 9-1. Exposure and Value of Structures in Tsunami Inundation Zone

Area Planning Commission	Buildings Exposed	Estimated Value within the Tsunami Inundation Zone			% of Total Replacement Value
		Structure	Contents	Total	
Central	0	$0	$0	$0	0.0%
East Los Angeles	0	$0	$0	$0	0.0%
Harbor	445	$2,530,847,432	$2,964,627,474	$5,495,474,907	13.4%
North Valley	0	$0	$0	$0	0.0%
South Los Angeles	0	$0	$0	$0	0.0%
South Valley	0	$0	$0	$0	0.0%
West Los Angeles	4,892	$2,177,194,005	$1,316,241,705	$3,493,435,710	3.2%
Total	5,337	$4,708,041,437	$4,280,869,180	$8,988,910,617	1.2%

Land Use

Some land uses are more vulnerable to damage from inundation, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Figure 9-4 shows the existing land use of all parcels in the tsunami inundation areas for the planning area, as estimated for the hazard mitigation plan. Industrial uses make up about 73 percent of the tsunami inundation areas. This is a high-risk use for this hazard area.

9.4.3 Critical Facilities and Infrastructure

Facilities

Counts of the identified critical facilities and critical infrastructure in the tsunami inundation areas are summarized in Table 9-2.

Infrastructure

Roads or railroads that are blocked or damaged can prevent access throughout the county and can isolate residents and emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by tsunami inundation or debris from flood flows also can cause isolation. Water and sewer systems can be flooded or backed up, causing further health problems. Underground utilities can also be damaged during flood events.

Source: City of Los Angeles. 2018

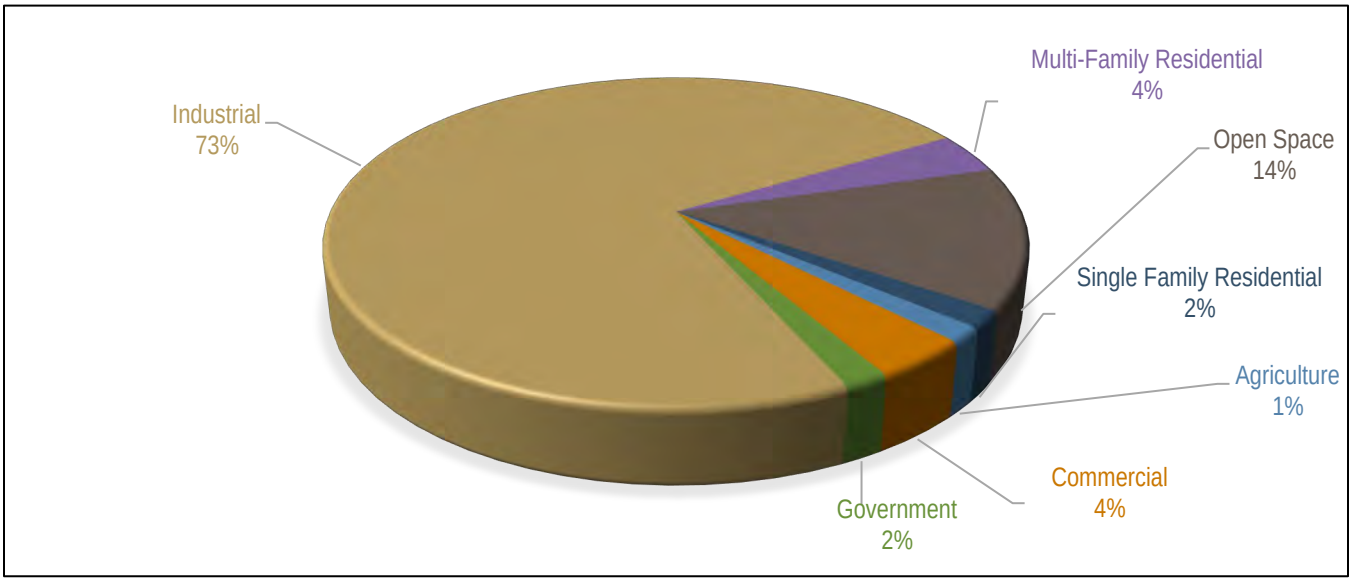

Figure 9-4. Present Land Use Within the Tsunami Inundation Area

Table 9-2. Critical Facilities in Tsunami Inundation Areas

Area Planning Commission	Central	East	Harbor	North Valley	South Los Angeles	South Valley	West Los Angeles	Total
Safety and Security	0	0	5	0	0	0	0	5
Food, Water and Sheltering	0	0	16	0	0	0	9	25
Health and Medical	0	0	0	0	0	0	0	0
Energy	0	0	5	0	0	0	0	5
Communications	0	0	0	0	0	0	1	1
Transportation	0	0	47	0	0	0	5	52
Hazardous Materials	0	0	17	0	0	0	0	17
Total	0	0	90	0	0	0	15	105

Roads

Roads are an important component in the management of tsunami related emergencies in that they act as the primary resource for evacuation to higher ground before and during the course of a tsunami event. Roads often act as flood control facilities in low depth, low velocity flood events by acting as levees or berms and diverting or containing flood flows. Using Hazus, the hazard mitigation plan identified the following major road facilities that may be impacted by tsunami events:

- Interstate 110
- State Highway 1
- State Highway 103
- State Highway 47
- State Highway 90
- Lincoln Blvd
- Marina Freeway
- Pacific Coast Highway

This is a list of major roads that may be impacted by a tsunami, based solely on exposure; it should not be misinterpreted as possible evacuation routes for tsunami events. Evacuation routes are identified in emergency response plans.

Bridges

Bridges exposed to tsunami events can be extremely vulnerable due to the forces transmitted by the wave run-up and by the impact of debris carried by the wave action. The hazard mitigation plan identified 14 bridges within the tsunami inundation areas.

Water, Sewer, Utilities

Water and sewer systems can be affected by the flooding associated with tsunami events. Floodwaters can back up drainage systems, causing localized flooding. Culverts 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 also be backed up, causing wastes to spill into homes, neighborhoods, rivers and streams. The forces of tsunami waves can impact above ground utilities by knocking down power lines and radio/cellular communication towers. Power generation facilities can be severely impacted by both the velocity impact of the wave action and the inundation of floodwaters. The hazard mitigation plan identified 29 utilities within tsunami inundation areas.

9.4.4 Environment

Tsunamis also have a devastating effect on insects, animals, plants, and natural resources. A tsunami changes the landscape. It uproots trees and plants and destroys animal habitats such as nesting sites for birds. Land animals can be killed by drowning and sea animals can be are killed by pollution if dangerous chemicals are washed away into the sea, thus poisoning the marine life. The impact of a tsunami on the environment relates not only to the landscape and animal life, but also to the human-influenced aspects of the environment. Solid waste and disaster debris are the most critical environmental problem faced by a tsunami-hit region.

9.5 VULNERABILITY

9.5.1 Population

The populations most vulnerable to the tsunami hazard are the elderly, disabled and very young who reside near beaches, low-lying coastal areas, tidal flats and river deltas that empty into ocean-going waters. In the event of a local tsunami generated in or near the City of Los Angeles, there would be little warning time, so more of the population would be vulnerable. The degree of vulnerability of the population exposed to the tsunami hazard event is based on a number of factors:

- Is there a warning system?
- What is the lead time of the warning?
- What is the method of warning dissemination?
- Where are the evacuation areas and routes?
- Will the people evacuate when warned?

The City of Los Angeles Emergency Management Department has provided answers to these questions through programs such as NotifyLA, the City’s emergency operations plan and associated training and exercise programs, and targeted outreach programs. A geographic analysis of demographics using the Hazus model identified populations vulnerable to the tsunami hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 31 percent of the households within the tsunami inundation area are economically disadvantaged, defined as having household incomes of $50,000 or less.
- **Population over 65 Years Old**—It is estimated that 13 percent of the population in the census blocks that intersect the tsunami inundation area are over 65 years old.
- **Population under 16 Years Old**—It is estimated that 8 percent of the population within census blocks located in or near the tsunami inundation area are under 16 years of age.

The Hazus modeling for the hazard mitigation plan estimated that 8,569 people would be displaced by the tsunami events depicted by the inundation mapping and 6,868 people would need short-term shelter.

9.5.2 Property

All structures along beaches, low-lying coastal areas, tidal flats and river deltas would be vulnerable to a tsunami, especially in an event with little or no warning time. The impact of the waves and the scouring associated with debris that may be carried in the water could be damaging to structures in the tsunami's path. Those that would be most vulnerable are those located in the front line of tsunami impact and those that are structurally unsound. Hazus-generated loss estimates for the estimated tsunami hazard areas, are listed in Table 9-3.

Table 9-3. Loss Estimates for Tsunami

Area Planning Commission	Structures Impacted[a]	Estimated Loss Associated with Flood			% of Total Replacement Value
		Structure	Contents	Total	
Central	0	$0	$0	$0	0.0%
East Los Angeles	0	$0	$0	$0	0.0%
Harbor	284	$249,045,396	$453,248,020	$702,293,416	1.7%
North Valley	0	$0	$0	$0	0.0%
South Los Angeles	0	$0	$0	$0	0.0%
South Valley	0	$0	$0	$0	0.0%
West Los Angeles	1,943	$185,236,583	$179,145,925	$364,382,508	0.3%
Total	2,227	$434,281,979	$632,393,945	$1,066,675,924	0.1%

9.5.3 Critical Facilities and Infrastructure

Using damage function curves to estimate the percent of damage to critical buildings and their contents, Hazus correlates these estimates to estimated functional down-time. Functional down-time is the time it will take to restore a facility to 100 percent of its functionality. Hazus estimated damage to critical facilities and critical infrastructure in the tsunami inundation zone as summarized in Table 9-4.

Table 9-4. Estimated Damage to Critical Facilities from Tsunami

	Number of Facilities Affected	Average % of Total Value Damaged		Days to 100% Functionality
		Structure	Content	
Safety and Security	1	15.0	70.3	630
Food, Water and Sheltering	13	4.1 – 14.2	22.2 – 73.8	480 - 630
Health and Medical	0	N/A	N/A	N/A
Energy	4	0.2 – 6.4	1.3	N/A
Communications	0	N/A	N/A	N/A
Transportation	26	0.3 – 22.4	0.3 – 35.6	
Hazardous Materials	7	0.6 – 32.7	0.0 – 58.6	N/A
Total/Average	51			

9.5.4 Environment

The vulnerability of aquatic habit and associated ecosystems would be highest in low-lying areas close to the coastline. Areas near gas stations, industrial areas and hazardous materials facilities would be vulnerable due to potential contamination from hazardous materials.

Tsunami waves can carry destructive debris and pollutants that can have devastating impacts on all facets of the environment. Millions of dollars spent on habitat restoration and conservation in the City of Los Angeles could be wiped out by one significant tsunami. There are currently no tools available to measure these impacts. However, it is conceivable that the potential financial impact of a tsunami event on the environment could equal or exceed the impact on property. Community planners and emergency managers should take this into account when preparing for the tsunami hazard.

9.6 FUTURE DEVELOPMENT TRENDS

According to the California Department of Finance, the population of Los Angeles County is expected to increase 13 percent by 2060, a growth rate of 0.28 percent per year over the next 45 years. The City of Los Angeles has limited potential for expansion through annexation, as it is surrounded by other incorporated cities. It is anticipated that future growth in the City will be managed through redevelopment, which creates an opportunity to correct past land use decisions, especially with regards to development within tsunami inundation zones. Los Angeles is subject to state general planning laws and the California Coastal Act. The City has adopted critical areas and resources lands regulations pursuant to these laws.

The amount of the tsunami inundation area that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of tsunami hazard areas through the City's existing capability to govern land use under its General Plan and zoning ordinances. Currently, neither of these capabilities includes the scope to regulate land uses in identified tsunami inundation areas.

9.7 SCENARIO

The 2007 report *Tsunami Hazard Assessment for the Ports of Long Beach and Los Angeles* analyzed recent studies suggesting tsunami sources in southern California that could have a greater impact on the Ports of Los Angeles and Long Beach due to short travel distance and high amplitude waves. The report concluded that local tsunamis may cause worse impact than remote ones; however, based on seismicity and geology, a large tsunami generated from local seismic activity or a local submarine landslide would likely not occur more than once every 10,000 years. A worst-case-scenario for the City of Los Angeles would be a near shore tsunami caused by a significant off-shore seismic event. While history has shown that these type events are not likely, should one occur, damages for this type of event would exceed those estimated in this risk assessment.

9.8 ISSUES

The planning team has identified the following issues related to the tsunami hazard for the City of Los Angeles:

- Present building codes and guidelines do not adequately address the impacts of tsunamis on structures, and current tsunami hazard mapping is not appropriate for code enforcement.
- There is a high degree of risk in the tsunami inundation areas due to the high percentage of industrial occupancy.
- As tsunami warning technologies evolve, tsunami warning capability in the City will need to be enhanced to provide the highest degree of warning to areas with tsunami risk exposure.
- With the possibility of climate change, sea level rise may become an important consideration as probable tsunami inundation areas are identified through future studies.

- Resources in the City of Los Angeles, such as the Tsunami Research Center at the University of Southern California, have done excellent work in implementing and supporting public information and awareness programs. These programs need to be continued, supported and enhanced to promote the concepts of mitigation and preparedness for the impacts of tsunamis.
- Special attention will need to be focused on vulnerable neighborhoods in the tsunami zone and on hazard mitigation through public education and outreach.

10. Climate Change Considerations for Floodplain Management

10.1 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.

The well-established worldwide warming trend of recent decades 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 National Aeronautics and Space Administration (NASA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen dramatically since then, surpassing 400 ppm in 2013 for the first time in recorded history (see Figure 10-1).

Source: NASA, 2020

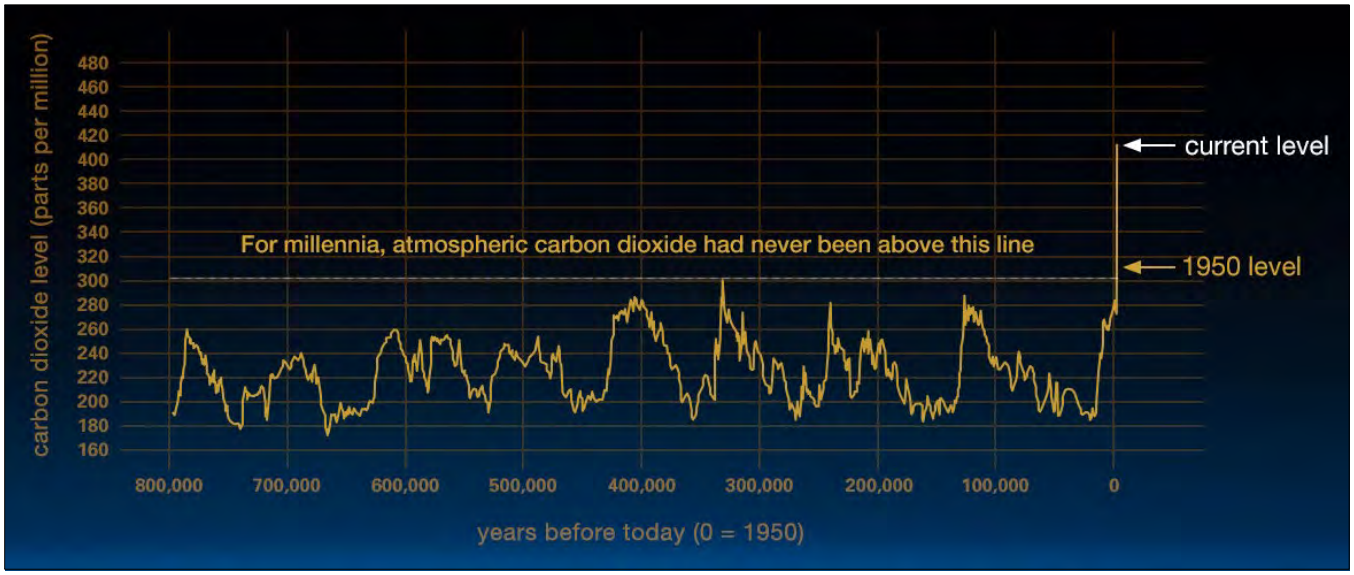

Figure 10-1. Global Carbon Dioxide Concentrations Over Time

Climate change will affect the people, property, economy and ecosystems of Los Angeles in a variety of ways. Some impacts will have negative consequences for the region and others may present opportunities. 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.

10.2 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.

The assumption that future flooding behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, the frequency of flooding will not remain constant if broad precipitation patterns change over time. 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. This chapter summarizes current understandings about climate change in order to provide a context for the recommendation and implementation of floodplain management measures in Los Angeles.

10.3 CURRENT GLOBAL INDICATIONS OF CLIMATE CHANGE

The major scientific agencies of the United States—including NASA and the National Oceanic and Atmospheric Administration (NOAA)—have presented evidence that climate change is occurring. NASA summarizes key evidence as follows (NASA, 2020a):

- Global Temperature Rise—The planet's average surface temperature has risen about 1.62 ºF since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. Most of the warming occurred in the past 35 years, with the five warmest years on record taking place since 2010.
- Warming Oceans—The oceans have absorbed much of this increased heat, with the top 2,300 feet of ocean showing warming of more than 0.4 ºF since 1969.
- Shrinking Ice Sheets—The Greenland and Antarctic ice sheets have decreased in mass. Greenland lost an average of 286 billion tons of ice per year between 1993 and 2016, and Antarctica lost about 127 billion tons of ice per year during the same time period. The rate of Antarctica ice mass loss has tripled in the last decade.
- Glacial Retreat—Glaciers are retreating almost everywhere around the world —including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.
- Decreased Snow Cover—Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier
- Sea Level Rise—Global sea level rose about 8 inches in the last century. The rate in the last two decades is nearly double that of the last century and is accelerating slightly every year.
- Declining Arctic Sea Ice—Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades
- Extreme Events—The number of record high temperature events in the United States has been increasing since 1950, while the number of record low temperature events has been decreasing. The U.S. has also witnessed increasing numbers of intense rainfall events.
- Ocean Acidification—Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.

10.4 PROJECTED FUTURE IMPACTS

10.4.1 Global Projections

Scientists project that Earth's average temperatures will raise between 5 ºF and 9 ºF by 2100 (Reuters, 2018). Some research has concluded that every increase of 2ºF in average global average temperature can have the following impacts (NRC, 2011):

- 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, 2007). By 2100, sea level is expected to rise 1.0 to 8 feet above 2000 levels (NOAA, 2019). Rising seas will make coastal storms and the associated storm surges more frequent and destructive. What is currently termed a once-in-a-century coastal flooding event could occur as frequently as once per decade (USGCRP, 2009).

10.4.2 Projections for the City of Los Angeles

According to the California Emergency Management Agency's *California Adaptation Planning Guide*, the most likely climate change impacts in the South Coast climate impact region, which includes Los Angeles, are as follows (Cal EMA, 2012):

- Increased temperatures
- Reduced overall precipitation
- Sea level rise
- Reduced tourism
- Reduced water supply
- Wildfire risk
- Public health (heat and air quality)
- Coastal erosion.

Researchers have developed estimates of expected sea level rise along the north and south California coasts. For southern California (south of Cape Mendocino), the latest estimates for sea level rise are as follows (CO-CAT, 2013):

- 2000 – 2030—1.6 to 11.8 inches
- 2000 – 2050—4.7 to 24 inches
- 2000 – 2100—16.6 to 65.8 inches.

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).

10.5 RESPONSES TO CLIMATE CHANGE

10.5.1 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 emergency management is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters (FEMA, 2020).
- 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, 2013a).

In this chapter, mitigation is used as defined by the climate change community. In the other chapters of the FMP2020, 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, 2013a).

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 activities 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, which can absorb large volumes of water during peak flows. Coastal ecosystems can hold out against storms, attenuating waves and reducing erosion.

10.5.2 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 the FMP2020 may be enhanced to better measure these impacts.

10.5.3 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.

10.6 POTENTIAL CLIMATE CHANGE IMPACT ON FLOOD HAZARDS

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.

10.6.1 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, drought preparedness and emergency response.

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.

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.

Sea Level Rise

Sea level and temperature are interrelated (U.S. EPA, 2013). Warmer temperatures result in the melting of glaciers and ice sheets. This melting means that less water is stored on land and, thus, 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. The impacts of sea level rise could include increased coastal community flooding, increased flooding near the mouths of streams that flow into the ocean, coastal erosion and landslides, seawater well intrusion, and lost wetlands and estuaries.

10.6.2 Dam Failure

On average, changes in California's annual precipitation levels are not expected to be dramatic; however, small changes may have significant impacts for water resource systems, including dams and the reservoirs behind them. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes

in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard.

If the freeboard of a dam is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream. According to the California Department of Water Resources, flood flows on many California rivers have been record-setting since the 1950s. This means that dams and other water infrastructure have been forced to manage flows for which they were not designed (DWR, 2007). The California Division of Safety of Dams has indicated that climate change may result in the need for increased safety precautions to address higher winter runoff, frequent fluctuations of water levels, and increased potential for sedimentation and debris accumulation from changing erosion patterns and increases in wildfires. According to the DSOD, climate change also will impact the ability of dam operators to estimate extreme flood events (DWR, 2008).

Dams are constructed with safety features known as “spillways.” Spillways are put in place on dams as a safety measure for the dam in the event of the reservoir filling too quickly. The spillway relieves pressure on the dam, decreasing the probability of overtopping or structural failure. Spillway overflow events, often referred to as “design failures,” result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

10.6.3 Tsunami

The impacts of climate change on the frequency and severity of tsunami events could be significant in regions with vulnerable coastline. Global sea-level rise will affect all coastal societies, especially densely populated low-lying coastal areas. Sea level rise has three effects on low-lying coastal regions: any structures located below the new, elevated level of the sea will be flooded; structures that were previously elevated will be subjected to a deeper penetrating runup of waves, and the rise in sea level may lead to coastal erosion that can further threaten coastal structures.

City of Los Angeles 2020 Floodplain Management Plan

PART 3—MITIGATION STRATEGY

11. Mission Statement, 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 FMP2015 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.

11.1 MISSION STATEMENT

A mission statement focuses the range of objectives and actions to be considered. The mission statement for the FMP2020 is as follows:

> Through partnerships and careful planning, identify and reduce flood hazards to protect the health, safety, quality of life, environment, and economy of the City of Los Angeles.

11.2 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 FMP2020:

- Reduce flood risk
- Protect life
- Protect property
- Increase resilience of critical facilities and infrastructures
- Increase community awareness and public education
- Pursue cost-effective, environmentally sound and multi-benefit mitigation measures
- Coordinate with other programs that can support or enhance flood mitigation

11.3 OBJECTIVES

The following objectives were selected to help establish priorities for recommended mitigation actions; each objective meets multiple goals:

1. Provide, improve and maintain flood protection.
2. Use the best available data, science and technologies to improve understanding of the locations and potential impacts of flood hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life and safety.
3. Minimize the impacts of flood hazards on current and future land uses through implementation of appropriate codes, standards, and ordinances.
4. Retrofit, purchase, and relocate structures that are in flood hazard areas, especially those known to be repetitively damaged.

5. Maintain or enhance early warning emergency response systems, evacuation procedures, training and equipment.
6. Increase resilience and continuity of operations of critical facilities and infrastructure.
7. Pursue effective and efficient approaches to reducing stormwater runoff, protecting water quality and water resources.
8. Increase public awareness of existing flood risks and the means to reduce these risks by conducting educational and outreach programs.
9. Encourage and support leadership within the private sector, nonprofit agencies and community-based organizations to promote and implement local floodplain management activities.
10. Anticipate and minimize effects of climate change on flood risk.
11. Minimize adverse impacts from flood risk on vulnerable communities.

12. NATURAL BENEFICIAL FUNCTIONS PLAN

12.1 OVERVIEW

12.1.1 What Are Beneficial Floodplain Functions?

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Riparian areas—the zones along the edge of a river or stream that are influenced by or are an influence upon the water body—generally have a greater diversity and structure of vegetation than upland areas. Shelter, space, food and water available in these areas determine the health of wildlife populations. Riparian communities are of special importance for many animals since water supply is a major limiting factor to the animals' population. Animals depend upon a supply of water for their existence.

12.1.2 CRS Credit for Protecting Natural Floodplain Functions

Wildlife and fisheries are impacted when plant communities are eliminated or fundamentally altered to reduce habitat. Human disturbance to riparian areas can limit wildlife's access to water, remove breeding or nesting sites, and eliminate suitable areas for rearing young. Changes in hydrologic conditions also can alter the plant community. FEMA's Community Rating System provides credits for adopting plans that protect one or more natural functions within a community's floodplain (Activity 510), such as the following (FEMA, 2017):

- 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, or actions to restore fully functioning habitat.
- 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, or sustain air and water resources (the corridors or networks must include some floodplains)
- All or part of a comprehensive or other community plan that includes an inventory of the ecological attributes of a watershed or floodplain and recommends actions for protecting them through a mechanism such as a development regulation, development order, grant program, or capital improvement plan.

The credit requires that the following criteria be met:

- The plan may cover more than one community, but it must benefit natural floodplain functions within the community seeking credit.
- 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 an appropriate regional agency.
- 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.

- The plan must include 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.
- There is no credit (under CRS Activity 510) for a plan that addresses water quality issues as a requirement for a permit under the National Pollution Discharge Elimination System (credit for such plans may be available under other CRS activities).
- The plan 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.
- A community can get credit for other plans that meet these credit criteria. These could be single-issue or single-species plans or plans that cover only one area of the community's floodplain.

The City of Los Angeles has two documents that meet these requirements: the *Los Angeles River Revitalization Master Plan* (April 2007), and the Conservation Element of the City's General Plan (September 2001). Both of these plans lay out long range visions for improvements, with timelines for implementation greater than the 10-year life span specified by the CRS program. This chapter integrates these two plans into the FMP2020, so that the City can review their status every five years when the FMP2020 is updated.

The Department of City Planning is updating the *Venice Community Plan* and *Local Coastal Program*. These plans address development on lands subject to sea level rise and are incorporating adaptation measures; anticipated adoption is in 2021. The Department of City Planning is also drafting wildlife protection regulations to address multi-benefit functions of hillsides for wildlife habitat and connectivity, flooding and watershed management, and ecological services provided in wetland and riparian areas. Wildlife protection regulations are expected to be adopted in 2021.

The following sections provide an overview of the *Angeles River Revitalization Master Plan* and the General Plan Conservation Element, inventory the key resource areas, and identify an integration strategy.

12.2 THE LOS ANGELES RIVER REVITALIZATION MASTER PLAN

The following content is excerpted from the Los Angeles River Revitalization Master Plan (City of Los Angeles, 2015a). Further information is available online: http://lariver.org/index.htm

The Los Angeles River flows 51 miles through some of the most diverse communities in Southern California. It stretches 32 miles within the City of Los Angeles, from Owensmouth in the upper reaches of the northwest San Fernando Valley, all the way to the border with Vernon at the southern end of downtown. The river is typically dry during summer, but can fill with fast-flowing waters during the rainy season.

Community leaders, elected officials, citizens, environmental groups, recreational groups, and others have explored ways to restore the river's natural benefits while maintaining flood protection and safety. In 2002, the Los Angeles City Council Ad Hoc Committee on the Los Angeles River was created as to encourage community involvement in river improvements and to help coordinate river-related projects in the City. As a result of the Ad Hoc River Committee's efforts, the began the preparation of a revitalization master plan that would identify proposals to make the Los Angeles River a "front door" to the City, supporting diverse civic activities. The Ad Hoc River Committee established the following goals for the *Los Angeles River Revitalization Plan*:

- Establish environmentally sensitive guidelines for improving communities along the river by providing open space, housing, retail spaces, and places for public institutions.

- Improve the environment, enhance water quality, improve water resources, and improve the ecological functioning of the river.
- Provide public access to the river.
- Provide significant recreation space and open space, and improve natural habitats.
- Preserve and enhance the flood control features of the river.
- Foster community awareness of and pride in the Los Angeles River.

The 18-month revitalization planning process looked at improvements along the river that would enhance neighborhoods, protect wildlife, promote the health of the river, and leverage economic development. The finished master plan outlines a 20-year blueprint for development and management of the Los Angeles River to be implemented by the City of Los Angeles. It calls for an extensive community engagement effort that will include public workshops at key project milestones, participation in neighborhood and community events, and an interactive web site (www.lariver.org).

12.2.1 Basic Principles

The vision for the Los Angeles River's revitalization encompasses four basic principles, as described in the sections below.

Revitalize the River

The Los Angeles River is the catalyst that can drive many other revitalization initiatives. As a very long-term goal, its ecological and hydrological functioning can be restored through creation of a continuous riparian habitat corridor within the channel and through removal of concrete walls where feasible. While completely restoring the 32-mile river to a naturalized condition is not likely feasible, given flood control requirements and current urban development, it is likely that the river channel could be naturalized in significant stretches that are part of the plan's long-range vision. Three goals complement the effort to begin to restore a functioning ecosystem.

- Off-channel storage of peak flood flows in order to reduce flow velocities, which is a necessary precondition for additional greening of the river channel and for ecosystem restoration.
- Improved water quality in the Los Angeles River achieved through implementation of a comprehensive, landscape-based system for treating stormwater runoff.
- Safe public access to the river channel during periods of low flows so that it becomes a focus for recreation and enjoyment in areas that are lacking in these amenities.

Green the Neighborhoods

The overall beauty of Los Angeles can be enhanced through the creation of greener neighborhoods with more open space, trees and parks. The following goal is central to this organizing principle:

- Develop a continuous, 32-mile Los Angeles River Greenway that acts as the centerpiece of the City's green space system. The greenway would be linked to an overall network of "green street" connections that extend the river's influence into adjacent neighborhoods and provide safe, non-motorized access between the river and public open space. As the greenway system develops, new linkages would strengthen connectivity between riparian systems along the river, upland habitat in parks and natural open space, and functional habitat in the mountains.

Complementary goals include the following:

- Re-purposing schoolyards, underused property, and other public and private open spaces for multipurpose shared use
- Cleaning stormwater through the use of best management practices in public landscapes

- Strengthening the river's identity using elements such as gateways and innovative bridges
- Creating a program to introduce more opportunities for art along the river.

Capture Community Opportunities

In the past, communities have considered the river to be an unsafe, unpleasant place that primarily functions to transport storm flows. Constrained by rail lines and freeways, the river has not been visually or physically accessible to most City residents. This principle calls for transforming the river into a safe, accessible, healthy, green and celebrated place. The goals for this principle are as follows:

- Making the river a focus of activity and helping to foster civic pride
- Engaging residents in community planning through neighborhood-by-neighborhood consensus-building to help identify the best areas for reorienting development and open space
- Providing opportunities for educational and public facilities
- Celebrating the cultural heritage of the river.

Create Value

The following are the goals of the principle of creating value:

- Improving quality of life by increasing the attractiveness of the City and enhancing public health for residents and visitors
- Creating environmentally sensitive, sustainable urban design and land use guidelines, such as those encouraging green buildings, rooftop gardens, and the use of water quality best management practices in street and park design
- Providing opportunities for new employment, housing, and retail space, such as galleries, service shops, restaurants, and cafés
- Focusing on underused areas and disadvantaged communities to ensure equitable opportunities for housing, parks, employment, and transportation where these amenities are lacking.

12.2.2 Implementation

The river management structure proposed in the master plan includes short- and long-term strategies to address river revitalization in a holistic manor. Three proposed management entities would each require the participation of all affected agencies and officials. The first implementation step is to convene a team to begin establishing each of these entities. This will require new appropriations in the City budget.

The master plan's recommendations encompass many specific project proposals over the next several years. The Plan recommends that criteria be adopted for evaluating potential candidate projects. The following initial list of criteria will be fine-tuned in the future according to the types and availability of funding:

- **Geographic synergy with other projects currently in progress**. Because the Plan's goals revolve around creating a continuous river system, projects that offer the opportunity to extend or complete those already in progress or to provide geographic continuity within a reach may offer more immediate benefits than projects that are geographically isolated.
- **Responsiveness to funding source objectives and evaluation criteria**. Projects funded through Proposition O or Proposition 50, for example, must address specific evaluation or performance criteria. Proposals that best meet those criteria may offer more opportunity to be funded than those that meet fewer criteria.

- **Responsiveness to restoration objectives established by federal partners, specifically, the Army Corps of Engineers.** To the degree that projects meet requirements for restoration of functional habitat, opportunities for funding partnerships may be possible.
- **Synergy with other related plans**. Master plan recommendations have been designed to support and complement recommendations set forth in several related plans. Proposals that can achieve the goals of multiple plans may offer more immediate benefits and help to leverage multiple funding resources.
- **Proposals meeting multiple objectives**. Proposals that meet recreation, water quality and other objectives may offer more return on investment than proposals with a single objective.
- **Multiple funding partners.** Projects that can enlist support from multiple funding partners may offer the potential to combine leveraged funding sources with multi-objective performance, and thereby increase the return on investment.
- **Supportive neighborhood organizations and advocacy groups**. Projects that have strong support within their communities may be quick wins that can build visibility, momentum, and support for the overall river revitalization effort. They are also projects that may be adopted—and thus be maintained and patrolled—by neighborhood organizations.
- **Incremental improvement on existing projects**. This criterion describes projects that are already in progress and could help meet goals of the plan, as is or with some modification.
- **Visibility**. Projects that are highly-visible offer potential to excite people about the river and show them that the City's commitment is real.
- **Private partner support**. Projects supported by the private sector help to demonstrate that revitalizing the river is something that is expected to provide added value.
- **Quick wins.** These are projects that can move forward with less effort and in a shorter timeframe than more complicated projects. This could occur, for example, if land, funding, and political will are available for discrete projects or incremental components of projects.
- **Meet demonstrated needs**. Examples might include creating a pocket park in park-deficient areas, or implementing water quality treatment terraces in areas with significant concentrations of storm outfalls in a severely impacted river reach.
- **On City-owned land.** The project would not require purchase of private property or negotiation of an easement or access agreement.

12.2.3 Current Status of the Plan

The *Los Angeles River Revitalization Plan* was a long-term visioning plan for the revitalization of the Los Angeles River with a 20-year projected performance period. The vision for this plan has been actively pursued by the City since its completion in 2007 with support from many stakeholders.

The plan's priority project list focuses implementation efforts on projects with potential to be implemented through partnerships and outside funding. The list will be updated on a regular basis. It is ordered by implementation time horizon, but the identified time horizons can change if adequate funding becomes available.

Many of the stakeholders in the revitalization plan also were active participants in the FMP2020 update effort so that the revitalization plan's vision could be represented in the outcomes of the FMP2020. The FMP2020 update process presented an opportunity for the City to confirm that the projects and the vision of the revitalization plan are still relevant and applicable for current City conditions and capabilities. The FMP2020 finds that the *Los Angeles River Revitalization Plan* is still a vital visioning tool that the FMP2020 can leverage to pursue flood risk reduction measures to restore the natural and beneficial floodplain functions of the Los Angeles River. This integration and leveraging will continue over the 5-year performance period for the FMP2020.

12.3 GENERAL PLAN CONSERVATION ELEMENT

The following content is excerpted from the Conservation Element of the City of Los Angeles General Plan. Further information is available online: https://planning.lacity.org/odocument/28af7e21-ffdd-4f26-84e6-dfa967b2a1ee/Conservation_Element.pdf

12.3.1 Compliance and Implementation

The State of California requires cities and counties to adopt general plan conservation and open space elements (Government Code Section 65302). The state has deemed that the Los Angeles Conservation and Open Space Elements, adopted in 1973 and updated in 2001, comply with state law. All elements of a general plan are required to be integrated, internally consistent and compatible (Government Code Section 65300.5). The Conservation Element is consistent with all adopted elements of the City's General Plan.

State open space and conservation element requirements focus on identification, preservation, protection and management of natural resources. Conservation elements should address "conservation, development, and utilization of natural resources including water and hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources." Water elements address water and land reclamation, water pollution (including ocean), regulation and use of land in stream beds, erosion, watershed protection, flood control, and rock, sand and gravel resources. Open space, as defined by the California Government Code (Section 65560), is any parcel or area of land or water that essentially is unimproved and devoted to at least one of the following open-space uses:

- Preservation of natural resources, such as flora and fauna (animal habitats), bird flyways, ecologic and other scientific study areas, and watersheds
- Managed production of resources, such as recharge of groundwater basins or areas containing mineral deposits that are in short supply
- Outdoor recreation, such as beaches, waterways, easements, trails and scenic highway corridors
- Public health and safety, such as flood, seismic, geologic or fire hazard zones or air quality.

As allowed by state law, Los Angeles has organized its general plan to meet its particular needs. It has opted to incorporate natural open space, agricultural and other open space features of the state's open space requirements into the Conservation Element. The Conservation Element references other City plans that address mandated subjects, including water supply and demand, which are addressed by City water plans and the General Plan Infrastructure Systems Element. The Conservation Element primarily addresses preservation, conservation, protection and enhancement of the City's natural resources.

The Conservation Element is implemented by various City regulations and programs, consistent with the requirements of state general plan law (Government Code Section 65400). Components of the City's Land Use Element address conservation-related land use and systems issues. The Floodplain Management Plan and Hazard Mitigation Plan help to implement the goals and policies found in the Conservation and other General Plan Elements.

12.3.2 Significant Ecological Areas

The section of the Conservation Element relevant to the CRS natural functions planning requirements is Section 12. This section identifies Significant Ecological Areas (SEAs), which are habitats identified by Los Angeles County as important for the preservation and maintenance of biodiversity. SEAs were identified and documented by the Los Angeles Regional Planning Commission in 1976. Selections were based on known habitats of sensitive or endangered species, as well as sites containing a diversity of native plant and animal resources. The county updated the SEA designations in 2019.

All or part of some of the sites in the City of Los Angeles are privately owned, and some have been developed with structures or other uses. Publicly owned portions of SEAs generally have been classified in the Open Space Zone and often are part of public park sites. SEA designations provide a basis for analyzing private projects for California Environmental Quality Act review. They guide public and private efforts to develop strategies for protecting and acquiring habitats. For example, in October 1999 the Department of Water and Power agreed to maintain the Chatsworth Reservoir as a natural reserve. Designation of the site as an SEA assisted efforts to protect it from sale and possible development.

12.4 INVENTORY OF KEY RESOURCE AREAS

Significant ecological areas and coast resource areas in the City of Los Angeles are shown in Figure 12-1 through Figure 12-5. Table 12-1 describes SEA classifications.

Table 12-1. Significant Ecological Area Classification

Class	Description
1	The habitat of rare, endangered, and threatened plant and animal species.
2	Biotic communities, vegetative association, and habitat of plant and animal species either one-of-a-kind or restricted in distribution on a regional basis.
3	Biotic communities, vegetative association, and habitat of plant and animal species either one-of-a-kind or restricted in distribution in Los Angeles County.
4	Habitat that at some point in the life cycle of a species or group of species serves as a concentrated breeding, feeding, resting or migrating grounds, and is limited in availability.
5	Biotic resources that are of scientific interest because they are either in extreme physical geographical limitations, or they represent unusual variation in a population or community.
6	Areas important as game habitat or as fisheries.
7	Areas that would provide for the preservation of relatively undisturbed example of the natural biotic communities in Los Angeles County.

Source: Los Angeles County, 2019.

The City's goal is to preserve SEAs in an ecologically viable condition for public education, research, and other non-disruptive outdoor uses; however limited compatible development is not precluded. As projects identified in the Los Angeles River Revitalization Master Plan are completed, the areas of the Los Angeles River improved by the projects would qualify as SEAs under the guidelines established under the Conservation Element of the City of Los Angeles General Plan.

In addition to SEAs, the City has identified the following areas that can provide valuable habitat (Environmental Affairs Department, 1998):

- Pacoima Spreading Grounds
- Sepulveda Flood Control Basin
- Los Angeles River
- Silverlake Reservoir
- Stone Canyon Reservoir
- San Pedro Harbor

Projects in these areas are subject to a higher level of review so that their habitat value is protected and potential impacts on the species they contain can be avoided.

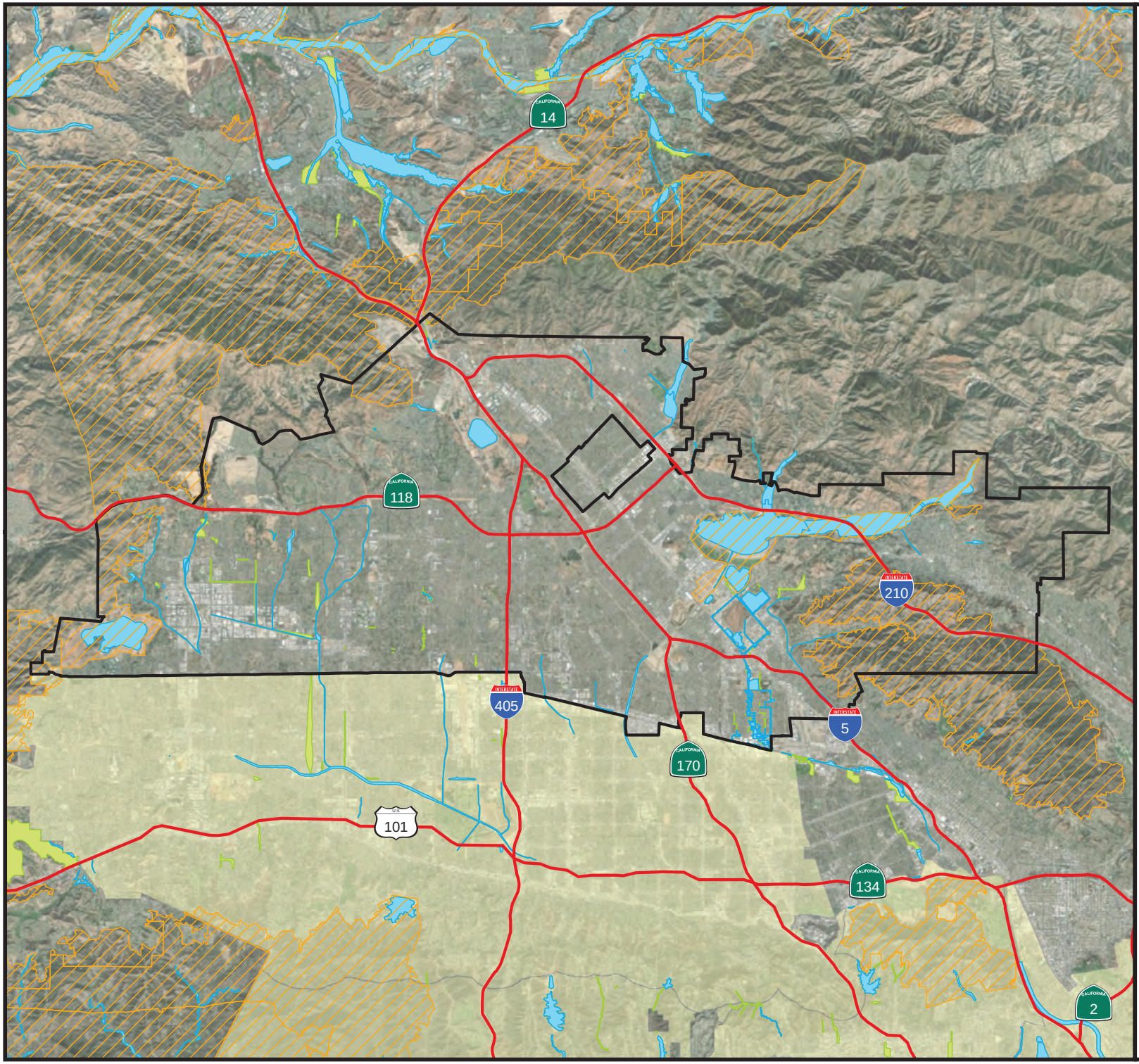

FIGURE 12-1.

Significant Ecological Areas Identified in the North Valley APC

Legend

- Significant Ecological & Coastal Resource Areas
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected
- City of Los

N

1 inch = 17,500 feet 1:210,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

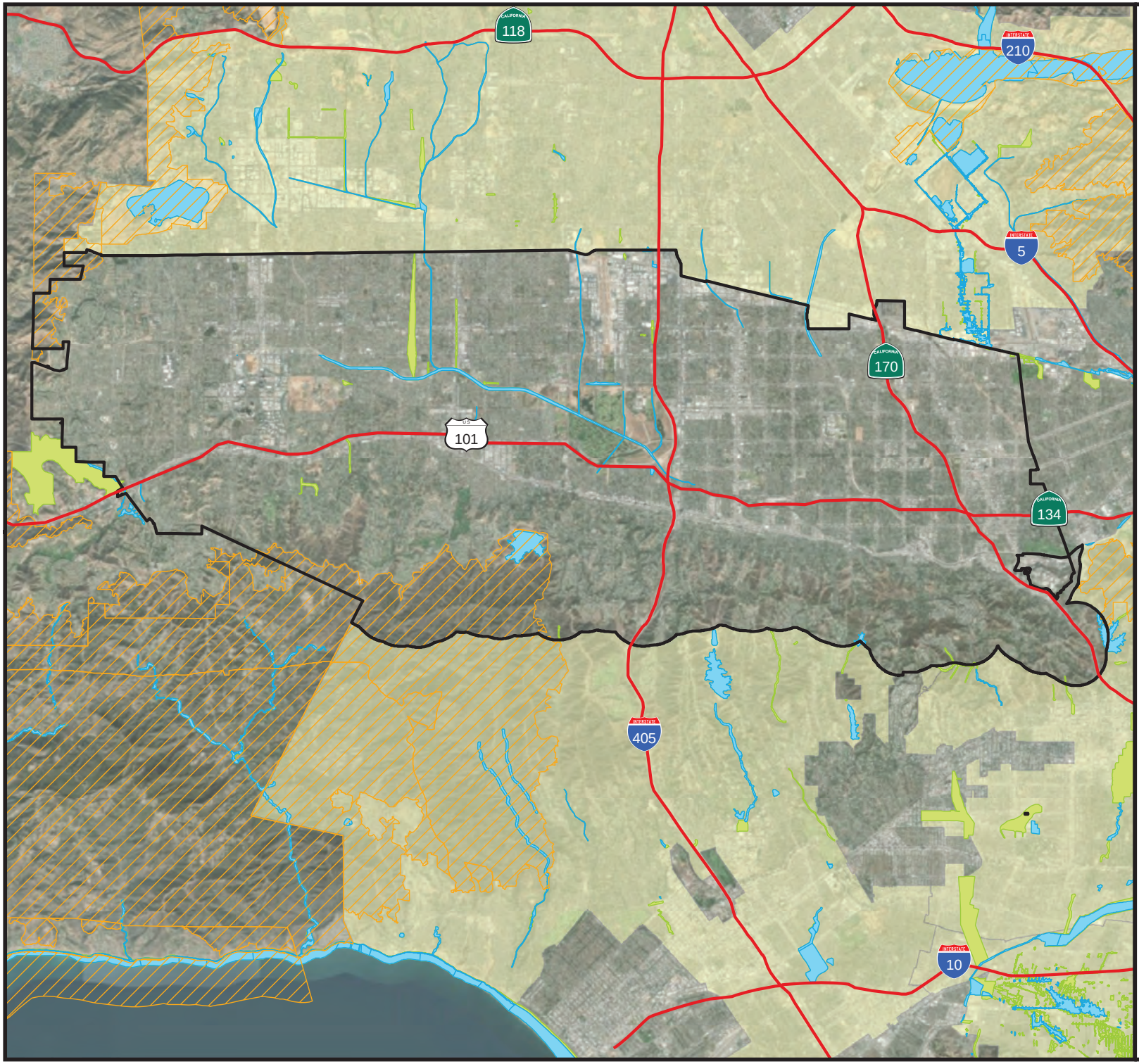

FIGURE 12-2.

Significant Ecological Areas Identified in the South Valley APC

Legend

- Significant Ecological & Coastal Resource Areas
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected
- City of Los

N

1 inch = 14,000 feet 1:168,000

Feet
0 10,000 20,000

Meters
0 2,500 5,000

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

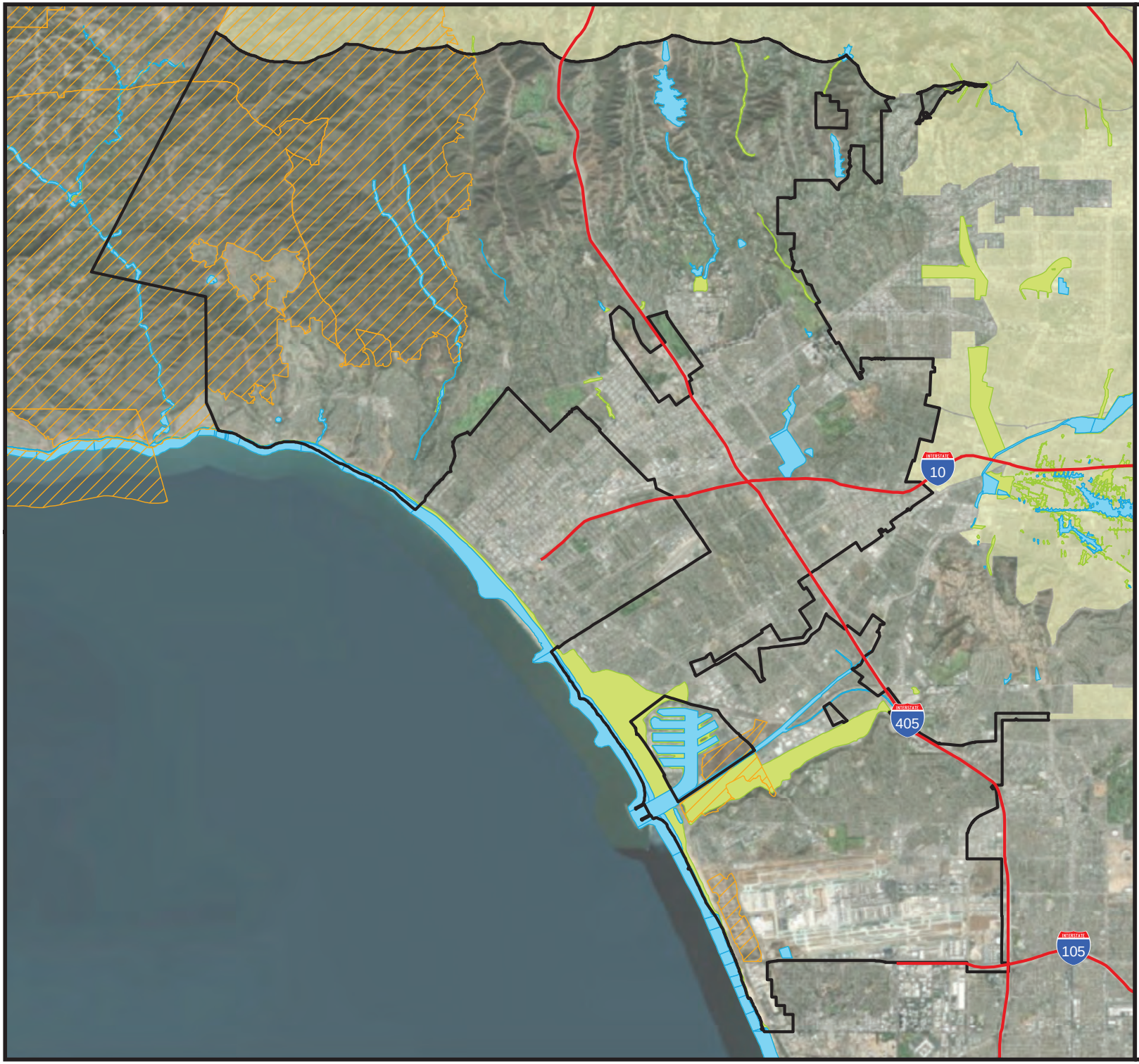

FIGURE 12-2.

Significant Ecological Areas Identified in the West Los Angeles APC

Legend

- Significant Ecological & Coastal Resource Areas
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected
- City of Los

N

1 inch = 11,300 feet 1:135,600

Feet
0 8,000 16,000

Meters
0 2,050 4,100

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

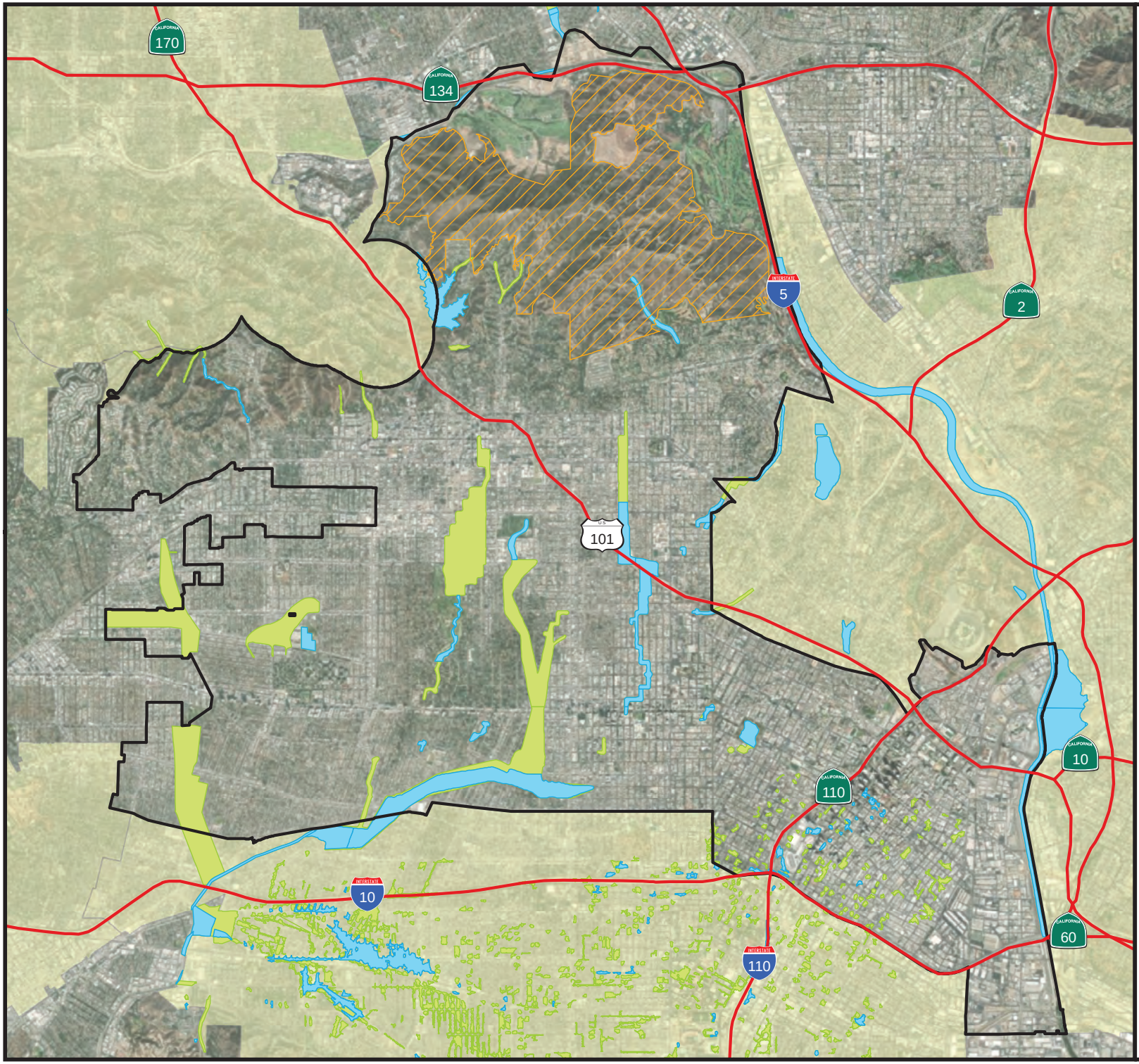

FIGURE 12-4.

Significant Ecological Areas Identified in the Central APC

Legend

- Significant Ecological & Coastal Resource Areas
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected
- City of Los

N

1 inch = 7,900 feet 1:94,800

Feet
0 5,500 11,000

Meters
0 1,400 2,800

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

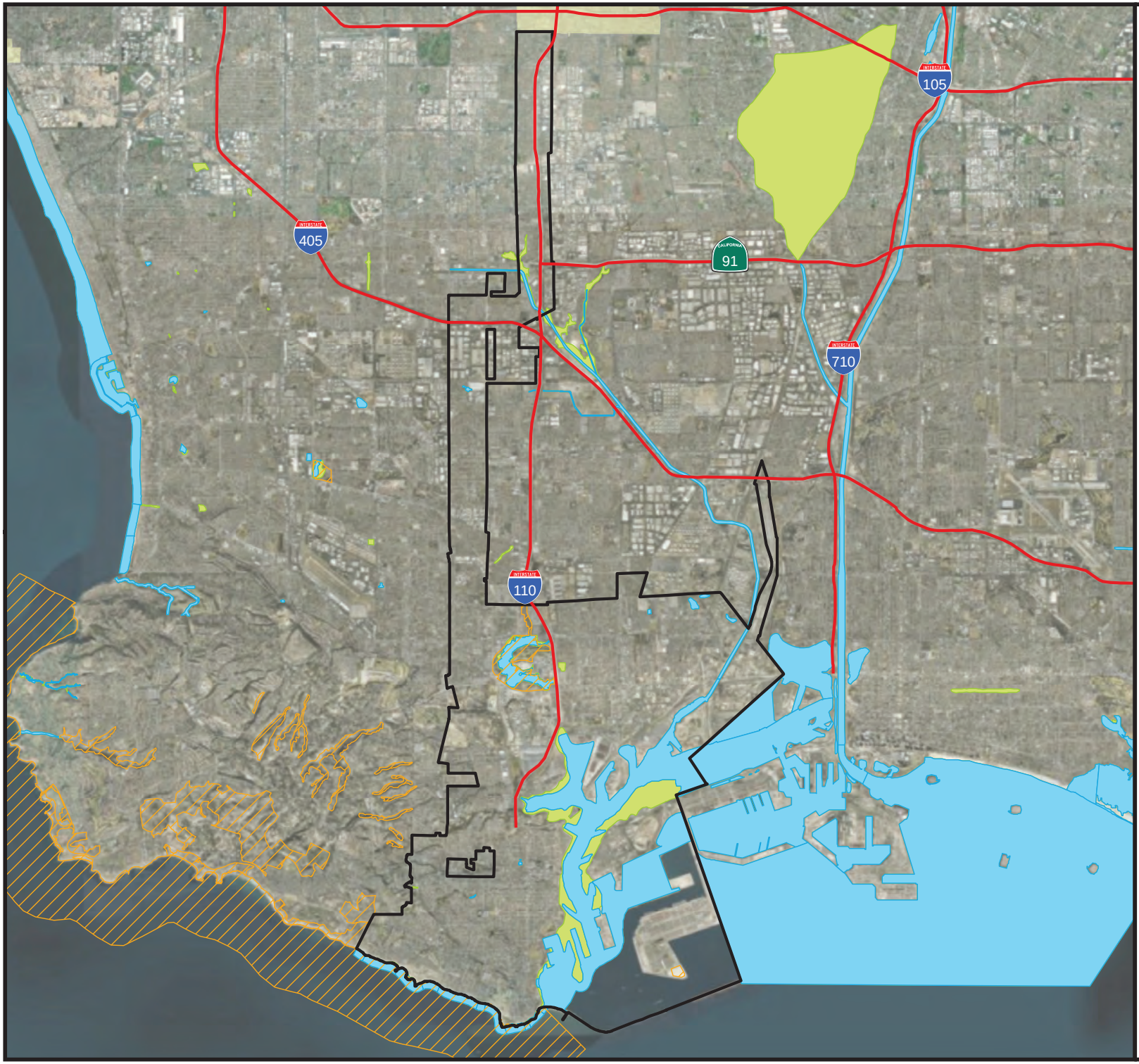

FIGURE 12-5.

Significant Ecological Areas Identified in the Harbor APC

Legend

- Significant Ecological & Coastal Resource Areas
- 1% Annual Chance Flood
- 0.2% Annual Chance Flood
- Highways
- Selected
- City of Los

N

1 inch = 11,900 feet 1:142,800

Feet
0 8,500 17,000

Meters
0 2,150 4,300

Map Projection:
NAD83 State Plane California Zone 5
Vertical Datum: NAVD88

Data Sources:
City of Los Angeles,
Esri, FEMA

12.5 ENHANCED WATERSHED MANAGEMENT PLANS

Municipalities, non-governmental organizations and community stakeholders throughout the County of Los Angeles are working collaboratively to develop Enhanced Watershed Management Plans for each of the county's five watersheds: Ballona Creek, Dominguez Channel, Marina Del Rey, Santa Monica Bay and Upper Los Angeles River. The objectives of the Enhanced Watershed Management Plans (or EWMPs) are to comply with water quality mandates, improve the quality of our rivers, creeks and beaches, and address current and future regional water supply issues.

Each of the five watersheds has a Watershed Management Group that meets on a regular basis. The goal of each Watershed Management Group is to develop an EWMP for their specific watershed. Each EWMP will identify current and future multi-benefit projects that will improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve local aesthetics, and support public education opportunities. Each EWMP will include water quality priorities, watershed control measures, reasonable assurance analysis, the scheduling of projects and the monitoring, assessment and adaptive management of projects.

Enhanced Watershed Management Plans for each of the five watersheds must be developed and submitted to the Los Angeles Regional Water Quality Control Board by June 28, 2015. The outcomes of the EWMP are as follows:

- Prioritization of water quality issues
- Identification of control measures
- Emphasis on Regional EWMP Projects
- Scheduling for implementation
- Estimates of costs
- Process to adapt based on monitoring data and experience gained

12.5.1 Green Infrastructure

Green infrastructure projects will have a substantial role in the EWMPs (see Figure 12-6). Green infrastructure projects are defined as new designs for streets, sidewalks or other paved areas that, when replaced utilizing permeable materials and drought tolerant plants, will capture, clean and/or infiltrate rain water. Converting Los Angeles' paved areas from gray to green will reap the following benefits:

- Cleaner rivers, creeks, lakes and beaches
- Recharged groundwater supplies
- Increased vegetation cools communities
- Designs beautify neighborhoods

12.5.2 Low Impact development

Low impact development (LID) is a leading stormwater management strategy that seeks to mitigate the impacts of runoff and stormwater pollution as close to its source as possible. Urban runoff discharged from municipal storm drain systems is one of the principal causes of water quality impacts in most urban areas. It can contain pollutants such as trash and debris, bacteria and viruses, oil and grease, sediments, nutrients, metals, and toxic chemicals that can negatively affect the ocean, rivers, plant and animal life, and public health.

LID comprises a set of site design approaches and best management practices that are designed to address runoff and pollution at the source. These LID practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows during an average storm.

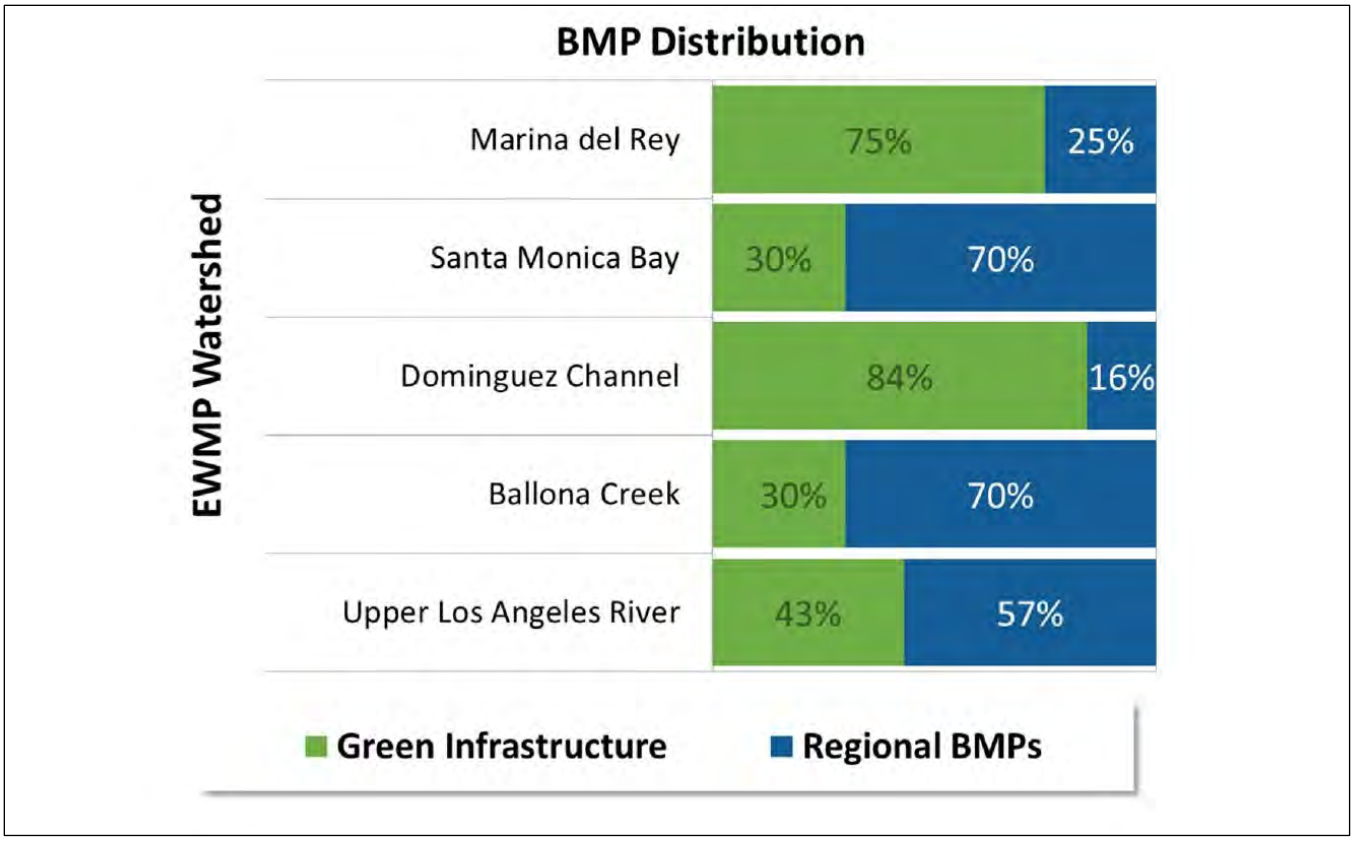

Figure 12-6. EWMP Best Management Practices Distribution

The City of Los Angeles' LID Ordinance became effective in May 2012. The LID Ordinance amended the previous Standard Urban Stormwater Mitigation Plan requirements (in effect since 2002) by incorporating LID practices and principles and expanding the categories of development that the ordinance applies to. Under the LID Ordinance, all development or redevelopment 500 square feet or more in size is required to capture and manage 100 percent of the first three-quarter-inch storm event onsite by implementing onsite infiltration, capture and use, and biofiltration/bio-treatment best management practices to the maximum extent feasible. Project applicants are required to incorporate stormwater mitigation measures into their design plans and submit the plans to the City for review and approval (see Figure 12-7)

The LID Ordinance applies only to specified kinds of development on private property, but LID techniques also will be incorporated in EWMP actions. Together, LID techniques implemented on private property under the LID Ordinance and implemented elsewhere through the EWMP projects have the potential to greatly mitigate the impacts of stormwater runoff throughout the City.

12.6 PLAN INTEGRATION

To ensure full integration of the natural beneficial functions plans, the action plan of the FMP2020 includes actions that involve coordination of actions identified in the Los Angeles River Revitalization Master Plan and the Conservation Element of the City of Los Angeles General Plan. There is a significant overlap in the goals and objectives of all three of these plans, and coordinating their implementation will help to ensure the success of all three. The plan maintenance strategy identified in Chapter 15 will enhance the City's abilities to coordinate these plans.

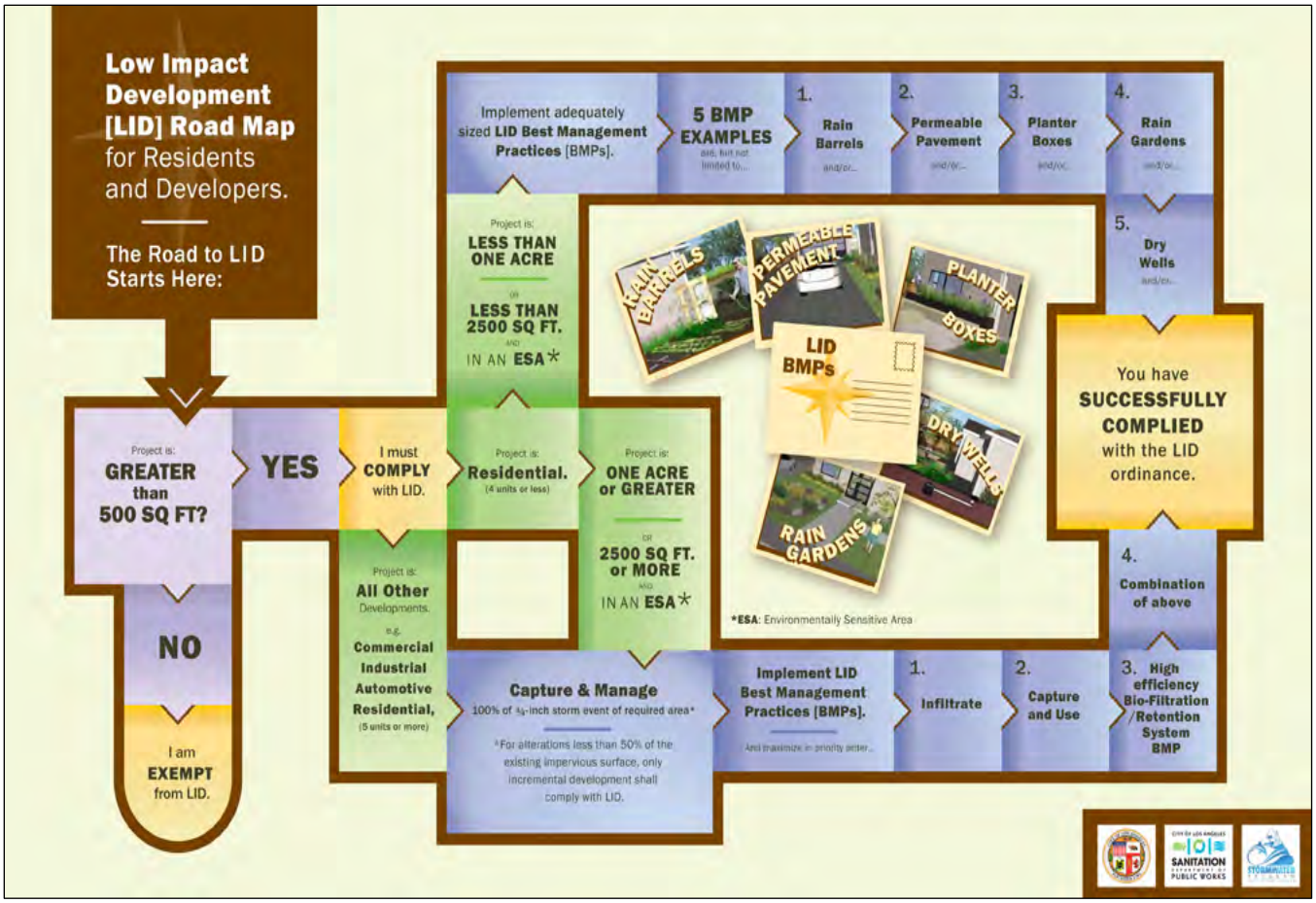

Figure 12-7. Low Impact Development Road Map

13. MITIGATION ACTION PLAN

13.1 CATALOG OF MITIGATION ALTERNATIVES

At its November 14, 2019, meeting, the Steering Committee performed a core capability exercise to assess local strengths, weaknesses, obstacles and opportunities related to floodplain management. The results of this exercise served as the basis for identifying the range of alternatives the City could consider as actions for the FMP2020. The planning team used the results of this exercise to refresh the catalog of floodplain management alternatives that was created for the FMP2015 planning effort. This catalog represents the range of floodplain management alternatives that were considered by the City in compliance with Step 7 of the CRS 10-step process. It represents 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. Floodplain management actions recommended in this plan were selected from an analysis of the alternatives presented in the catalog.

The planning team also used findings of public outreach efforts, the risk assessment results, and the actions identified in the FMP2015 to finalize the catalog for the FMP2020 update. The resulting catalog includes alternatives that are categorized in three ways:

- By what type of hazard it addresses:
  - Flooding
  - Dam failure
  - Tsunami
- By who would have responsibility for implementation:
  - Individuals (personal-scale actions)
  - Businesses (corporate-scale actions)
  - Government agencies (government-scale actions)
- 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 includes actions to mitigate current risk from the flood hazards assessed by this plan as well as actions to help reduce risk from changes in the impacts of these hazards resulting from climate change. It provides a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are generally within the capabilities of the City to implement. Some of its alternatives may not be feasible based on selection criteria identified for this plan. Actions were selected based on an analysis of the City's ability to implement the action and general feasibility. Actions from the catalog that are not included in the action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- The City 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.

Table 13-1 presents the catalog of flood hazard alternatives considered by the City. Table 13-2 presents the catalog of dam failure alternatives considered by the City. Table 13-3 presents the catalog of tsunami hazard alternatives considered by the City.

13.2 MITIGATION ACTIONS SELECTED FOR THE ACTION PLAN

The action plan (CRS Step 8) consists of specific mitigation actions identified for implementation by the Steering Committee and planning team. All actions from the FMP2015 have been brought forward as ongoing recommendations, with minor revisions to provide floodplain management benefits. The numbering from the FMP2015 was reused for the FMP2020. Table 13-4 lists the recommended mitigation actions, along with the following information for each:

- The agencies responsible for overseeing implementation of the action. Where multiple agencies are listed, a lead agency is identified by underlining in the table.
- Possible funding sources
- A qualitative estimate of project cost
- A proposed timeline, 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 objectives addressed by the action.

Lead departments and possible funding sources are identified as follows:

- BOE—Bureau of Engineering, Department of Public Works
- CAO—Chief Administrative Office
- DBS—Department of Building and Safety
- DCP—Department of City Planning
- DGS—Department of General Services
- DOA—Department of Airports
- DRP—Department of Recreation and Parks
- DWP—Department of Water and Power
- EMD—Emergency Management Department
- FCBAF—Flood Control Benefit Assessment Fund (funding source for LACDPW-owned facilities only)
- FD—Fire Department
- HD—Harbor Department
- LACDPW—Los Angeles County Department of Public Works
- LASAN—Bureau of Sanitation, Department of Public Works
- Library—Library Department
- PD—Police Department.
- STREETS LA—Bureau of Street Services, Department of Public Works

A companion document prepared in conjunction with this plan, the *City of Los Angeles 2020 Repetitive Loss Area Analysis*, provides a detailed assessment of areas in Los Angeles that have experienced repeated flood damage in the past, with recommended actions to mitigate flooding at each specific repetitive loss area.

Table 13-1. Alternatives to Mitigate the Flooding Hazard

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

Table 13-2. Alternatives to Mitigate the Dam Failure Hazard

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

Table 13-3. Alternatives to Mitigate the Tsunami Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• Manipulate the hazard: ❖ None • Reduce exposure to the hazard: ❖ Locate outside of hazard area • Reduce vulnerability to the hazard: ❖ Apply personal property mitigation techniques to your home such as anchoring your foundation and foundation openings to allow flow though. • Build local capacity to respond to or prepare for the hazard: ❖ Develop and practice a household evacuation plan ❖ Educate yourself on the risk exposure from the tsunami hazard and ways to minimize that risk	• Manipulate the hazard: ❖ None • Reduce exposure to the hazard: ❖ Locate structure or mission critical functions outside of hazard area whenever possible • Reduce vulnerability to the hazard: ❖ Mitigate personal property for the impacts of tsunami • Build local capacity to respond to or prepare for the hazard: ❖ Develop and practice a corporate evacuation plan ❖ Educate employees on the risk exposure from the tsunami hazard and ways to minimize that risk	• Manipulate the hazard: ❖ Build wave abatement structures • Reduce exposure to the hazard: ❖ Locate structure or functions outside of hazard area whenever possible ❖ Relocate identified critical facilities located in tsunami high hazard areas • Reduce vulnerability to the hazard: ❖ Harden infrastructure for tsunami impacts ❖ Adopt higher regulatory standards that will provide higher levels of protection to structures built in a tsunami inundation area ❖ Utilize tsunami mapping to guide development away from high risk areas through land use planning • Build local capacity to respond to or prepare for the hazard: ❖ Create a probabilistic tsunami map for the planning area ❖ Provide incentives to guide development away from hazard areas ❖ Develop a tsunami warning and response system ❖ Provide residents with tsunami inundation maps ❖ Join NOAA's Tsunami Ready program ❖ Develop and communicate evacuation routes ❖ Enhance the public information program to include risk reduction options for the tsunami hazard

Table 13-4. Recommended Flood Mitigation Actions

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-1—Continue to maintain the City Tsunami Response Plan Annex and community education effort and participate in the Los Angeles County Operational Area Tsunami Mitigation Task Force. Consider inclusion of outreach to identified vulnerable populations.				
EMD, HD	General Fund, HD	Low. Work performed by existing staff	Ongoing	2, 5, 11
P-2—Continue to partner with the NOAA and the NWS, who provide tsunami warning information to the state, the county and the city.				
EMD, HD, FD	General Fund, HD	Low. Work performed by existing staff	Ongoing	2, 5
P-3—Maintain the City Tsunami Response Plan Annex as part of the City's Emergency Operations Organization Master Plan.				
EMD, HD	General Fund, HD	Low. Work performed by existing staff	Ongoing	5, 6
P-4—Update evacuation plans for areas potentially affected by a tsunami according to California State Office of Emergency Services tsunami inundation maps and the City's Tsunami Response Plan Annex. Forward these evacuation plans to appropriate agencies for coordination (police, sheriff, Department of Transportation, DCP, Los Angeles County, etc.).				
EMD, FD, PD	General Funds; Possible grants	Low. Work performed by existing staff	Ongoing	5, 6, 11
P-5—Continue to maintain and annually update the Dam and Reservoir Emergency Notification List.				
DWP	DWP	Low. Work performed by existing staff	Ongoing	5, 8, 11
P-6—Continue to evaluate reservoirs in terms of earthquake safety and implement necessary mitigation or improvement measures, as required by the California Department of Water Resources Division of Safety of Dams.				
DWP, LACDPW	DWP, FCBAF	High	Ongoing	1, 2, 5
P-7—Continue to collect and analyze data regarding water volumes and pumping capabilities in water storage facilities provided by the Los Angeles Water Systems Data Acquisition Center to ensure those facilities are functioning properly to minimize potential hazards.				
DWP	DWP	Low. Work performed by existing staff	Ongoing	1, 2, 5
P-8—Continue to dispatch reservoir inspection and damage teams following natural disasters to inspect and report the condition of facilities.				
DWP, LACDPW	DWP, FCBAF	Low. Work performed by existing staff	Ongoing	1, 2, 5, 6
P-9—Continue to routinely monitor the existing structural condition of City-owned water storage facilities.				
DWP	DWP	Low. Work performed by existing staff	Ongoing	1, 2, 5, 6
P-10—Maintain a flood threat recognition system for properties downstream of City-owned water tanks.				
DWP, EMD	DWP	Low. Work performed by existing staff	Ongoing	2, 5
P-11—Prepare and update emergency response plans for water tanks and other non-dam systems.				
DWP	DWP	Medium	Ongoing	1, 2, 3, 5, 6, 11
P-12—Continue to provide and participate in community education and outreach programs and events in the City (such as Earth Day, Public Works Week and preparedness fairs), prioritizing identified vulnerable populations.				
EMD, LASAN BOE, LASAN, DCP, HD, FD, PD, DBS, DWP	General Fund	Low. Work performed by existing staff	Ongoing	5, 8, 9, 11
P-13—Maintain the City's Emergency Management Department and ReadyLA websites and other City social media sites to provide emergency preparedness information to the general public and media.				
EMD	General Fund	Low. Work performed by existing staff	Ongoing	5, 8, 10, 11
P-14—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.				
BOE, EMD	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	6, 8, 9, 11
P-15—Maintain the City's Emergency Operations Master Plan and Procedures including, but not limited to, periodic plan updates and training and exercises.				
EMD	General Fund	Low. Work performed by existing staff	Ongoing	2, 5, 6,11
P-16—Make sand and 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.				
FD, BOE, STREETS LA, EMD,	General Fund; Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 5, 8, 9, 11

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-17—Maintain and improve the drainage complaint database to help identify flood risks.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 7
P-18—Maintain and improve a technically based prioritization methodology for use in developing the stormwater capital improvement program.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 7, 10
P-19—Maintain regular contact with surrounding cities, the Los Angeles County Department of Public Works, and applicable state and federal agencies regarding floodplain management and the National Flood Insurance Program.				
BOE, CAO, EMD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3
P-20—Network with other agencies and participate in organizations such as the Association of State Floodplain Managers, California Floodplain Management Association and the National Association of Flood and Stormwater Management Agencies to remain current in the field of floodplain management.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 3, 10
P-21—Provide training and necessary support to foster Certified Floodplain Managers within the Department of Public Works and other Departments with floodplain management responsibilities.				
BOE, LASAN, DCP, DBS	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3
P-22—Conduct an annual National Flood Insurance Program seminar for City agencies responsible for applying and enforcing floodplain management regulations.				
BOE, DBS, DCP, HD	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3
P-23—Based on the annual National Flood Insurance Program seminar, update operational procedures and training materials for staff who apply and enforce floodplain management regulations and provide annual training.				
DBS, DCP, HD, BOE	General Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3
P-24—Maintain Geographic Information System mapping and modeling capability to support the stormwater facilities condition assessment program.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 6, 7
P-25—Continue to maintain precise survey benchmarks throughout the City.				
BOE	General Fund	Low. Work performed by existing staff	Ongoing	2, 3
P-26—Develop and maintain a citywide list of priority maintenance-related flood problem sites for where the City has jurisdiction.				
LASAN, BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 7
P-27—Based on the citywide list of priority maintenance-related flood problem sites (see P-26), conduct necessary inspection and maintenance at priority maintenance-related flood problem sites prior to the wet season and after significant storms, where the City has jurisdiction.				
LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 6, 7
P-28—Provide public education about keeping the stormwater system free of debris, the blockage of flow paths and reporting violations.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 7, 8, 9, 11
P-29—Post "No Dumping" signs at points of entry to the stormwater system where the City has jurisdiction.				
LASAN, LACDPW	Stormwater Pollution Abatement Fund (City); Benefit Assessment for Flood Control (County)	Low. Work performed by existing staff	Ongoing	7, 8
P-30—Maintain a map for potential landslide and mudflow areas (including post-fire impact areas).				
BOE, LASAN, DBS, DCP, LACDPW	General Fund, Stormwater Pollution Abatement Fund, FCBAF (post-fire mapping only)	Low. Work performed by existing staff	Ongoing	2, 3, 8
P-31—Update the established policy for substantial improvement/damage assessment to be consistent with FEMA requirements as needed.				
BOE, DBS	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 3, 4

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-32—Verify, through the plan check process and post development review, that new development complies with the regulations in the City's Ordinance for the Management of Flood Hazards (Ordinance No. 172,081), including freeboard requirements on new construction and substantial improvements.				
BOE, DBS, DCP, HD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	1, 3, 4
P-33—Update the City's Flood Damage Prevention Ordinance to incorporate standards appropriate for the flood risk in the City and to incorporate natural floodplain functions and green infrastructure elements. Consider the inclusion of additional measures to address flood risk to identified vulnerable populations. Coordinate with DCP on the development of wildlife protection regulations.				
BOE, DBS, DCP, HD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	1, 3, 4
P-34—Provide information to the Flood Hazard Mitigation Coordinator on July 1 of each year for preparation of the Annual Floodplain Management Plan Evaluation Report. Describe the progress made for each mitigation action and any floodplain management regulatory actions and compliance actions conducted during the reporting period, including the number of permits approved in designated flood hazard areas, the number of waivers applied for, and the number of waivers approved. Following the completion of the Plan Evaluation Report, the Steering Committee will meet at least one time during the year to finalize the report for posting and presentation to the City Council.				
BOE, CAO, Steering Committee	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3
P-35—Maintain a filing system for all Elevation Certificates that includes a process for obtaining accurately completed Elevation Certificates that is based upon a review and approval of all elevation certificates prior to the closure of a permit record.				
BOE, DBS	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3, 4
P-36—Continue to refine the use of the Plan Check and Inspection System to track high-risk properties and ensure that drainage is adequately addressed through the plan check process.				
BOE, LASAN, DBS	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 4
P-37—Incorporate floodplain management information into the Zoning Information and Map Access System (NavigateLA). Ongoing updates will be needed based on updated floodplain management data.				
BOE, DBS, DCP	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	3, 8
P-38—Transfer electronic data annually to the Flood Hazard Mitigation Coordinator regarding structures damaged due to flooding caused by catastrophic events.				
DBS	General Fund	Low. Work performed by existing staff	Ongoing	1, 2, 4
P-39—Update Certified Unified Program Agency data annually regarding hazardous materials storage (including water-reactive chemicals).				
FD	General Fund	Low. Work performed by existing staff	Ongoing	2, 7
P-40—Continue to notify insurance agencies and realtors of the requirement that all lessors or renters give written notice to all prospective and interested parties—including but not limited to, purchasers, lessee and renters—prior to finalization of a transaction when the subject land and/or structures are located within FEMA-designated flood zones. The notice shall comply with the latest version of CRS manual.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	3, 8, 9, 11
P-41—Provide flood zone information to all residents. Provide notifications when flood insurance is required. Provide notifications when FEMA-designated flood zone changes are made.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 3, 8
P-42—Develop and distribute flood protection information and materials to property owners and developers in high-risk areas including FEMA mapped floodplains, identified repetitive loss areas, and areas outside of mapped floodplains with known flood risks.				
BOE, DBS, DCP, EMD, Library	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3, 8, 9, 11

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-43—Maintain a list of critical facilities in the city as documented in the City's Local Hazard Mitigation Plan. Provide flood protection information to operators of critical facilities in FEMA-designated flood zones. Encourage the implementation of flood protection measures at such facilities.				
BOE, EMD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3, 4, 6
P-44—Maintain a current list of City-owned or city-leased properties located in FEMA-designated flood zones and evaluate floodplain management alternatives.				
BOE, DGS	General Fund; Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 4, 6
P-45—Pursuant to the directives of the City's Repetitive Loss Area Analysis, continue to investigate repetitive loss properties as they are identified by FEMA. Annually notify repetitive loss property owners about local flood hazards and property protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current repetitive loss property questionnaire to new repetitive loss properties.				
BOE, LASAN, BDS	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 4, 8
P-46—Identify flood risk areas in the City. Provide annual investigation and notification to property owners of high-risk areas about local flood hazards and proper protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current flood hazard questionnaire to new owners in high risk areas.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 3, 8, 9, 11
P-47—In the Plan Check and Inspection System database, flag repetitive loss properties and high-risk areas for review and approval of building permit applications by the Flood Hazard Mitigation Coordinator. Ongoing updates will be needed based on updated floodplain management data. Include data in ZIMAS and NavigateLA.				
BOE, DBS	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 3, 4, 8
P-48—Request that FEMA modify the repetitive loss property list based on mitigation projects implemented by owners or other responsible parties.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 4
P-49—Identify possible sources of funding (increased cost of compliance funds, mitigation grant funds, and others), and provide this information to repetitive loss property owners.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 3, 4, 8
P-50—Establish standards and/or incentives for the use of structural and nonstructural techniques that mitigate flood hazards and manage stormwater pollution.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 7
P-51—Plan and design stormwater projects so that water quality is protected, and flood risks are reduced on site and off site.				
BOE, LASAN, DBS	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	1, 2, 3, 7
P-52—Continue to require environmental review in the development process to provide for the protection of, or creation of natural resources that can mitigate the impacts of the development.				
BOE, DBS, DCP	General Fund	Low. Work performed by existing staff	Ongoing	1, 2, 7
P-53—Continue to implement environmentally sensitive property management at City-owned sites.				
DGS, DOA, DRP, DWP, HD	Various	Low. Work performed by existing staff	Ongoing	1, 2, 7
P-54—Update a City-wide Watercourse Permit Manual.				
BOE	General Fund, Possible grants	Low. Work performed by existing staff	Ongoing	2, 3, 7
P-55—Update the City's floodplain management website to promote awareness of programs that pursue flood hazard resilience, including but not limited to the National Flood Insurance Program, FEMA's Hazard Mitigation Assistance programs, HUD's CDBG programs, and EPA's Building Blocks programs.				
BOE, EMD	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	8, 9, 11
P-56—Develop a program for regular condition assessment of stormwater facilities where the City has jurisdiction to identify the physical and hydraulic condition of the system and to support infrastructure management needs.				
BOE, LASAN	Stormwater Pollution Abatement Fund	High	Long Term	1, 2, 3, 6

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-57—Conduct a systematic evaluation of FEMA designated flood zones and revise/update designated flood zones to reflect current conditions. Any revised data generated by the City will be provided to FEMA with a request for effective map revision.				
BOE, LASAN	Stormwater Pollution Abatement Fund	High	Long Term	2, 3
P-58— Evaluate current development regulations, including the grading ordinance and zoning ordinances (floodplain management ordinance, proposed wildlife protection ordinance), to determine whether the standards provide sufficient protection for adjacent (downstream or down-slope) development. Evaluate the effects of remedial grading and revise practices to minimize downstream impacts such as soil erosion and drainage. Coordinate updated regulations for hillsides that address the size and intensity of structures to manage flood hazard in hillsides and maintain native habitat to minimize erosion and increase slope stability.				
DCP, DBS, BOE, LASAN	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	1, 2, 3
P-59—Update the Map of Hillside Areas (BOE Basic Grid Map A- 13372) to more accurately reflect areas subject to hillside regulations based on latest data and regulations (CF 09-1390 and related documents).				
DCP, DBS, BOE, LASAN	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	2, 3
P-60—Study and recommend solutions to conflicts between height limitations and flood mitigation elevation requirements for structures.				
DCP, BOE	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	1, 2, 3, 4
P-61—Research and continue to improve municipal code regulations regarding soil stability and erosion abatement.				
DBS, DCP, BOE	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	2, 3
P-62—Require that all land division proposals in FEMA-designated flood zones include base flood elevation data including recordation of this information on final plats.				
BOE, DBS, DCP	Stormwater Pollution Abatement Fund; General Fund	High	Long Term	1, 2, 4, 9
P-63—Develop a model educational program for hillside properties in general and Mandeville Canyon in particular. The target audience should be, at minimum, residents and real estate agents.				
BOE, DBS	Stormwater Pollution Abatement Fund, Grants	High	Long Term	2, 8, 9
P-64—Develop an annual inspection program of watercourse obstructions and revetments in Mandeville Canyon.				
BOE, LASAN, Streets Los Angeles, CAO, City Attorney; Council Office District 11	General Fund, Grants	High	Long Term	1, 8, 9
P-65—EMD to continue to coordinate its ongoing access to Federal Empower data that identifies residents of the City who may have disabilities or other medical conditions, or access or functional needs that increase their vulnerability to disasters. This information can be used by field level incident commanders or the City's Emergency Operations Center in order to ensure timely and efficient evacuation of vulnerable populations in an event of fire, flood, or tsunami.				
EMD, FD, PD, BOE, DOA, DOD	General Funds; Possible grants	High	Long Term	2, 5, 11
P-66—Continue to develop and maintain evacuation plans for areas potentially affected by a catastrophic dam failure, as identified in the Dam Inundation Map of the General Plan and forward these evacuation plans to appropriate agencies for coordination (police, sheriff, Los Angeles County, etc.).				
EMD, FD, PD, DWP	General Funds; Possible grants	High	Long Term	2, 5, 11
P-67—Maintain self-registry for vulnerable populations with access and functional needs and strive to identify sources of public safety hazards caused by all flood risk zones, including but not limited to the city regulated floodplain, identified repetitive loss areas, dam failure inundation areas, tsunami inundation areas, and areas potentially impacted by sea level rise.				
EMD, PD, DWP, DOA, DOD	General Funds; Possible grants	High	Long Term	2, 5, 11

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-68—Conduct regular coordination meetings with the Los Angeles County Department of Public Works to communicate the City's list of priority stormwater projects, discuss watershed management programs, and develop countywide standards.				
BOE, LASAN, LACDPW	Stormwater Pollution Abatement Fund; Benefit Assessment for Flood Control (County)	Low	Long Term	1, 2, 3, 7
P-69—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 and areas with greatest economic need.				
BOE, LASAN, DBS, DCP, DGS	General Fund, Stormwater Pollution Abatement Fund; Grants	Low -Work performed by existing staff	Long Term	1, 2, 4, 8
P-70—Utilize risk-based information from the City of Los Angeles 2020 Floodplain Management Plan and the City of Los Angeles 2018 Local Hazard Mitigation Plan to update the Safety Element of the City's General Plan pursuant to California Assembly Bill 2140 California Senate Bill 379 and California Senate Bill 1000.				
DCP, DBS	General Fund	Medium	Short	1, 2, 3, 6
P-71—Institute a program to capture perishable data (e.g., high water marks, damages, functional downtime) after flood events in the City, especially where flooding occurs in places that have not been identified a hazard areas on existing FEMA or City maps.				
BOE, LASAN	General Fund, FEMA Pollution Abatement Fund	Medium	Long term	1,2,8
P-72—Continue to maintain/ enhance the city's classification under the Community rating System (CRS) as a means to mitigate the impacts from flood insurance reform.				
BOE, DBS, DCP, CAO, LASAN, EMD	General Fund	Low	Ongoing	1,2,3,4,5,6,7,8, 9,10
P-73—Where feasible, cost effective and supported both publicly and politically, restore the natural and beneficial floodplain functions of appropriate floodplains (floodplains that have been identified through a master plan or study certified by a qualified agency) in the City.				
BOE, LASAN, DBS, DCP, DGS	General Fund, Stormwater Pollution Abatement Fund	Low -Work performed by existing staff	Long Term	1, 2, 4, 8
P-74—Using the best available data and science, consider probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the City's comprehensive floodplain management program. This would include but is not limited to codes, ordinances, plans, studies, public information programs and city directives.				
BOE, LASAN, DCP, DGS, DBS	General Fund	Medium	Long term	1,2,3,10, 11
P-75—Update the open space and conservation elements of the general plan and identify ways to promote the preservation and enhancement of the beneficial functions of floodplains.				
DCP, BOE, LASAN	General Fund	High	Short term	1, 4, 10
P-76—Coordinate floodplain management programs within the Los Angeles River impact area with those projects identified in the Los Angeles River Revitalization Master Plan.				
BOE, LASAN	Federal and State Funds, Possible grants, General Fund	Medium	Long term	1, 2, 9
P-77—The City currently has five approved Enhanced Watershed Management Plans: Ballona Creek, Dominguez Channel, Marina Del Rey, Santa Monica Bay, and Upper Los Angeles River. These plans were approved in 2016 by the Los Angeles Regional Water Quality Control Board. The plans are considered adaptive management plans and must be reassessed and submitted for approval to the Water Quality Control Board every 5 years to ensure the City is working toward meeting its water quality compliance mandates.				
LASAN, BOE	Safe Clean Water Program Fund, General Fund/Stormwater Pollution Abatement Fund, Possible Grants	Low	Short term	1, 2, 3, 7, 10

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	Objectives
P-78—Coordinate floodplain management program recommendations and objectives with the Enhanced Watershed Management Plans.				
BOE, LASAN	Safe Clean Water Program Fund, General Fund/Stormwater Pollution Abatement Fund, Possible Grants	Medium	Long term	1, 2, 3, 7, 10
P-79—Include an identifier for RLAA properties in the DBS permitting process so that property owners can be made aware of the potential flood risk when applying for construction permits.				
DCP, BOE, DBS	General Fund	Low	Short term	All

a. Where multiple departments are listed, the underlined department will be the lead agency for overseeing implementation of the action.

13.3 STATUS OF ACTIONS FROM FMP2015

All actions selected for the action plan are carried over from the FMP2015, with minor edits and clarifications due department name changes. The following changes are noted from the FMP2015:

- 2015 Action P-32—This action was split into two actions, one on enforcement and one on updating the code.
- 2015 Action P-33—This action is the residual action from P-32 above and is technically a new action for the FMP2020.
- 2015 Action P-34—This action is based on the combination of actions P-33 and P-53 from the FMP2015.
- 2015 Action P-69—This action has been completed so is not carried over for the current update.

13.4 BENEFIT/COST ANALYSIS AND ACTION PLAN PRIORITIZATION

A qualitative benefit-cost review was performed for each identified mitigation action. 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. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of each action:

- 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).
  - **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.
  - **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.
- 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. The action plan was

prioritized according to the benefit/cost analysis, funding availability and the immediacy of the need for each project (CRS Step 8), 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 a 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 13-5 lists the priority of each action as assigned by the planning team, using the same parameters used in selecting the actions. For many of the actions identified in this action plan, the City of Los Angeles may seek financial assistance under the FEMA Hazard Mitigation Grant Program or Hazard Mitigation Assistance program, 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, the City reserves the right to define "benefits" according to parameters that meet the goals and objectives of the FMP2020.

13.5 ANALYSIS OF MITIGATION ACTIONS

Each recommended action was classified based on the type of mitigation it involves, 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 citizens 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 13-6 presents the results of this analysis.

Table 13-5. Prioritization of Mitigation Actions

Action	# 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)
P-1	2	Medium	Low	Yes	No	Yes	High
P-2	2	Low	Low	Yes	No	Yes	High
P-3	2	Medium	Low	Yes	No	Yes	High
P-4	2	Medium	Low	Yes	Yes	Yes	High
P-5	2	Medium	Low	Yes	No	Yes	High
P-6	3	High	High	Yes	No	Yes, partially	Medium
P-7	3	High	Low	Yes	No	Yes	High
P-8	4	High	Low	Yes	No	Yes	High
P-9	4	High	Low	Yes	No	Yes	High
P-10	2	High	Low	Yes	No	Yes	High
P-11	5	Medium	Medium	Yes	No	Yes	Medium
P-12	3	Low	Low	Yes	No	Yes	High
P-13	3	Low	Low	Yes	No	Yes	High
P-14	3	Low	Low	Yes	No	Yes	High
P-15	3	Medium	Low	Yes	No	Yes	High
P-16	5	High	Low	Yes	No	Yes	High
P-17	2	Medium	Low	Yes	No	Yes	High
P-18	5	Medium	Low	Yes	No	Yes	High
P-19	2	Low	Low	Yes	No	Yes	High
P-20	3	Low	Low	Yes	No	Yes	High
P-21	3	Medium	Low	Yes	No	Yes	High
P-22	3	Medium	Low	Yes	No	Yes	High
P-23	3	Medium	Low	Yes	No	Yes	High
P-24	4	Medium	Low	Yes	No	Yes	High
P-25	2	High	Low	Yes	No	Yes	High
P-26	4	Medium	Low	Yes	No	Yes	High
P-27	3	High	Low	Yes	No	Yes	High
P-28	4	Medium	Low	Yes	No	Yes	High
P-29	2	Low	Low	Yes	No	Yes	High
P-30	3	Medium	Low	Yes	No	Yes	High
P-31	3	Medium	Low	Yes	No	Yes	High
P-32	3	High	Low	Yes	No	Yes	High
P-33	2	Low	Low	Yes	No	Yes	High
P-34	3	Low	Low	Yes	No	Yes	High
P-35	4	High	Low	Yes	No	Yes	High
P-36	2	Low	Low	Yes	No	Yes	High
P-37	3	Low	Low	Yes	No	Yes	High
P-38	2	Medium	Low	Yes	No	Yes	High
P-39	3	High	Low	Yes	No	Yes	High
P-40	3	Medium	Low	Yes	No	Yes	High
P-41	4	Medium	Low	Yes	No	Yes	High
P-42	4	Medium	Low	Yes	No	Yes	High
P-43	2	Low	Low	Yes	No	Yes	High
P-44	4	Medium	Low	Yes	No	Yes	High

Action	# 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)
P-45	4	Medium	Low	Yes	No	Yes	High
P-46	4	High	Low	Yes	No	Yes	High
P-47	4	Low	Low	Yes	No	Yes	High
P-48	4	Medium	Low	Yes	No	Yes	High
P-49	4	High	Low	Yes	No	Yes	High
P-50	4	High	Low	Yes	No	Yes	High
P-51	3	High	Low	Yes	No	Yes	High
P-52	3	Medium	Low	Yes	Maybe	Yes	High
P-53	3	Low	Low	Yes	No	Yes	High
P-54	3	Medium	Low	Yes	Yes	Yes	High
P-55	2	Low	Low	Yes	No	Yes	High
P-56	4	High	High	Yes	No	Maybe	Medium
P-57	2	High	High	Yes	No	Maybe	Medium
P-58	3	High	Low	Yes	No	Yes	High
P-59	2	High	Low	Yes	No	Maybe	Medium
P-60	4	Medium	Low	Yes	No	Maybe	Medium
P-61	2	Medium	Low	Yes	No	Maybe	Medium
P-62	4	High	High	Yes	No	Maybe	Low
P-63	5	Medium	Low	Yes	No	Maybe	Medium
P-64	3	Medium	High	No	No	Maybe	Low
P-65	3	High	High	Yes	Yes	Maybe	Low
P-66	2	High	High	Yes	Yes	Maybe	Low
P-67	2	Medium	High	No	Yes	Maybe	Low
P-68	3	High	High	Yes	Yes	Maybe	Low
P-69	4	Medium	Low	Yes	No	Maybe	Medium
P-70	4	High	Low	Yes	Yes	Maybe	Low
P-71	4	High	Medium	Yes	No	Yes	Medium
P-72	3	Medium	Medium	Yes	Yes	Maybe	Medium
P-73	10	Medium	Low	Yes	No	Yes	High
P-74	4	High	Low	Yes	No	Yes	High
P-75	4	High	Medium	Yes	No	Maybe	Medium
P-76	3	High	High	Yes	Yes	Maybe	Medium
P-77	3	Medium	Medium	Yes	Yes	Maybe	Medium
P-78	5	Low	Low	Yes	No	Yes	High
P-79	Medium	Low	Yes	No	Yes	High	P-79

Table 13-6. Analysis of Mitigation Actions

Hazard Type	Initiative Addressing Hazard, by Mitigation Type					
	1. Prevention	2. Property Protection	3. Public Education and Awareness	4. Natural Resource Protection	5. Emergency Services	6. Structural Projects
Dam Failure	6, 7, 9, 20, 21, 24, 25, 26, 27, 34, 37, 39, 50, 56, 70, 72, 74, 75, 77	69, 72	12, 13, 14, 28, 29, 41, 42, 43, 46, 55, 72	52, 53, 72, 73, 75, 76, 77, 78	5, 8, 10, 11, 15, 16, 38, 65, 66, 67, 71, 72	72
FEMA Floodplains	19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, 36, 37, 39, 44, 50, 54, 56, 57, 58, 60, 61, 62, 64, 70, 72, 74, 75, 77	35, 69, 72	12, 13, 14, 28, 29, 35, 40, 41, 42, 43, 46, 55, 63, 72	33, 52, 53, 72, 73, 75, 76, 77, 78	15, 16, 38, 65, 67, 71, 72	18, 72, 68
Landslide/ Mudflow	20, 21, 24, 25, 26, 27, 30, 34, 37, 39, 50, 54, 56, 58, 59, 61, 64, 70, 72, 74, 75, 77	69, 72	12, 13, 14, 28, 29, 41, 42, 43, 46, 55, 63, 72	52, 53, 72, 73, 75, 76, 77, 78	15, 16, 38, 65, 67, 71, 72	18, 72, 68
Repetitive Loss Properties	17, 20, 21, 22, 23, 24, 25, 26, 27, 34, 36, 37, 39, 47, 50, 54, 56, 57, 58, 60, 61, 64, 70, 72, 74, 75, 77	69, 72	12, 13, 14, 28, 29, 41, 42, 43, 45, 46, 48, 49, 55, 63, 72, 79	52, 53, 72, 73, 75, 76, 77, 78	15, 16, 38, 65, 67, 71, 72	18, 72, 68
Tsunami	1, 20, 21, 24, 25, 26, 27, 34, 37, 39, 50, 70, 72, 74, 75	69, 72	1, 12, 13, 14, 28, 29, 41, 42, 43, 46, 55, 72	52, 53, 72, 73, 75	1, 2, 3, 4, 15, 16, 38, 65, 67, 71, 72	72
Urban Drainage	17, 20, 21, 24, 25, 26, 27, 34, 36, 37, 39, 50, 54, 56, 58, 60, 64, 70, 72, 74, 75, 77	69, 72	12, 13, 14, 28, 29, 41, 42, 43, 46, 55, 63, 72	51, 52, 53, 72, 73, 75, 76, 77, 78	15, 16, 38, 65, 67, 71, 72	18, 51, 72, 68
Climate Change/Adaptive Capacity	20, 21, 24, 25, 26, 27, 34, 36, 37, 39, 50, 54, 56, 60, 64, 70, 74, 77	69	12, 13, 14, 28, 29, 41, 42, 43, 46, 55	52, 53, 70, 74, 77	15, 16, 38, 65, 67	68

City of Los Angeles 2020 Floodplain Management Plan

PART 4—PLAN MAINTENANCE

14. PLAN ADOPTION

This chapter documents formal adoption of the FMP2020 by the Los Angeles City Council (CRS Step 9). A copy of the adoption resolution is provided in Figure 14-1.

To Be Provided with Final Draft

Figure 14-1. Resolution Adopting FMP2020

15. PLAN MAINTENANCE STRATEGY

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

- A method and schedule for monitoring, evaluating, and updating the floodplain management plan over a 5-year cycle
- A process for the community to continue to participate in the plan maintenance process
- A process for the City to incorporate floodplain management requirements into other planning mechanisms, such as general or capital improvement plans, when appropriate

The plan maintenance strategy is the formal process that will ensure that the FMP2020 remains an active and relevant document and that the City of Los Angeles maintains its eligibility for applicable funding sources. It includes a schedule for monitoring and evaluating the FMP2020 annually and producing an updated plan every five years. The strategy also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in the FMP2020 will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, hazard mitigation planning, and building code enforcement and implementation. The FMP2020's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

15.1 PLAN IMPLEMENTATION

The effectiveness of the FMP2020 depends on its implementation and incorporation of its action items into existing local plans, policies and programs. Together, the action items in the FMP2020 provide a framework for activities that the City of Los Angeles can implement over the next 5 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 City of Los Angeles Department of Public Works Bureau of Engineering will have lead responsibility for overseeing the FMP2020 implementation and maintenance strategy. Implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan.

15.2 STEERING COMMITTEE

The Steering Committee is a total volunteer body that oversaw the development of the floodplain management plan and made recommendations on key elements of the plan, including the maintenance strategy. 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 FMP2020 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 local stakeholders.

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 City of Los Angeles Department of Public Works Bureau of Engineering 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 development of the FMP2020, so keeping an interim steering committee intact will provide a head start on future updates. It will be the steering committee's role to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

15.3 ANNUAL PROGRESS REPORT

The minimum task of the ongoing annual steering committee meeting will be the evaluation of the progress of the 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 City of Los Angeles
- 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 floodplain management.

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 Bureau of Engineering floodplain management plan web page
- Provided to the local media through a press release
- Provided to the Board of Public Works, Mayor, and City Council to inform them of 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.

15.4 PLAN UPDATE

The City of Los Angeles intends to update the FMP2020 on a 5-year cycle from the date of its adoption (CRS Step 10). This cycle may be accelerated to less than 5 years based on the following triggers:

- A federal flood-related disaster declaration that impacts the City of Los Angeles
- A flood event that causes loss of life
- A comprehensive update of the City of Los Angeles general plan.

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

- The update process will be convened through a steering committee.
- The 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 City of Los Angeles City Council and Mayor will adopt the updated plan.

It is the City of Los Angeles' intention to fully integrate the FMP2020 into the next update of the City's local hazard mitigation plan. This will allow for a uniform update cycle for both plans and eliminate redundant planning.

15.5 CONTINUED PUBLIC INVOLVEMENT

The public will continue to be apprised of the plan's progress through the floodplain management plan website and by providing copies of annual progress reports 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 City of Los Angeles 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 City of Los Angeles at the time of the update. At a minimum, this strategy will include the use of local media outlets.

15.6 INCORPORATION INTO OTHER PLANNING MECHANISMS

The City of Los Angeles, through adoption of a general plan and zoning ordinance, has planned for the impact of flooding. Policies in these planning mechanisms were reviewed and expanded as appropriate in development of the FMP2020. The general plan and the FMP2020 are complementary documents that work together to achieve the goal of reducing risk. An update to the general plan may trigger an update to the FMP2020.

The following other planning processes and programs also are to be coordinated with the recommendations of the FMP2020:

- Local hazard 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

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. As information becomes available from other planning mechanisms that can enhance the FMP2020, that information will be incorporated via the update process.

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TERMINOLOGY

ACRONYMS

APC—City of Los Angeles Area Planning Commission

BOE—Bureau of Engineering, Department of Public Works

CAO—Chief Administrative Office

CEQA—California Environmental Quality Act

CFR—Code of Federal Regulations

CRS—Community Rating System

DBS—Department of Building and Safety

DCP—Department of City Planning

DGS—Department of General Services

DOA—Department of Airports

DRP—Department of Recreation and Parks

DSOD —California Division of Safety of Dams

DWP—Department of Water and Power

DWR—(California) Department of Water Resources

EMD—Emergency Management Division

ESA—Endangered Species Act

EWMP—Enhanced Watershed Management Plans

FD—Fire Department

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

FIRM—Flood Insurance Rate Map

FMP2015—2015 City of Los Angeles Floodplain Management Plan

FMP2020—2020 City of Los Angeles Floodplain Management Plan

GIS—Geographic Information System

Hazus—MH—Hazards, United States-Multi Hazard

HD—Harbor Department

IPCC—Intergovernmental Panel on Climate Change

LACDA—Los Angeles County Drainage Area (Study)

LACDPW—Los Angeles County Department of Public Works

LASAN—Los Angeles Sanitation and Environmental

LID—Low impact development

LOMR—Letter of Map Revision

NFIP—National Flood Insurance Program

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

NWS—National Weather Service

PD—Police Department.

SEA—Significant Ecological Area

SEMS—Standardized Emergency Management System

SFHA—Special Flood Hazard Area

USGCRP—U.S. Global Change Research Program

DEFINITIONS

100-Year Flood: The flood that has a 1 percent chance of being equaled or exceeded in any given year. The 100-year flood does not necessarily occur once every 100 years. It is possible for a 100-year flood to occur more than once in a relatively short period of time.

Acre-Foot: The amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Base Flood: Another term for the 100-year flood—the flood having a 1 percent chance of being equaled or exceeded in any given year. The base flood is used as a reference flood level to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.

Benefit/Cost Analysis: A systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness. For the purposes of benefit-cost analysis of proposed mitigation actions, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Capability Assessment: A description and analysis of a community's current capacity to address threats associated with flooding. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified.

Community Rating System (CRS): A voluntary program that provides flood insurance premium discounts to property owners in communities that exceed the minimum requirements of the National Flood Insurance Program and complete activities that reduce flood hazard risk.

Critical Facility: 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.

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Economically Disadvantaged Populations: Households with household incomes below a federally defined minimum.

Exposure: The number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Federal Disaster Declaration: Declarations for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A federal disaster declaration puts into motion long-term federal recovery programs to help disaster victims, businesses, and public entities.

Flash Flood: A flood that occurs with little or no warning when water levels rise at an extremely fast rate.

Flood Insurance Rate Map (FIRM): The official map on which the Federal Emergency Management Agency delineates special flood hazard area for a given location.

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the special flood hazard area.

Floodway: Areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Freeboard: The margin of safety added to the base flood elevation in the design of structures intended to mitigate flooding.

Frequency: How often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard.

Goal: A general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a floodplain management plan is measured by the degree to which its goals have been met (that is, by the benefits in terms of actual floodplain management).

Geographic Information System (GIS): A computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program: A FEMA program that provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (Hazus) Loss Estimation Program: A GIS-based program used to support the development of risk assessments. The Hazus software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards. Hazus is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards.

Hydraulics: The branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: The analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: The measure of the effects of a hazard.

Inventory: A list of assets identified in a study region that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: A short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Preparedness: Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability of Occurrence: A statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: The process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Significant Ecological Area: An area mapped in the *Los Angeles County Special Management Areas Policy Map* that contains irreplaceable biological resources, representing the biodiversity of the county. Lands in the SEAs generally have undisturbed or lightly disturbed habitat.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in river situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact floodplain management.

Vulnerability: An asset's susceptibility to damage during a hazard event. Vulnerability depends on an asset's construction, contents, and the economic value of its functions.

Watershed: An area that drains down-gradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Zoning Ordinance: An ordinance that designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

City of Los Angeles 2020 Floodplain Management Plan

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 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.

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).

City of Los Angeles 2020 Floodplain Management Plan

Appendix B. Steering Committee Charter

CITY OF LOS ANGELES
2020 FLOODPLAIN MANAGEMENT PLAN
STEERING COMMITTEE CHARTER

PURPOSE OF THE STEERING COMMITTEE

The name of this organization shall be the City of Los Angeles 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 interested in this planning effort.*
- *Solicit a wide range of input into the planning process and advocate for public involvement.*
- *Educate all participants in hazard mitigation 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 ALTERNATE CHAIRPERSON

Aaron Gross, Chief Resiliency Officer of the City of Los Angeles will serve as the chairperson. Conni Pallini of The Department of City 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; and*
- *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 chair person. 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% plus one of the voting committee membership, 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. Members may also *delegate their voting power to other members of the SC to vote in their absence.* Committee members may abstain from voting if they have a conflict of interest on the matter. SC 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 CPT at least one week in advance.*

ALTERNATES

It was the decision of the SC to *allow for designated alternates for SC members, if desired*. Designated alternates shall be considered official members of the SC. 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 their designated alternate. SC members were given until August 9, 2019 to designate an alternate. Those SC members that choose to designate alternates shall notify the Core Planning Team (CPT) 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.* Members may abstain from voting if they choose. The City is able to accept the direction of the SC or not. It is the City's choice. Designated alternates for SC members are interchangeable and have full voting rights on behalf of the SC member. In either case, the 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 CPT for this project includes appropriate representatives from the City of Los Angeles along with contract consultant assistance provided by Tetra Tech, Inc. The CPT 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 *City of Los Angeles Public Information Officer (PIO)*. In the PIO's absence, *the SC Chair will serve as the spokesperson*.

In addition, each member should have a responsibility to represent the SC's recommendation when speaking on plan-related issues as a committee member. Any differing personal or organizational viewpoints should be clearly distinguished from the committee's work. Finally, committee members *will 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 *conducted on the second Thursday of each month from 9:30 a.m. to 11:30 a.m. PST at the City of Los Angeles AT 500 E. Temple Street, Los Angeles, CA. The exact room may fluctuate do 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 *approximately one week 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 CPT before the meeting is conducted. *If a primary member and his or her alternate miss two consecutive meetings over the course of the planning process, the member will be relieved of his or her membership on the SC.* 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 following protocol:

- *Requests to be heard must be made to the chairperson of the SC by submitting a completed speaker request form to the chairperson before the meeting is called to order. Speaker request will be available at all SC committee meetings. The speaker request form asks the following information:*
    - *Agenda item number to be discussed or public comment*
    - *If the person is in favor/opposed to the agenda item (if applicable)*
    - *Person's name*
    - *Person's telephone number (optional)*
    - *Person's address (optional)*
    - *Name of organization (if applicable)*
    - *A brief summary of the person's position on the matter (optional).*
- *Persons wishing to speak on items listed on the agenda will be heard when the chair or alternate chair calls for comments from the audience and must have relevance to the hazard mitigation plan and the planning area. Relevance will be determined by the chair or alternate chair.*
- *The chair may specify the number of minutes each person will be permitted to speak based on the number of persons wishing to speak and the time available.*
- *After the public has commented, the item is closed to further public comment and brought to the SC for discussion and action. There is no further comment permitted from the audience unless invited by the SC.*

The SC will strive to post meeting agendas on the City's floodplain management website *one week prior to all scheduled* meetings.

COURTESY

SC members should treat each other with respect, listen to each other, work cooperatively, and allow all members to voice their opinions.

ADA and Title VI 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.

Acomodamientos ADA y Titulo VI: Individuos que requieran acomodamiento razonable, servicios de interpretación, y materiales en otros idiomas o formatos alternativos pueden comunicarse con el coordinador del departamento al (626) 458-7901. Las solicitudes deben hacerse una semana antes de la reunión programada. Personas con impedimentos auditivos o del habla pueden usar el Servicio de Relevo de California al 7-1-1.

STEERING COMMITTEE MEMBERSHIP

Government Representatives	Department / Bureau	Alternate
1. Frazier, Quentin	Port of Los Angeles	**Allen, Randy** **Reed, Lynette**
2. Gross, Aaron	Chief Resiliency Officer-Mayor's Ofc.	**Affeldt, Michael**
3. Hammett, Mike	Los Angeles Police Department	**Hom, Japhet**
4. Huynh, Charmie	Department of Building and Safety	**Nepomuceno-Juacalla, Carolynn** **Perez, Michael**
5. Ignatczyk, John	Los Angeles Fire Department	
6. Kharaghani, Shahram	Los Angeles Sanitation & Environment	**Scaduto, Michael**
7. Meyerhofer, Larry	Emergency Management Department	**Pijuan, Alen**
8. Pallini, Conni	Department of City Planning	**Mik, Lena** **Phinouwong, Nina**
9. Shu, Susan	Bureau of Engineering	**Lin, Chang-Shien**
10. Tan, Emmanuel	Department of Water and Power	**Plumb, Cliff** **Hu, JianPing**
Non-Voting Government Representatives		
11. Nemick, Mary	Bureau of Engineering	
12. Santo-Domingo, Cathie	Los Angeles Recreation and Parks	
Non-Government Representatives		
1. Aniolek, Gregg	Community Emergency Response Team	
2. Christiansen, Marissa	Friends of the Los Angeles River	**Mejia, Stephen**
3. Demesa, Ed	U.S. Army Corp of Engineers	**Vivanti, John**
4. Duboff, Jessica	Los Angeles Chamber	**Asuncion, Kendal**
5. Ellis, Dr. Andre	CSULA Geosciences & Environment	
6. Greenspan, Mike	Resident	
7. McOmber, Britta	UCLA Luskin School of Public Affairs	
8. Miranda, Solomon	CA Department of Water Resources	
9. Robinson, Prof. Alex	USC Landscape Architecture	
10. Vega, Norma	Red Cross of Greater Los Angeles	**Garcia-Ruiz, Joselito**
11. Wood, Patricia	Los Angeles County Flood Control District	**Tran, Larry**

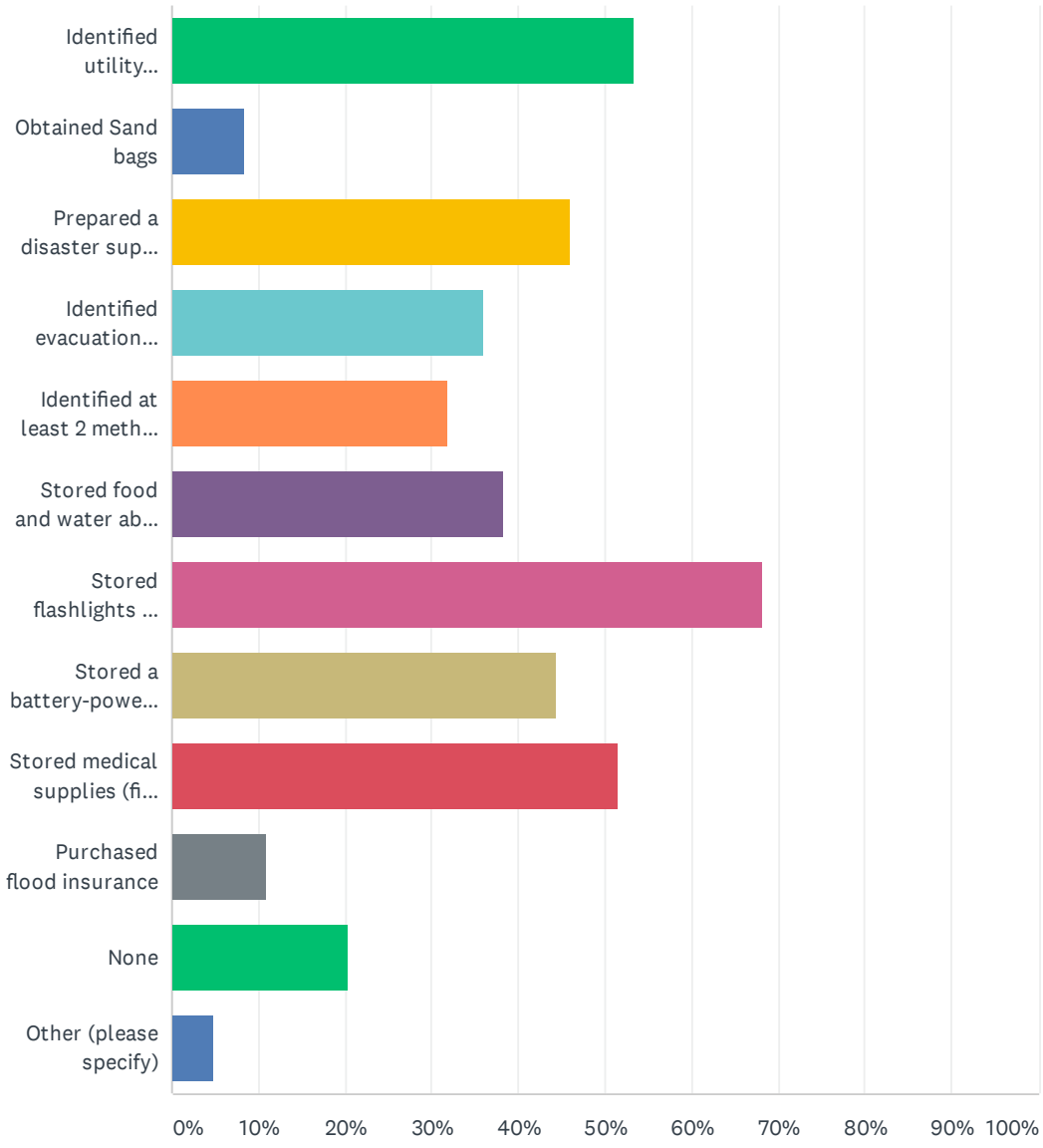
City of Los Angeles 2020 Floodplain Management Plan

Appendix C. Public Outreach Materials

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)

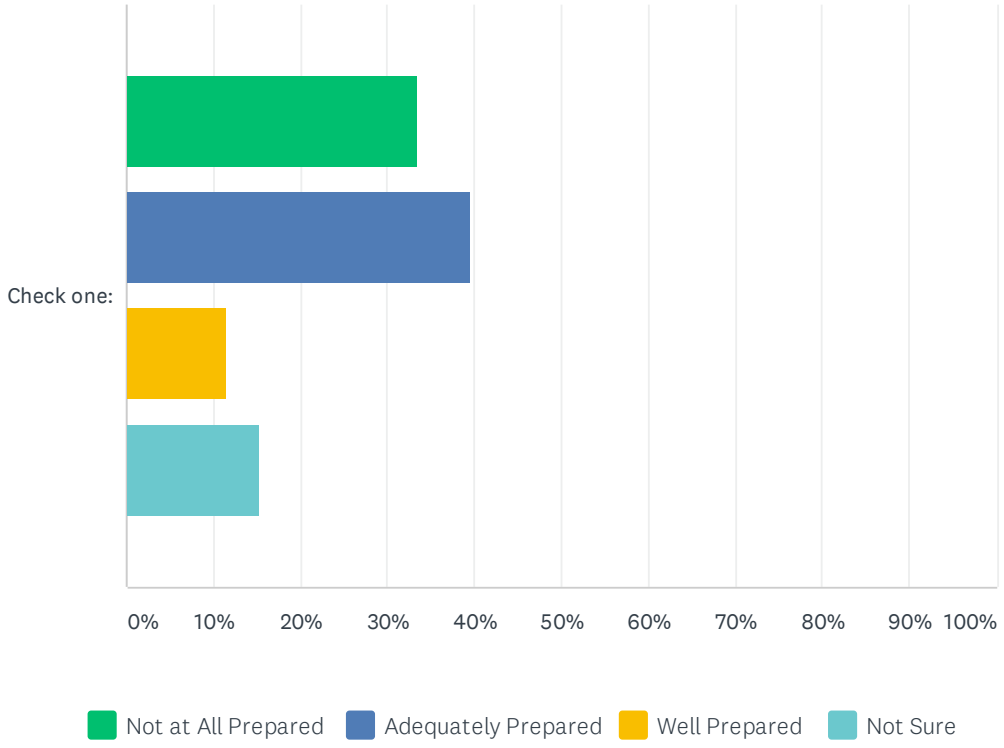
Answered: 167 Skipped: 2



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?

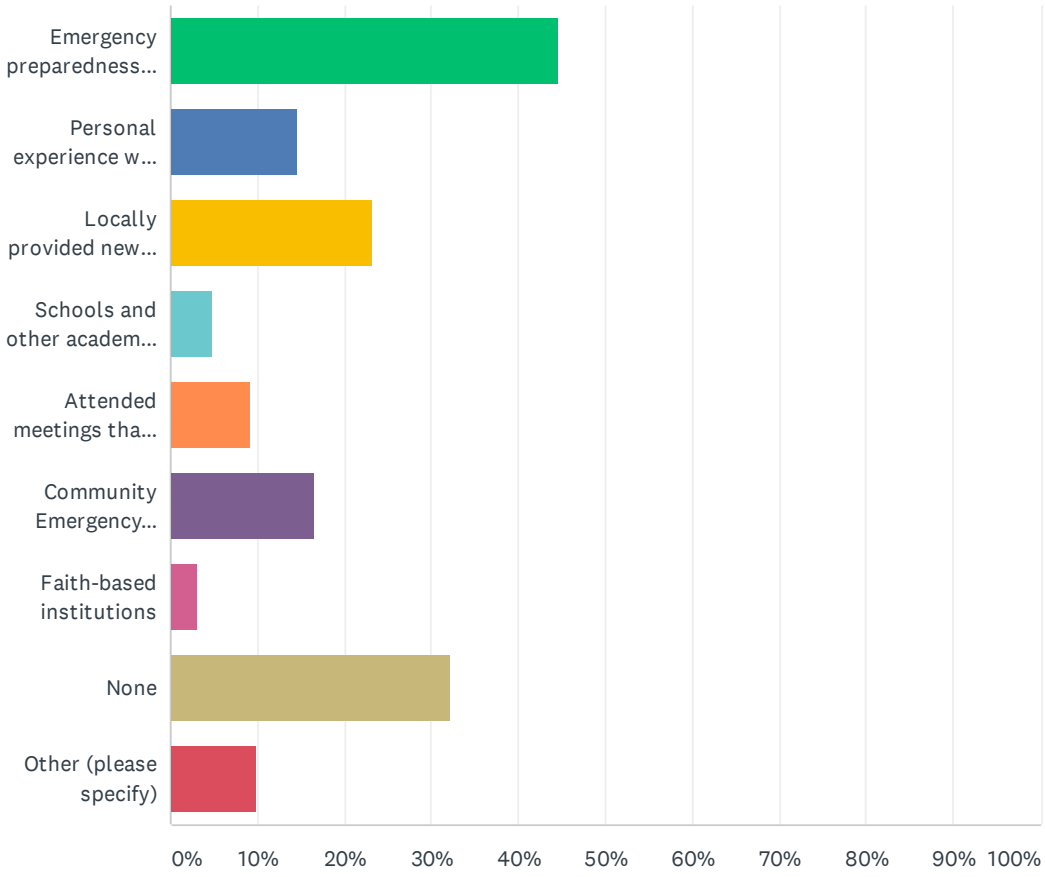
Answered: 164 Skipped: 5



	NOT AT ALL PREPARED	ADEQUATELY PREPARED	WELL PREPARED	NOT SURE	TOTAL	WEIGHTED AVERAGE
Check one:	33.54% 55	39.63% 65	11.59% 19	15.24% 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)

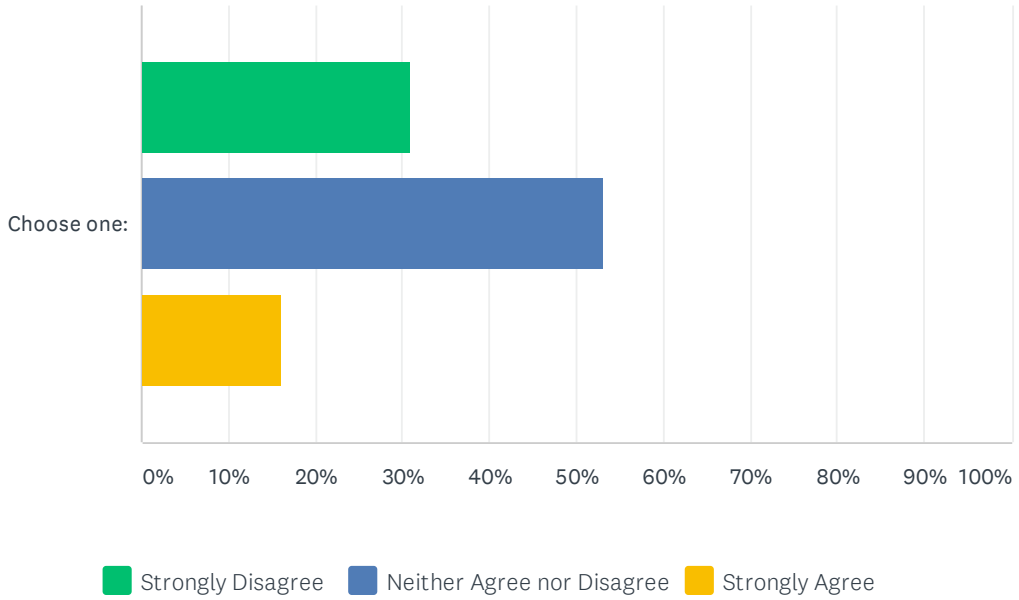
Answered: 164 Skipped: 5



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.

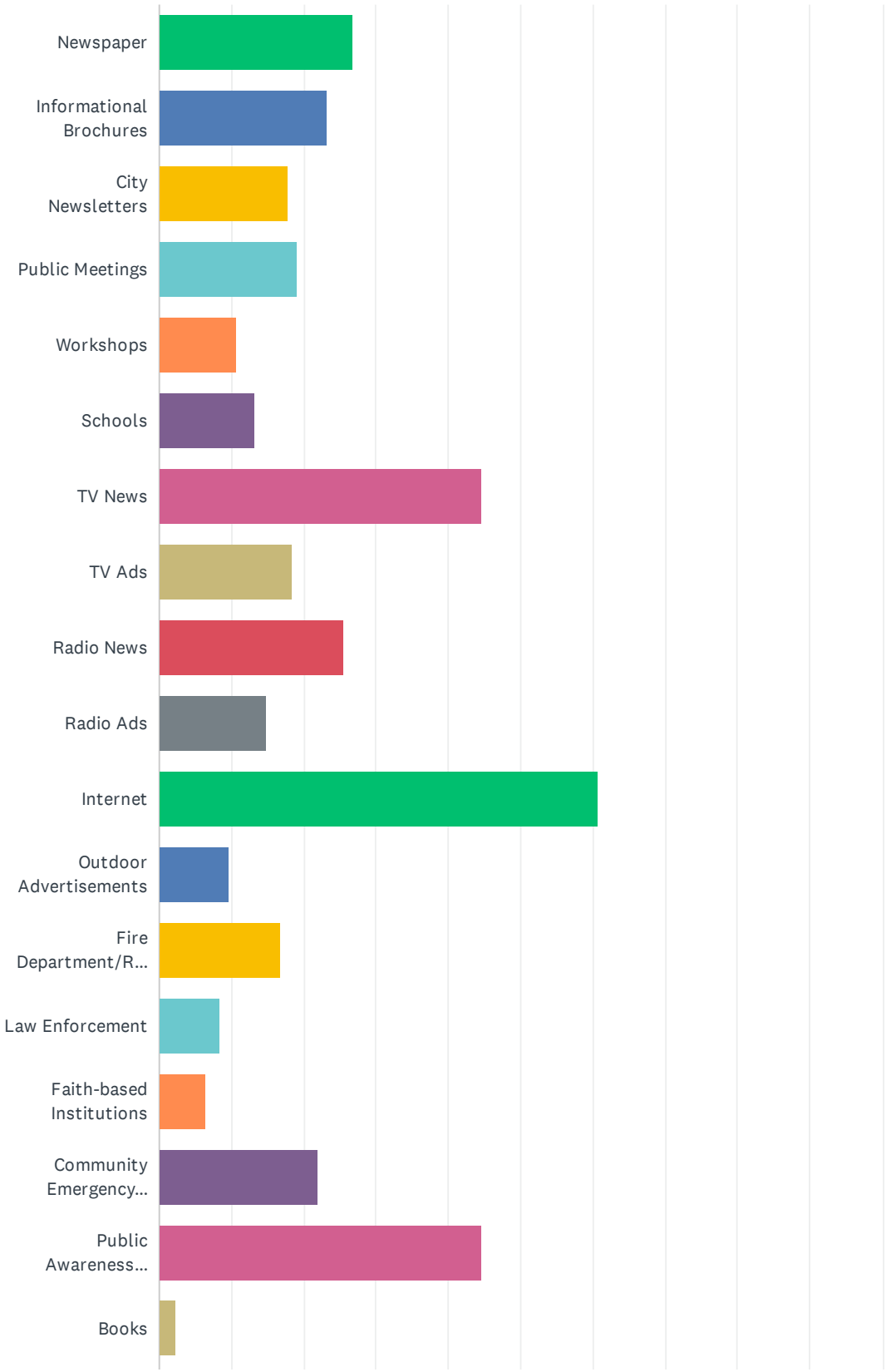
Answered: 162 Skipped: 7

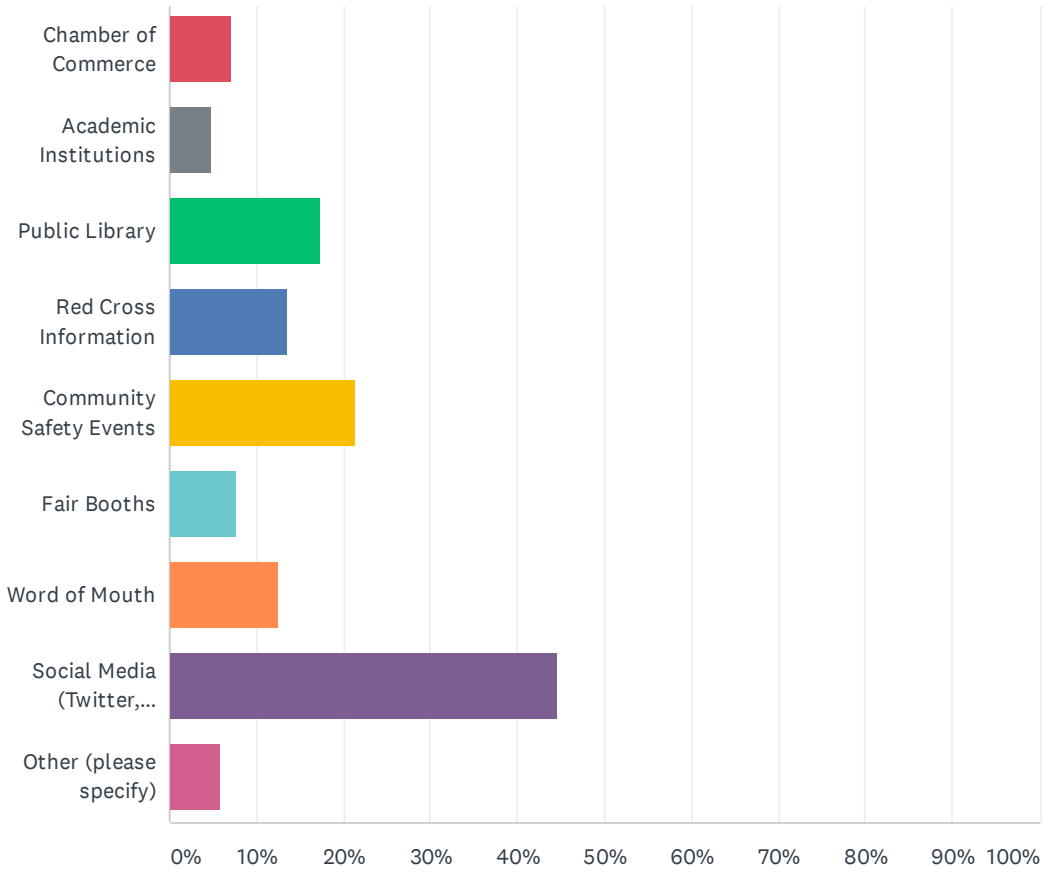


	STRONGLY DISAGREE	NEITHER AGREE NOR DISAGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
Choose one:	30.86% 50	53.09% 86	16.05% 26	162	2.70

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

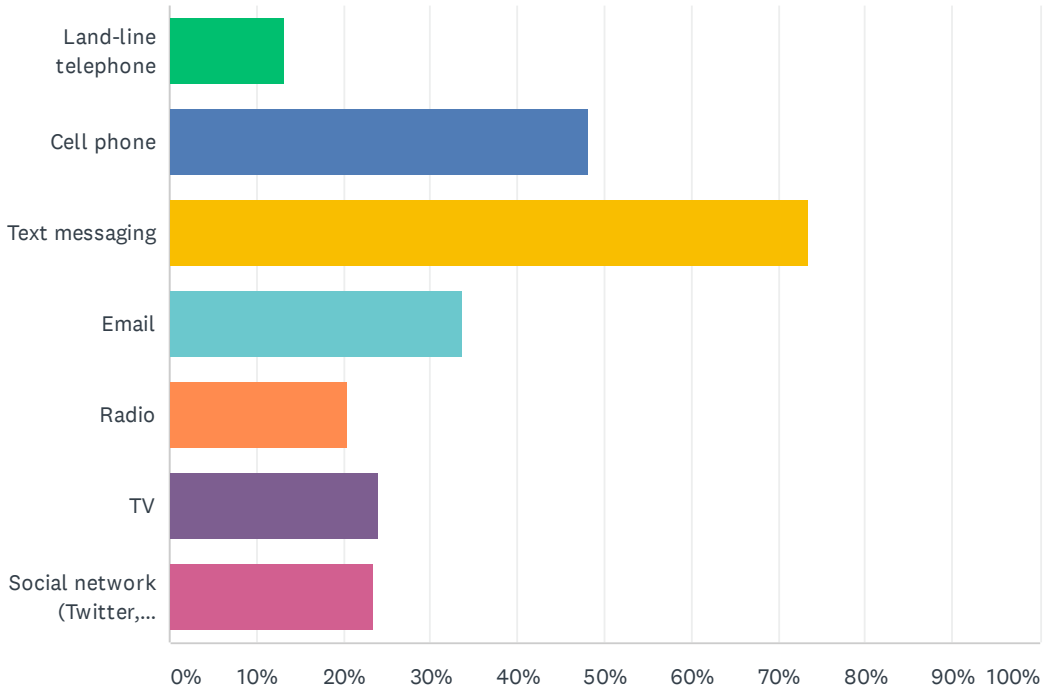



Chamber of Commerce
Academic Institutions
Public Library
Red Cross Information
Community Safety Events
Fair Booths
Word of Mouth
Social Media (Twitter,...
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

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?

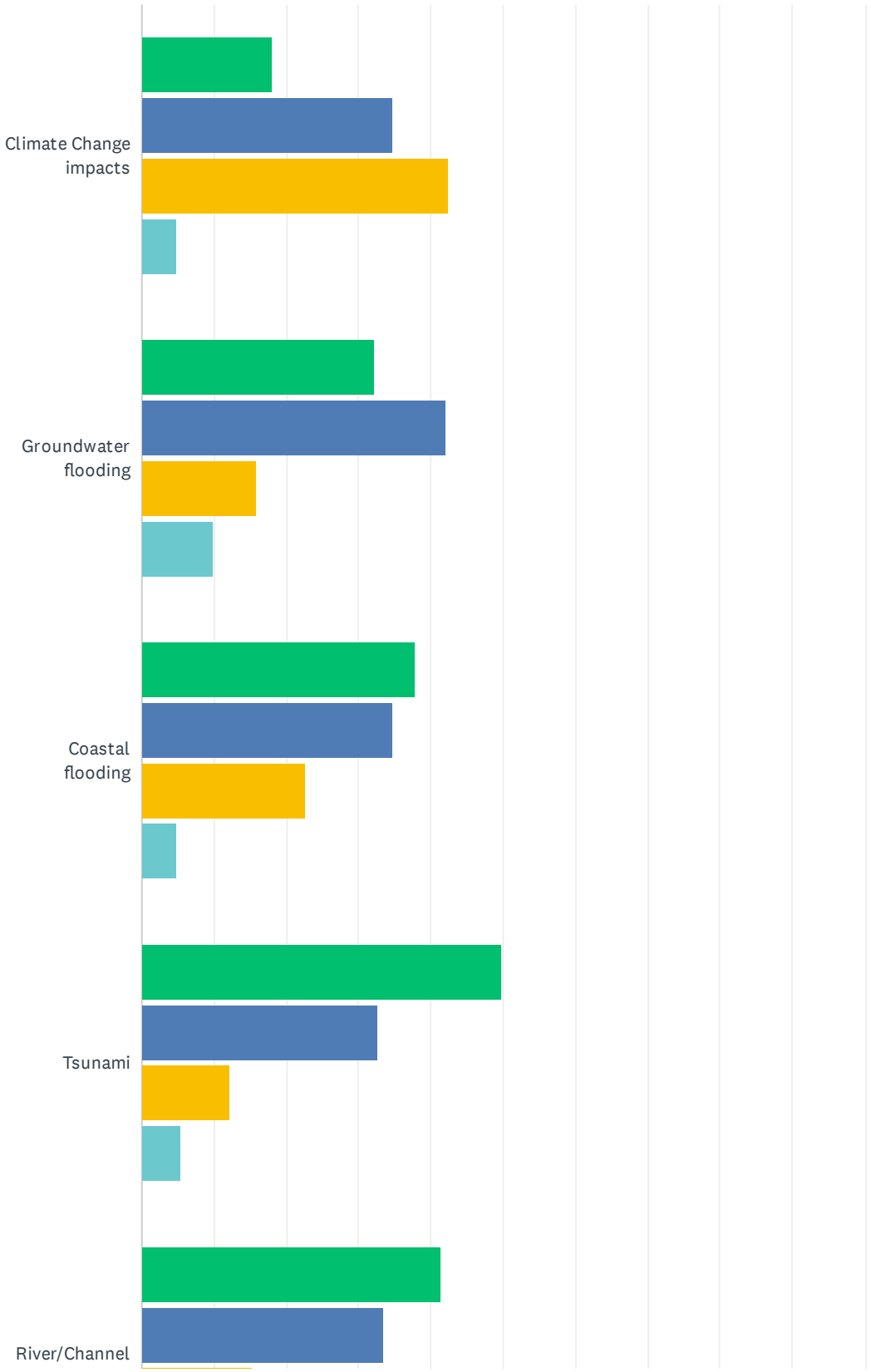
Answered: 166 Skipped: 3

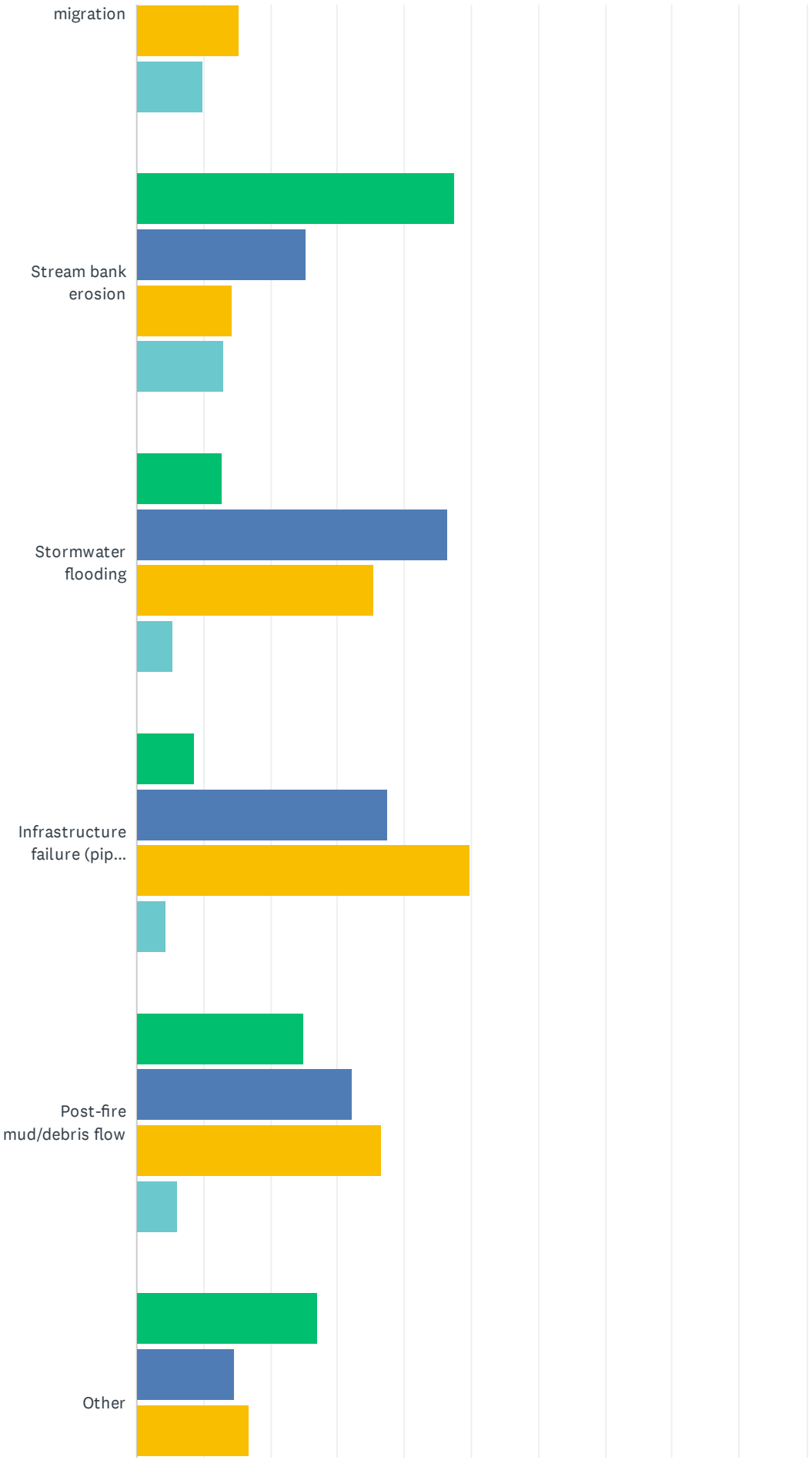


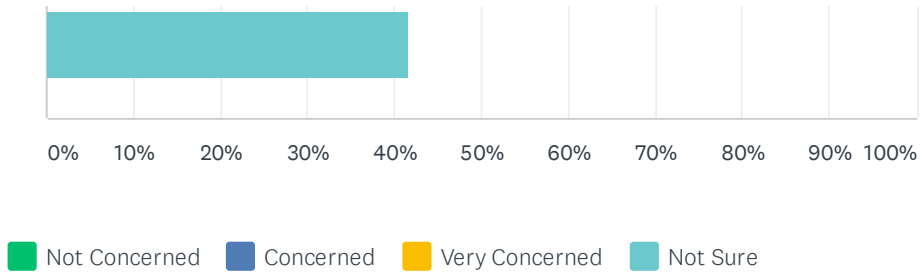
ANSWER CHOICES	RESPONSES	
Land-line telephone	13.25%	22
Cell phone	48.19%	80
Text messaging	73.49%	122
Email	33.73%	56
Radio	20.48%	34
TV	24.10%	40
Social network (Twitter, Facebook, etc.)	23.49%	39
Total Respondents: 166		

Q7 How concerned are you about the following flood related hazards in Los Angeles? (Check one response for each hazard)

Answered: 168 Skipped: 1



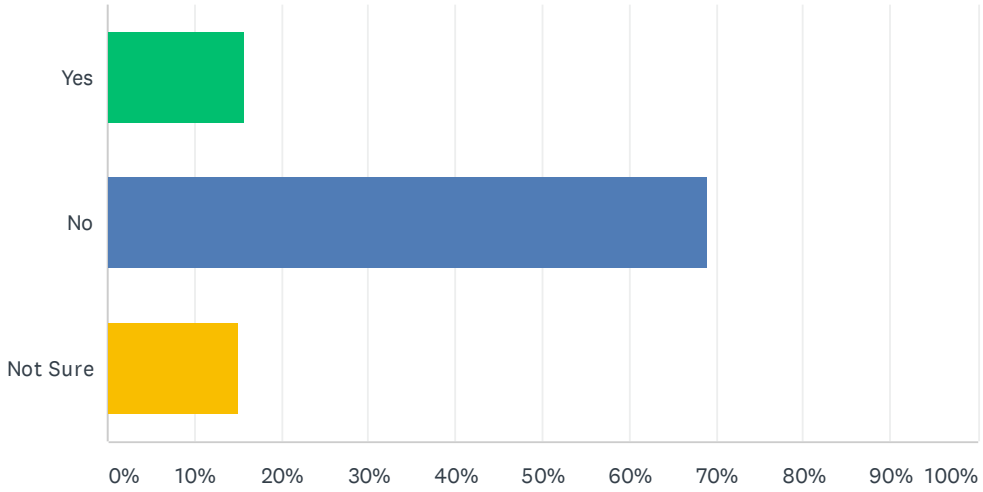

migration
Stream bank erosion
Stormwater flooding
Infrastructure failure (pip...
Post-fire mud/debris flow
Other



	NOT CONCERNED	CONCERNED	VERY CONCERNED	NOT SURE	TOTAL	WEIGHTED AVERAGE
Climate Change impacts	17.96% 30	34.73% 58	42.51% 71	4.79% 8	167	3.63
Groundwater flooding	32.32% 53	42.07% 69	15.85% 26	9.76% 16	164	2.96
Coastal flooding	37.80% 62	34.76% 57	22.56% 37	4.88% 8	164	2.84
Tsunami	49.70% 82	32.73% 54	12.12% 20	5.45% 9	165	2.41
River/Channel migration	41.46% 68	33.54% 55	15.24% 25	9.76% 16	164	2.77
Stream bank erosion	47.53% 77	25.31% 41	14.20% 23	12.96% 21	162	2.72
Stormwater flooding	12.80% 21	46.34% 76	35.37% 58	5.49% 9	164	3.62
Infrastructure failure (pipes, tanks)	8.59% 14	37.42% 61	49.69% 81	4.29% 7	163	3.95
Post-fire mud/debris flow	25.00% 41	32.32% 53	36.59% 60	6.10% 10	164	3.41
Other	27.08% 13	14.58% 7	16.67% 8	41.67% 20	48	4.04

Q8 Do you have flood insurance?

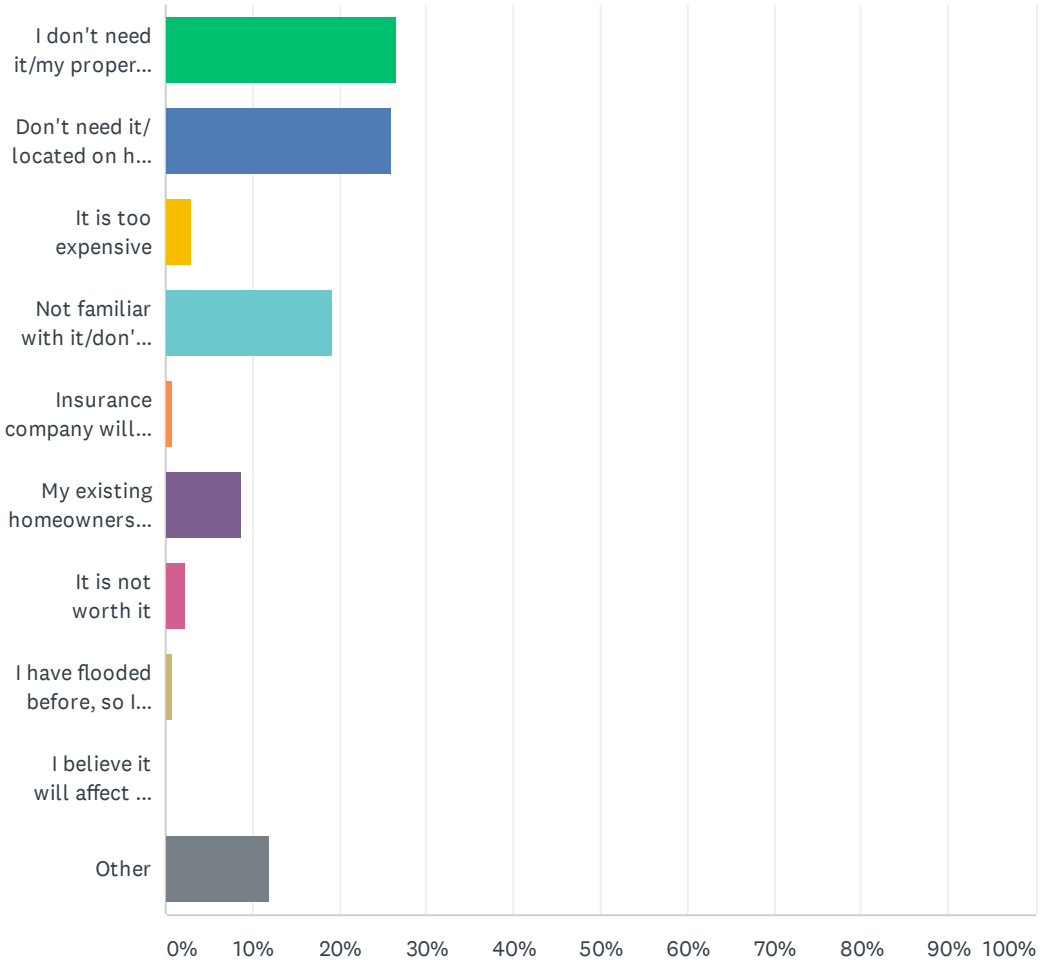
Answered: 165 Skipped: 4



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?

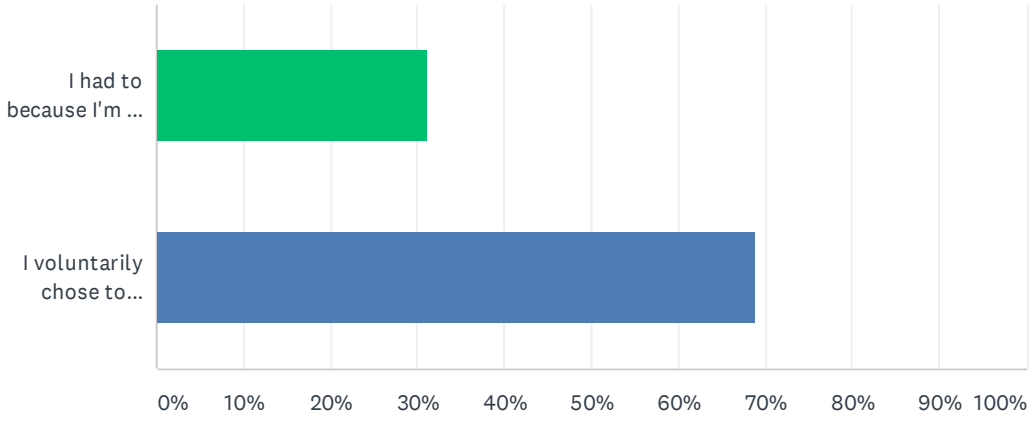
Answered: 135 Skipped: 34



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



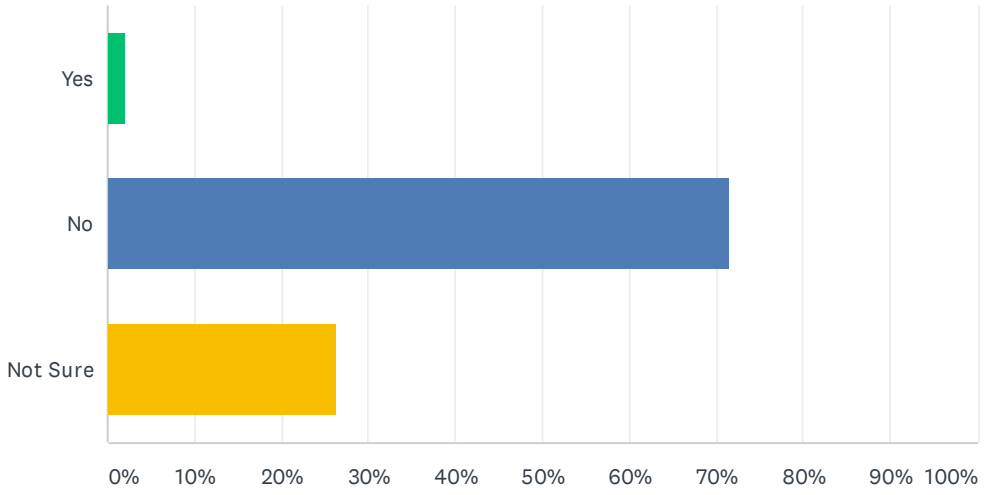
ANSWER CHOICES	RESPONSES	
I had to because I'm in a flood prone area	31.25%	10
I voluntarily chose to purchase it	68.75%	22
Total Respondents: 32		

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?

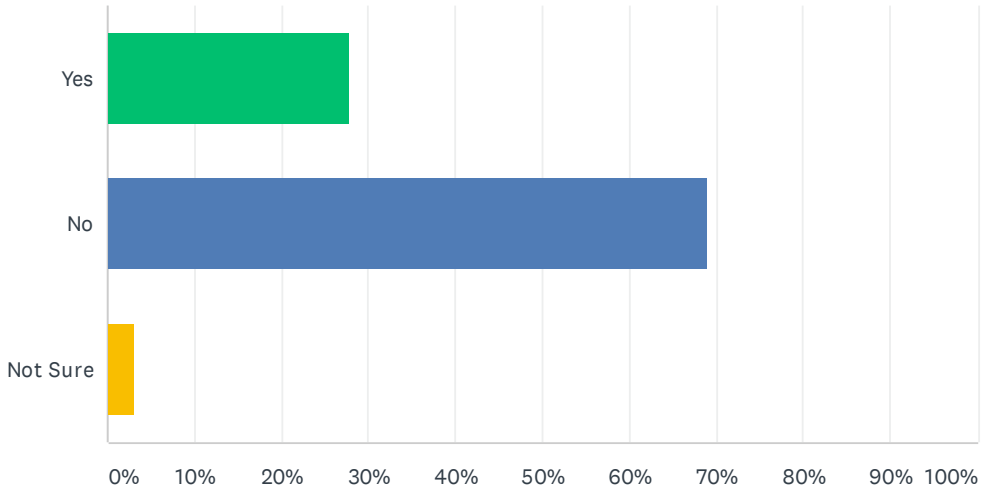
Answered: 144 Skipped: 25



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?

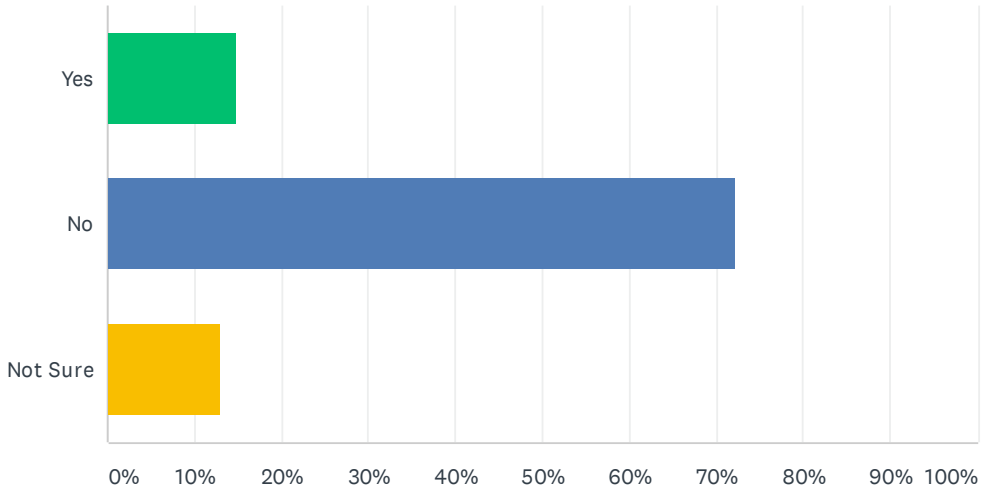
Answered: 155 Skipped: 14



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?

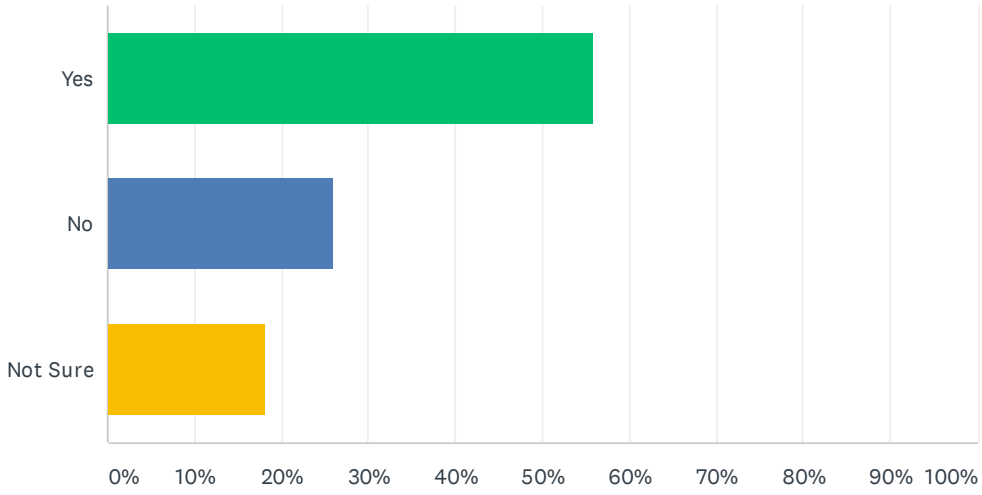
Answered: 155 Skipped: 14



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?

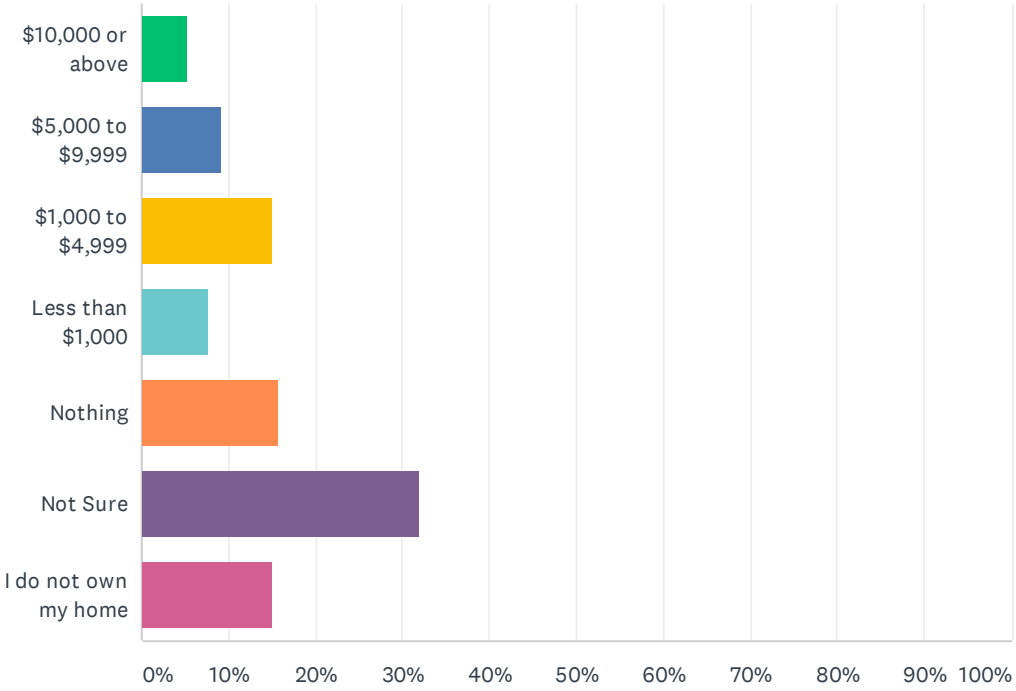
Answered: 154 Skipped: 15



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)

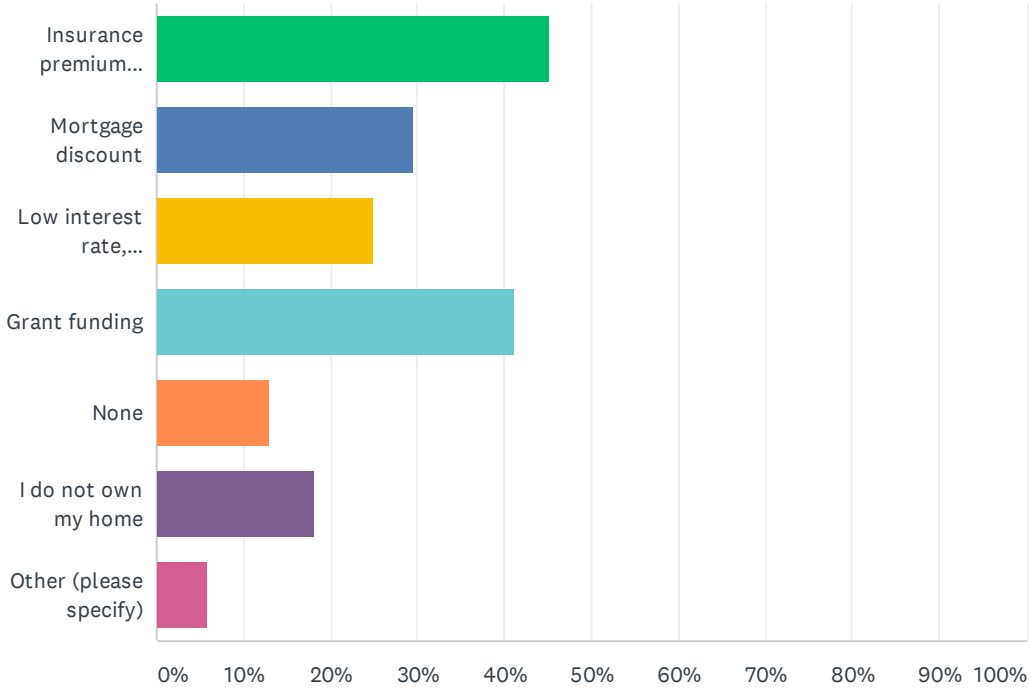
Answered: 153 Skipped: 16



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)

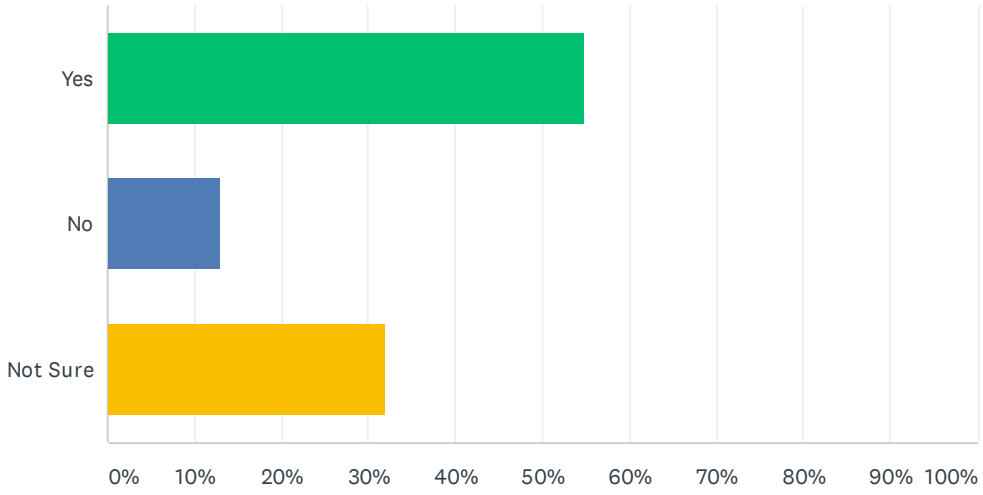
Answered: 153 Skipped: 16



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?

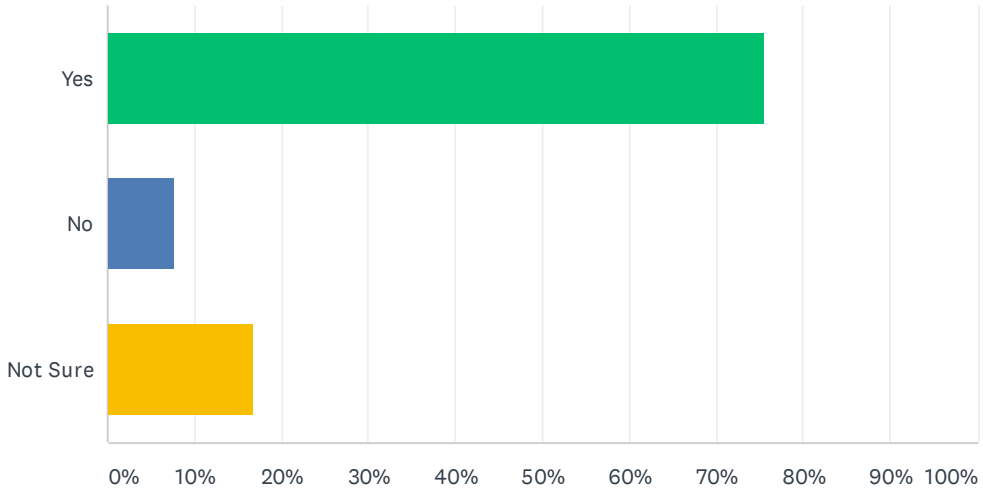
Answered: 153 Skipped: 16



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?

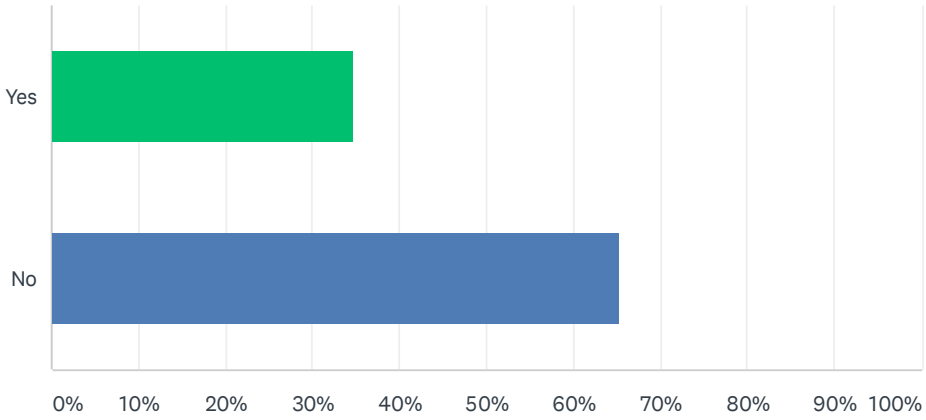
Answered: 155 Skipped: 14



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



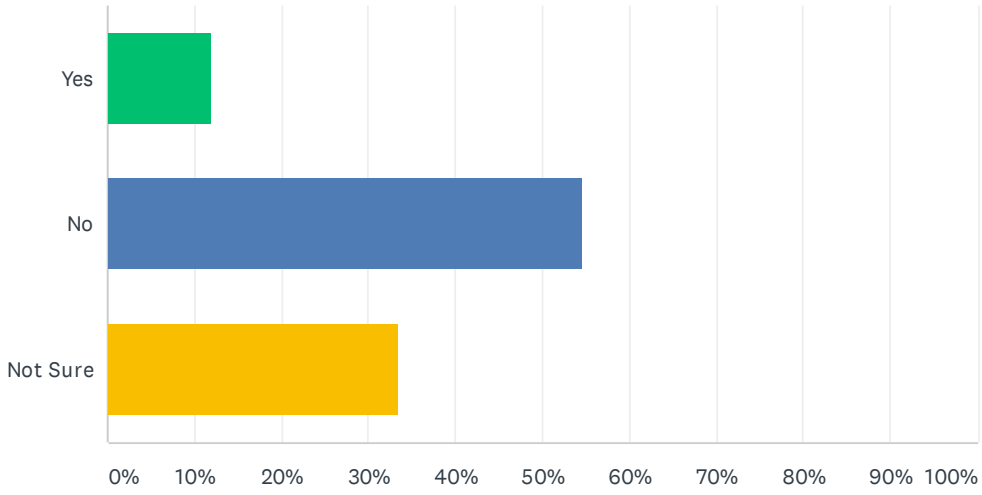
ANSWER CHOICES	RESPONSES	
Yes	34.64%	53
No	65.36%	100
TOTAL		153

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?

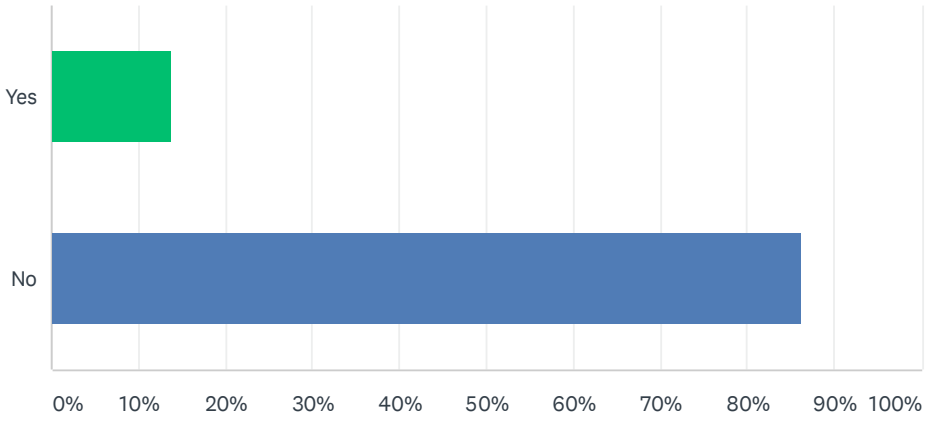
Answered: 152 Skipped: 17



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?

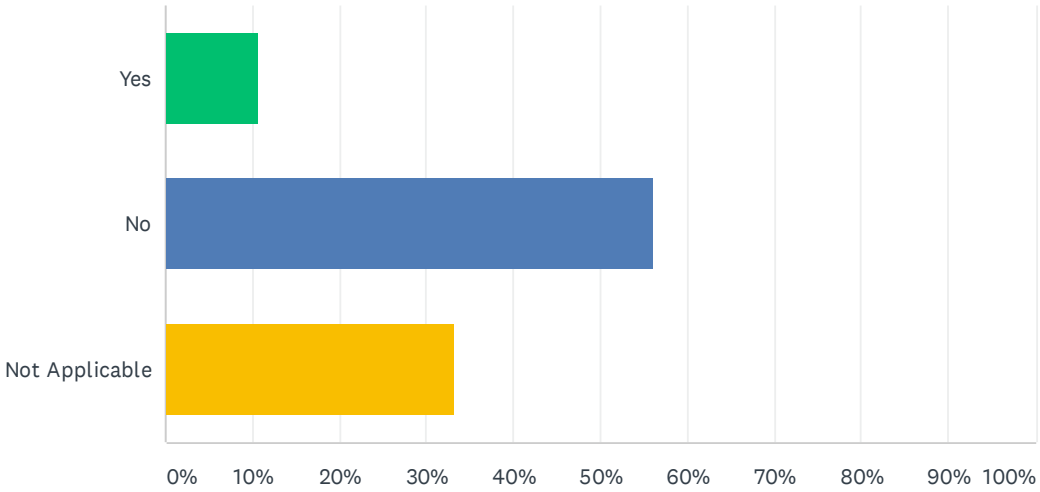
Answered: 153 Skipped: 16



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.

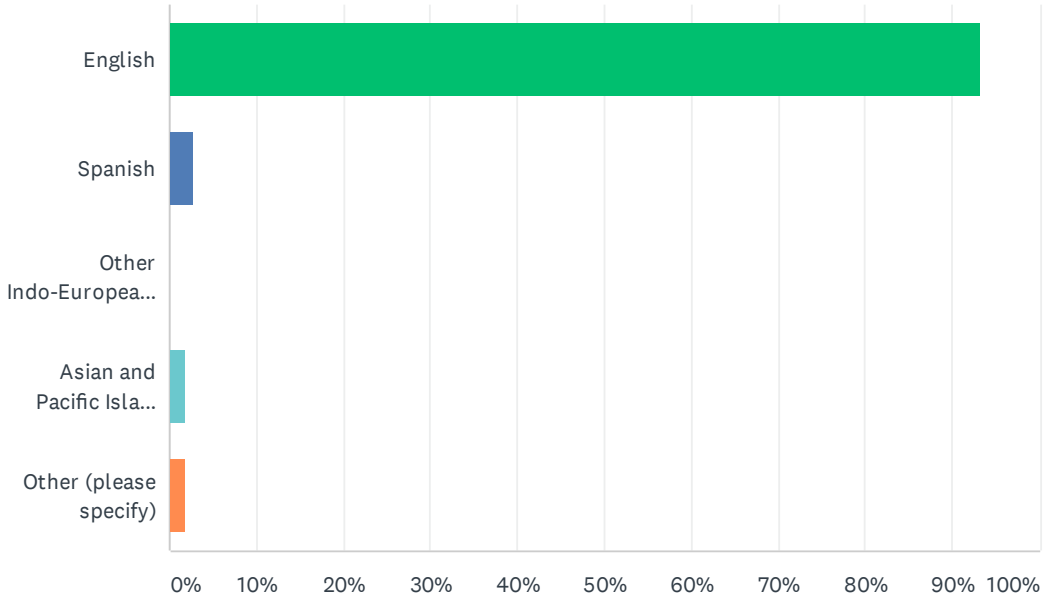
Answered: 150 Skipped: 19



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.

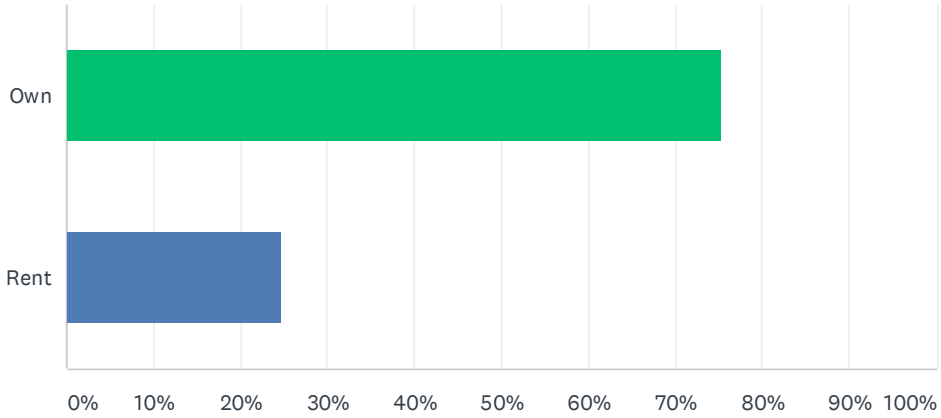
Answered: 151 Skipped: 18



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?

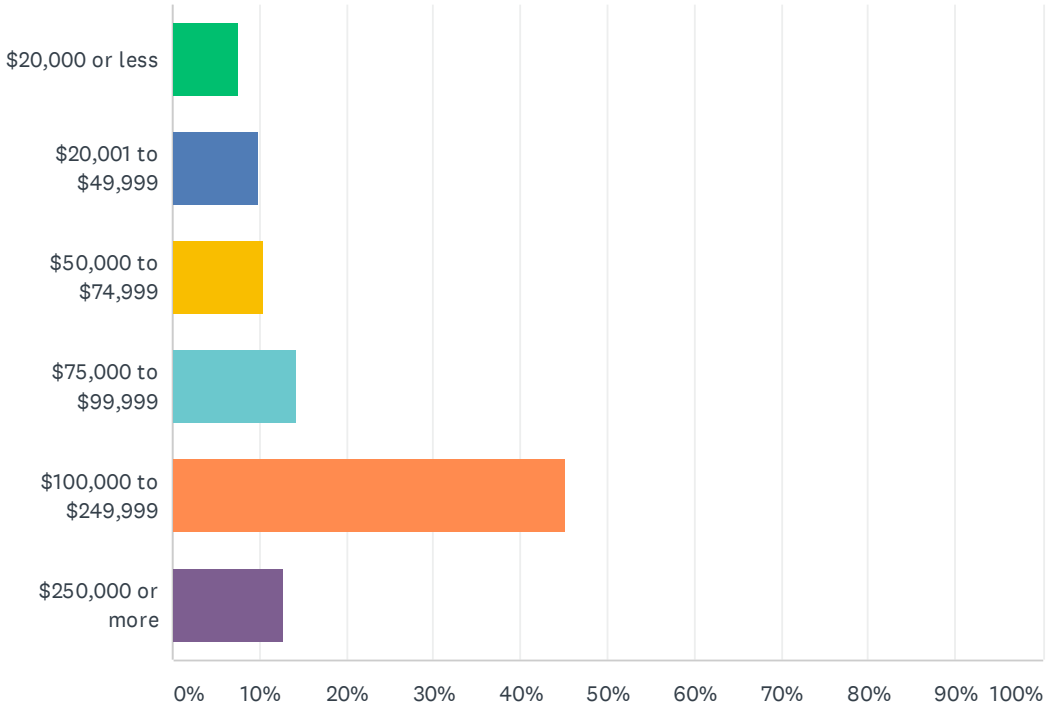
Answered: 150 Skipped: 19



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

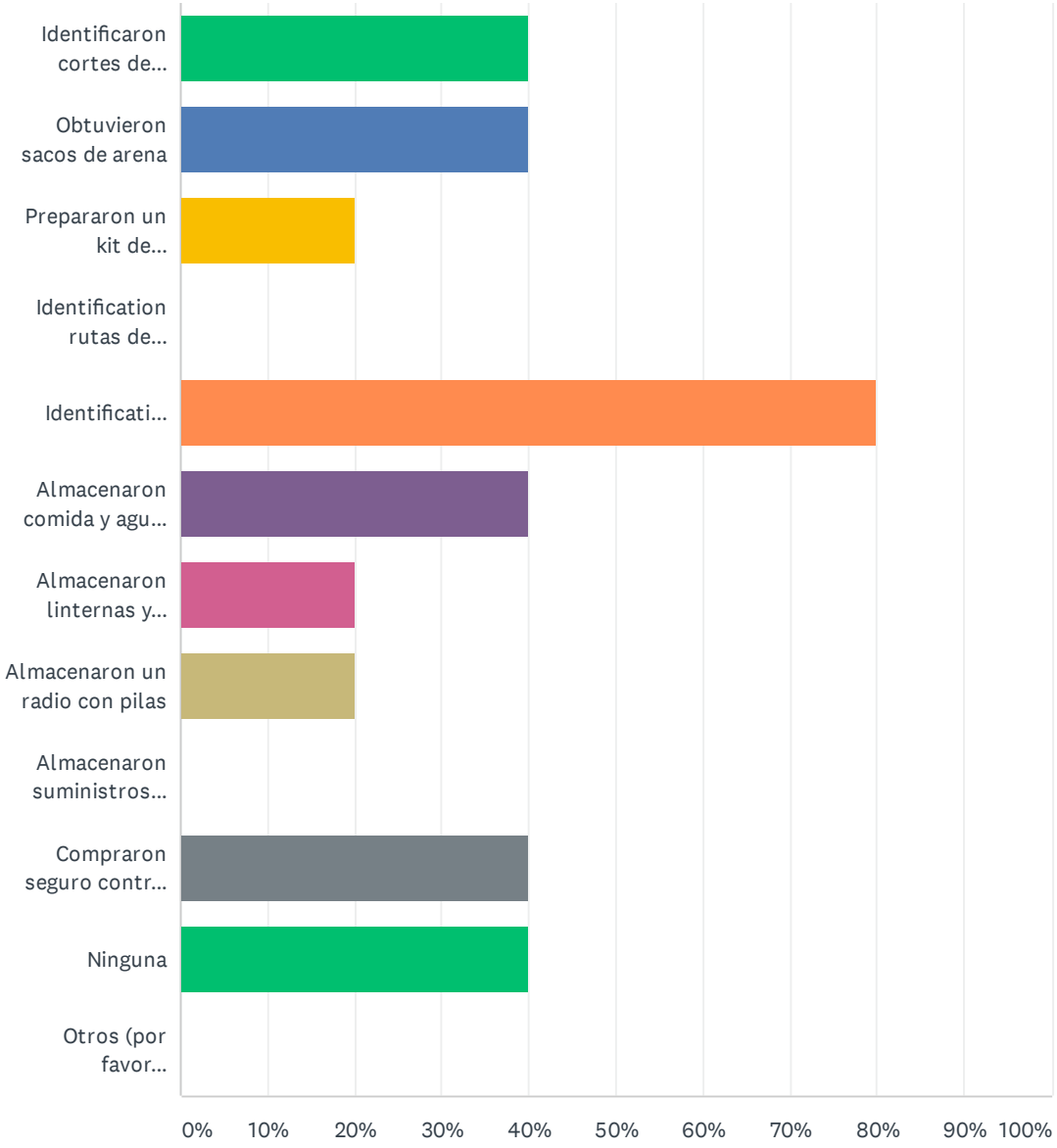
Q28 Comments

Answered: 24 Skipped: 145

City of Los Angeles Survey Results
SPANISH

Q1 ¿Cuál de los siguientes pasos ha tomado su hogar para prepararse para un evento de inundación?(Marque todo lo que corresponda)

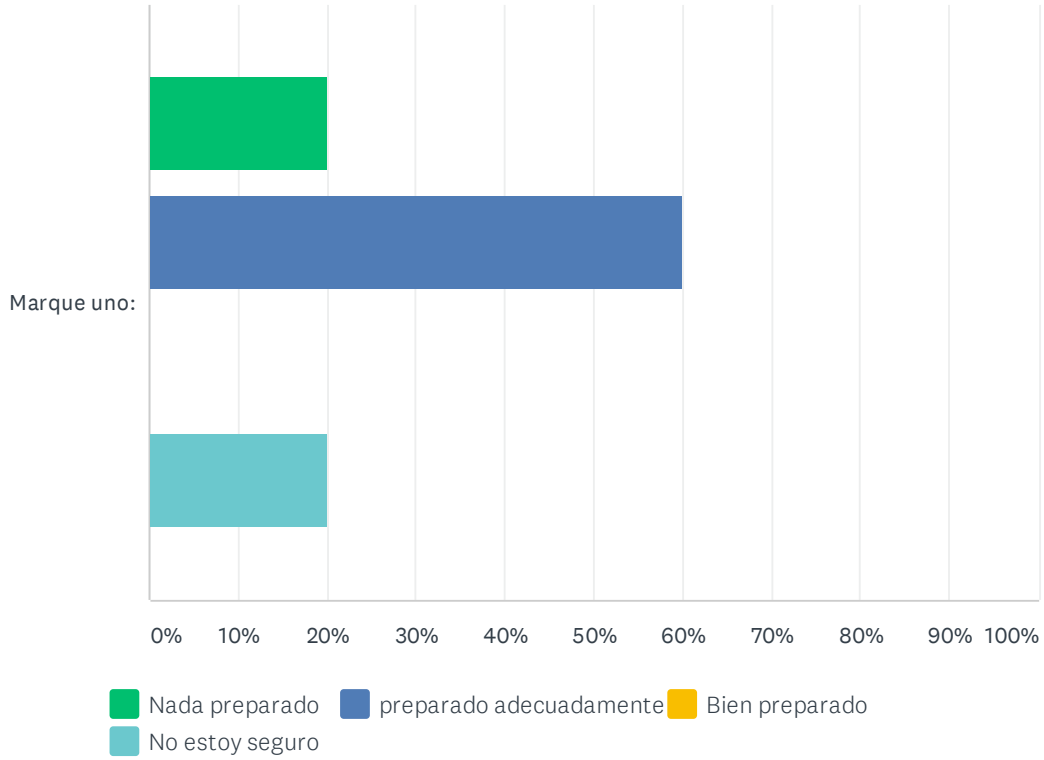
Answered: 5 Skipped: 0


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?

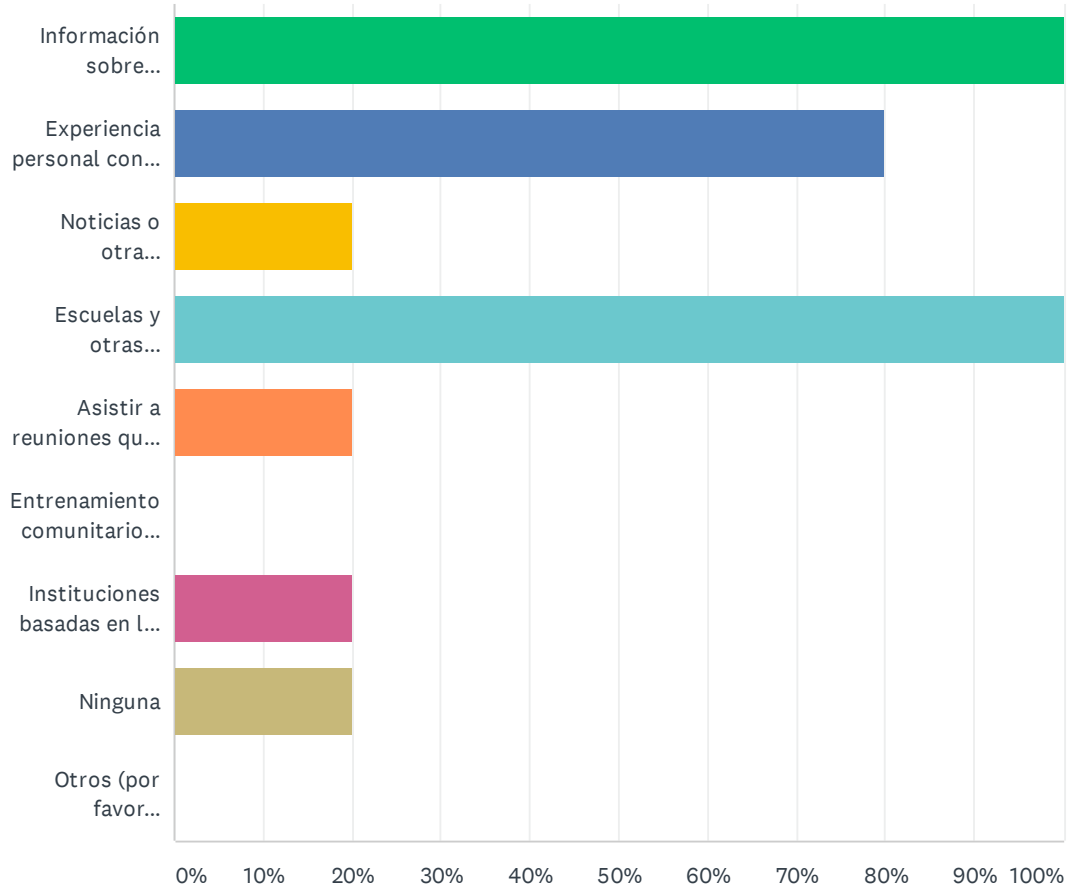
Answered: 5 Skipped: 0



	NADA PREPARADO	PREPARADO ADECUADAMENTE	BIEN PREPARADO	NO ESTOY SEGURO	TOTAL	WEIGHTED AVERAGE
Marque uno:	20.00% 1	60.00% 3	0.00% 0	20.00% 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)

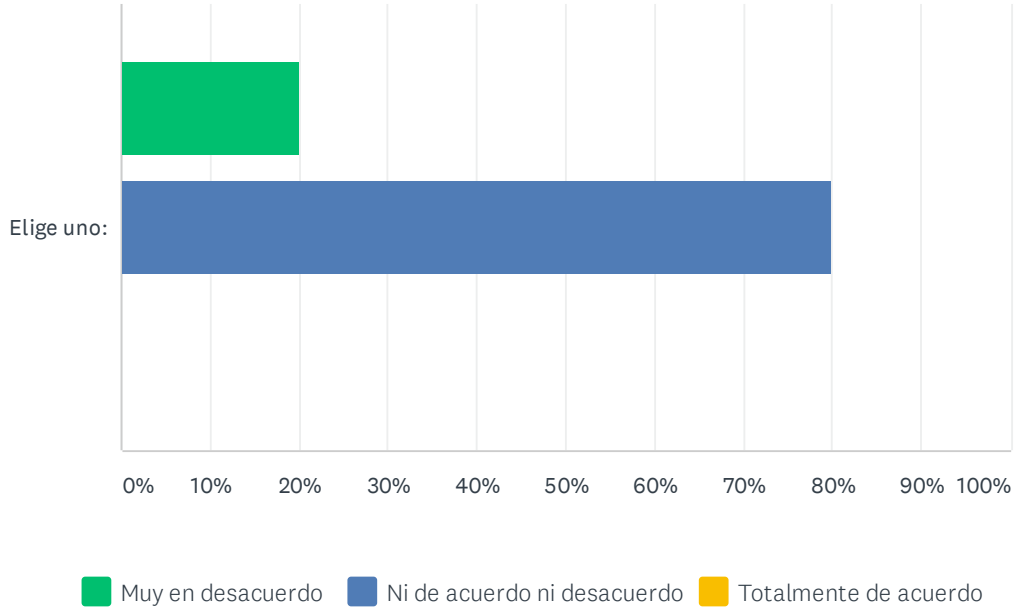
Answered: 5 Skipped: 0



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.

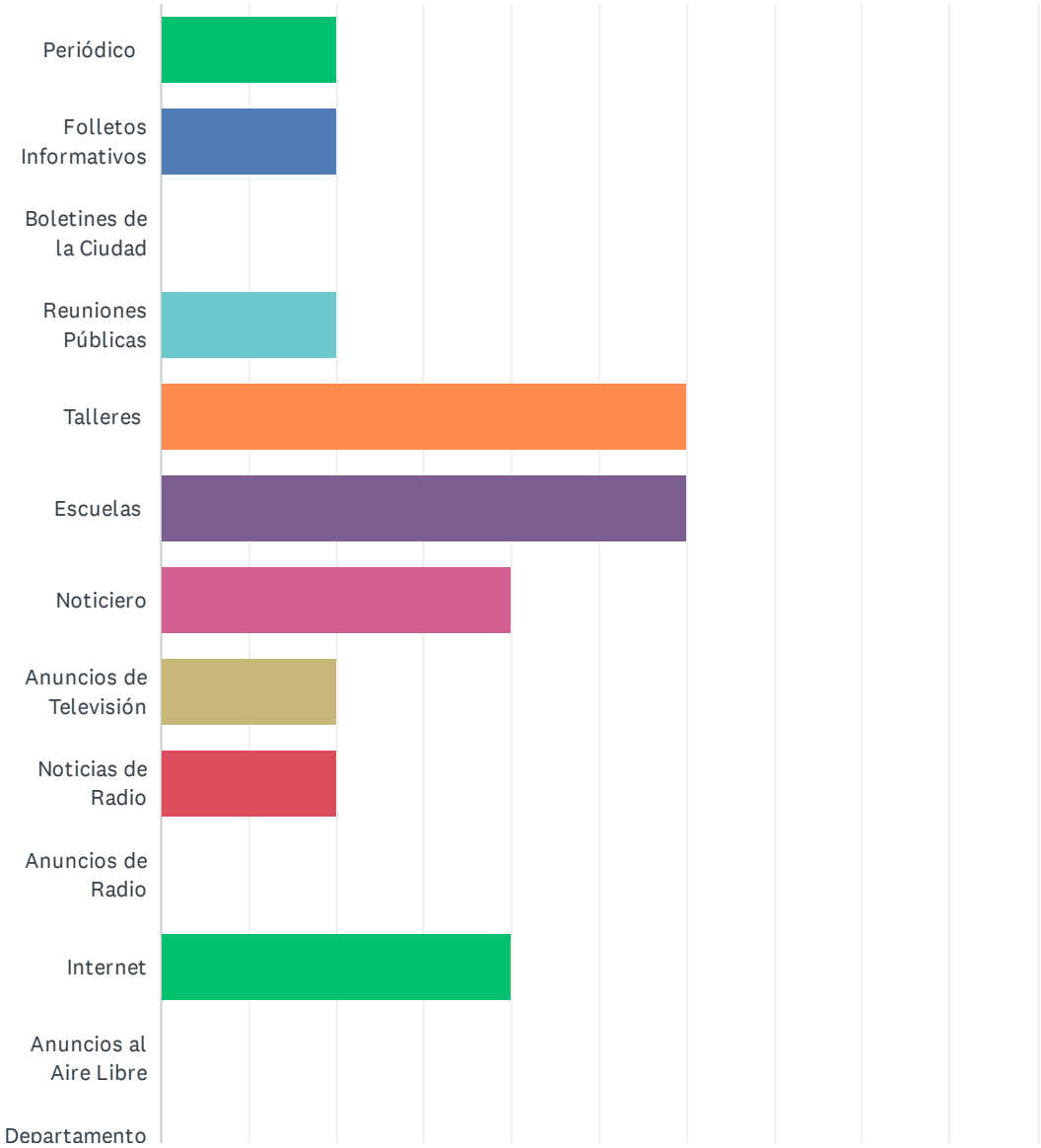
Answered: 5 Skipped: 0

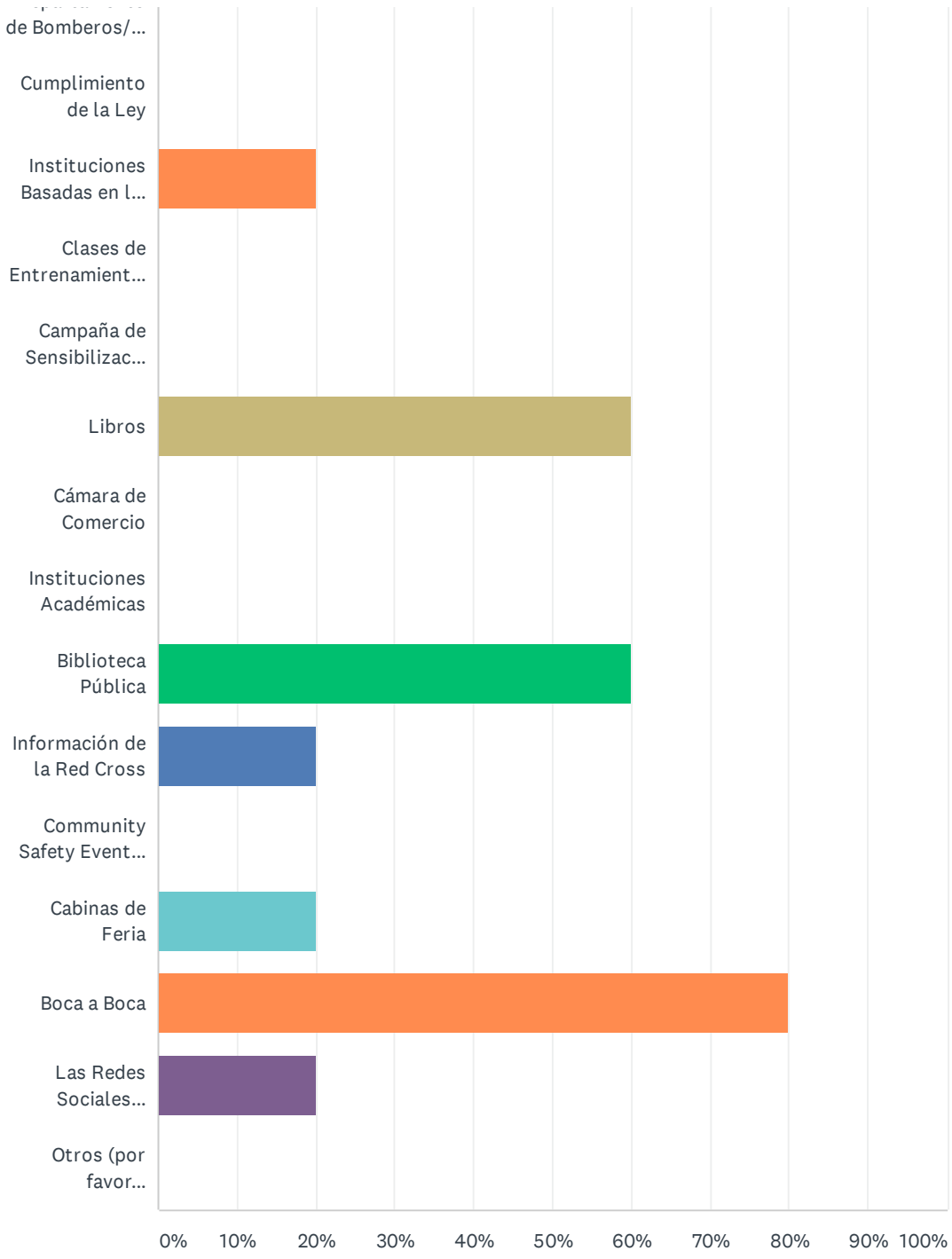


	MUY EN DESACUERDO	NI DE ACUERDO NI DESACUERDO	TOTALMENTE DE ACUERDO	TOTAL	WEIGHTED AVERAGE
Elige uno:	20.00% 1	80.00% 4	0.00% 0	5	2.60

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



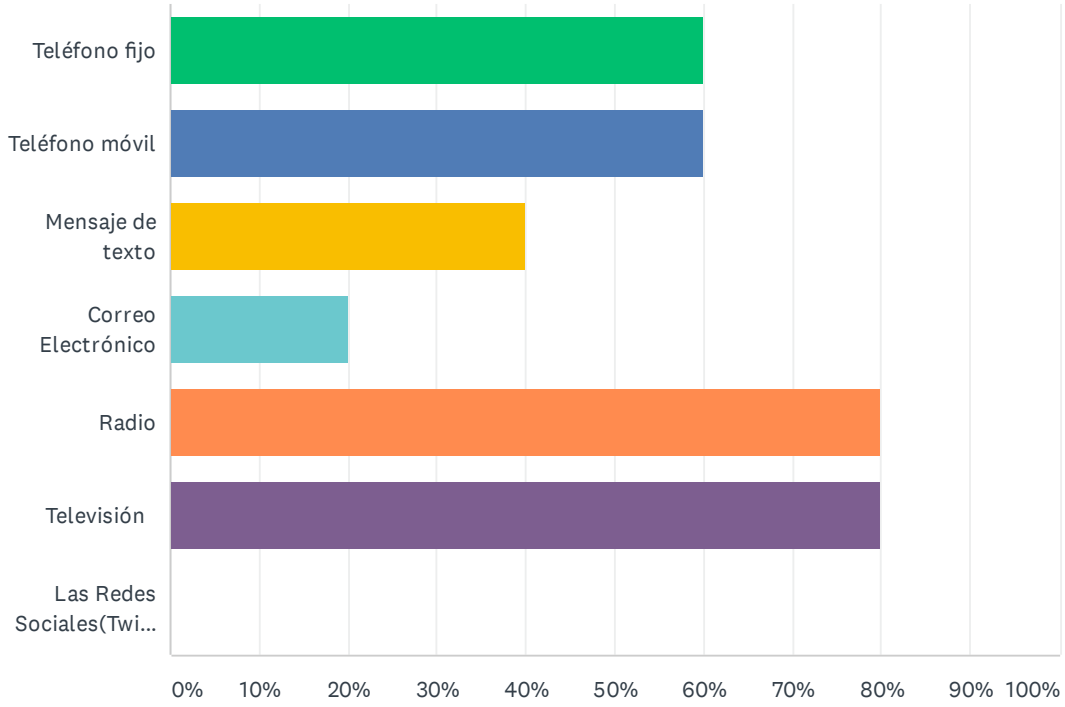

de Bomberos/...
Cumplimiento de la Ley
Instituciones Basadas en l...
Clases de Entrenamient...
Campaña de Sensibilizac...
Libros
Cámara de Comercio
Instituciones Académicas
Biblioteca Pública
Información de la Red Cross
Community Safety Event...
Cabinas de Feria
Boca a Boca
Las Redes Sociales...
Otros (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?

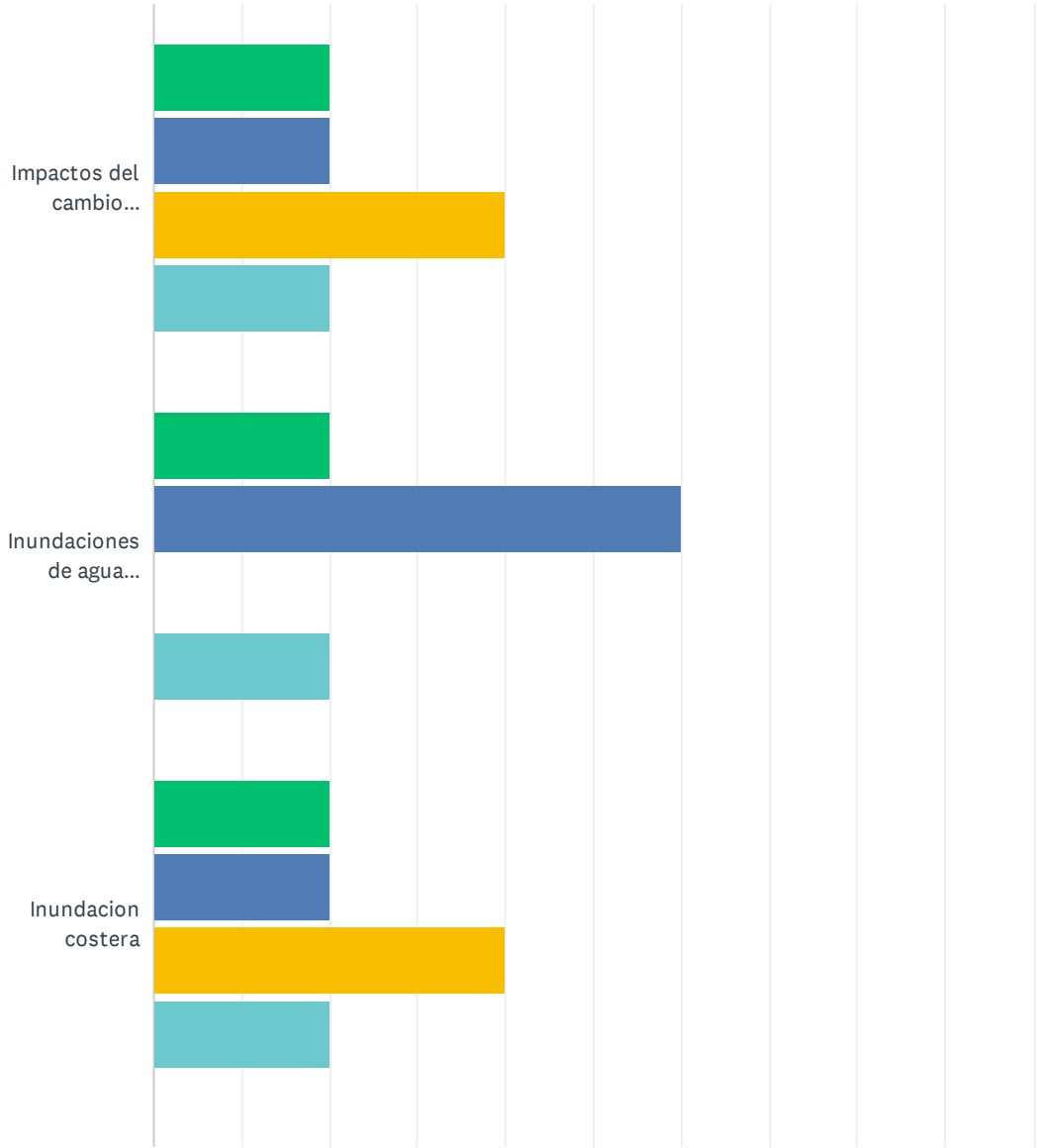
Answered: 5 Skipped: 0

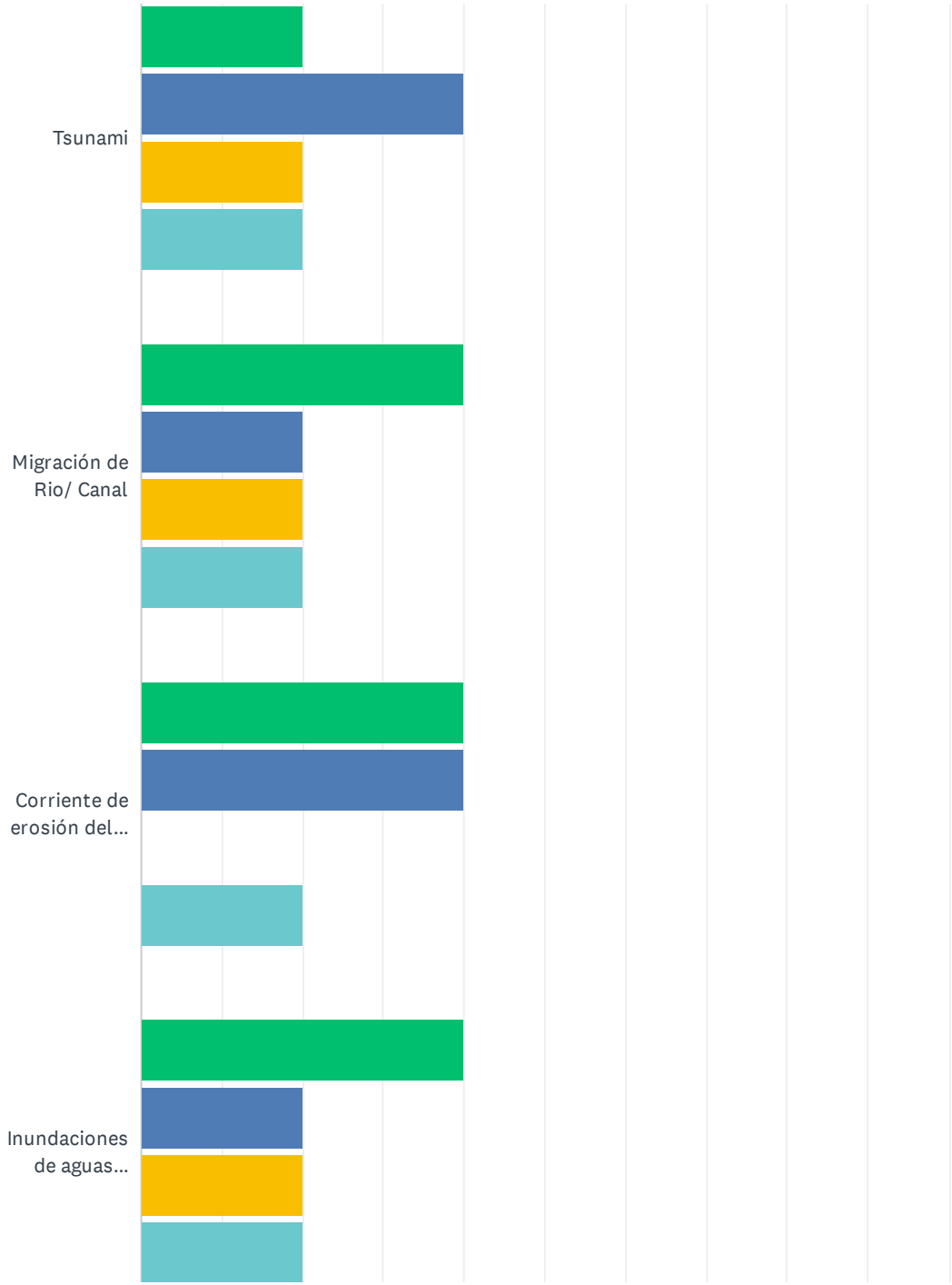


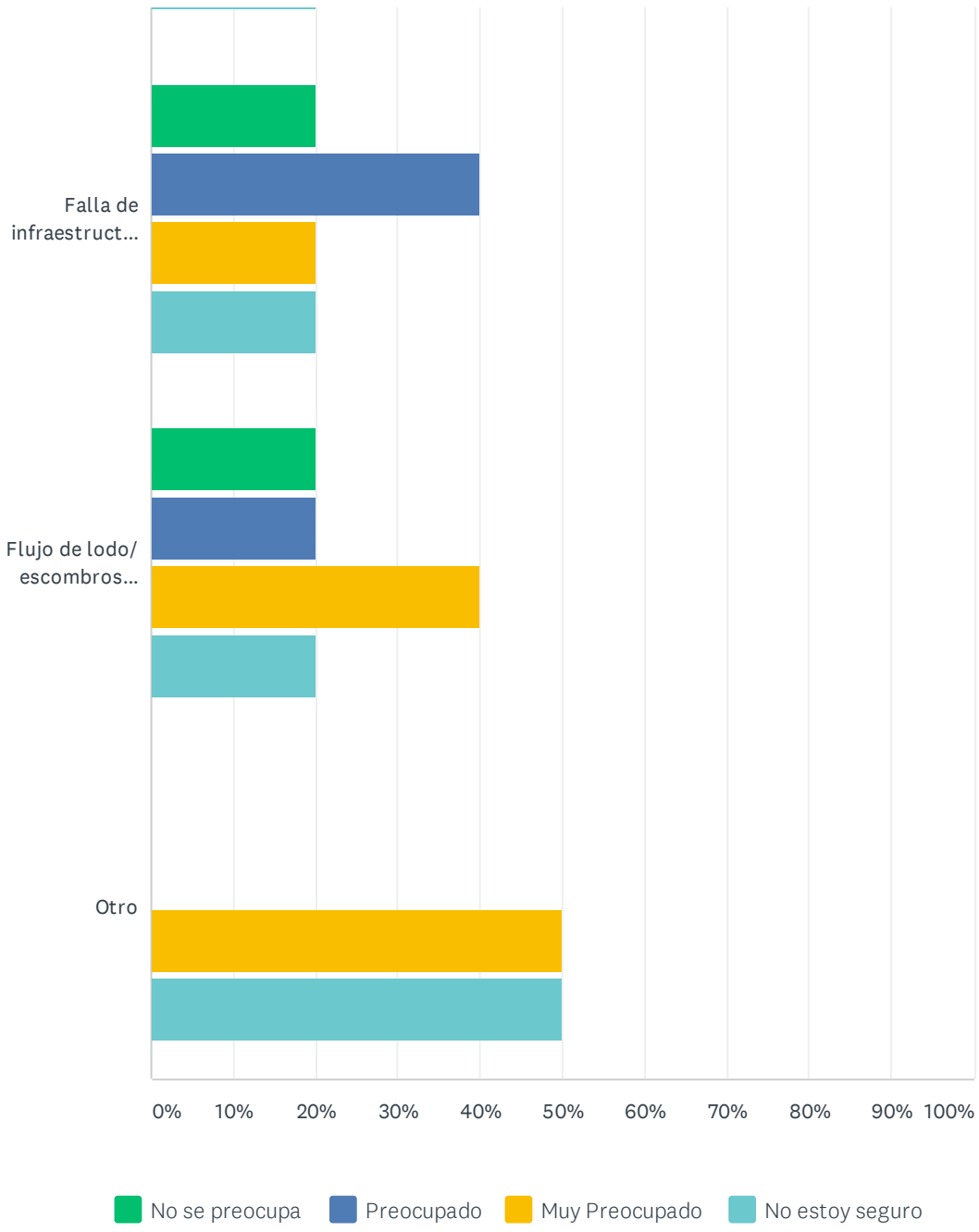
ANSWER CHOICES	RESPONSES	
Teléfono fijo	60.00%	3
Teléfono móvil	60.00%	3
Mensaje de texto	40.00%	2
Correo Electrónico	20.00%	1
Radio	80.00%	4
Televisión	80.00%	4
Las Redes Sociales(Twitter, Facebook, etc.)	0.00%	0
Total Respondents: 5		

Q7 ¿Que tan preocupado está usted por los siguientes peligros relacionados en Los Ángeles? (Marque una respuesta para cada peligro)

Answered: 5 Skipped: 0



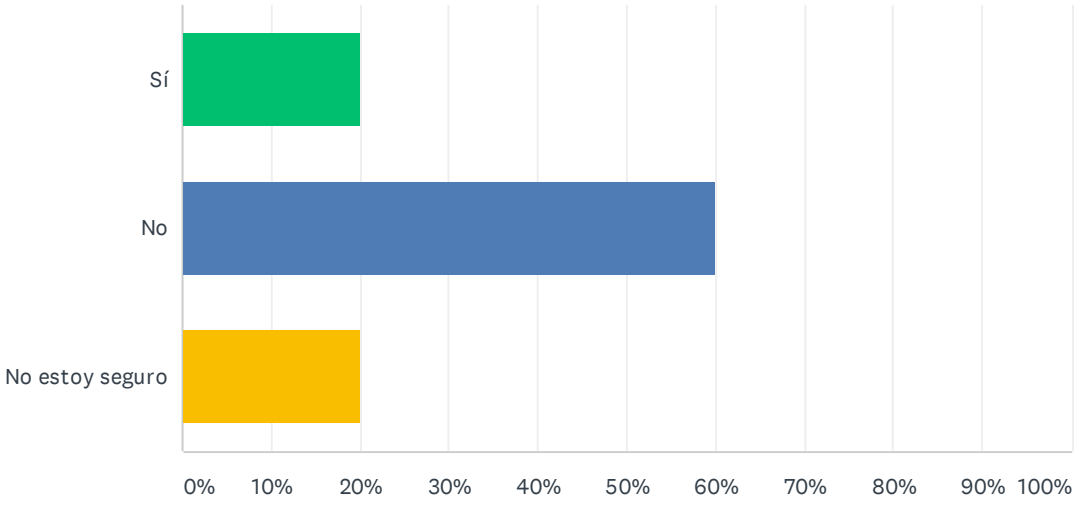

Tsunami
Migración de Rio/ Canal
Corriente de erosión del...
Inundaciones de aguas...


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% 1	20.00% 1	40.00% 2	20.00% 1	5	4.00
Inundaciones de agua subterráneas	20.00% 1	60.00% 3	0.00% 0	20.00% 1	5	3.20
Inundacion costera	20.00% 1	20.00% 1	40.00% 2	20.00% 1	5	4.00
Tsunami	20.00% 1	40.00% 2	20.00% 1	20.00% 1	5	3.60
Migración de Rio/ Canal	40.00% 2	20.00% 1	20.00% 1	20.00% 1	5	3.20
Corriente de erosión del banco	40.00% 2	40.00% 2	0.00% 0	20.00% 1	5	2.80
Inundaciones de aguas pluviales	40.00% 2	20.00% 1	20.00% 1	20.00% 1	5	3.20
Falla de infraestructura (tuberías, tanques)	20.00% 1	40.00% 2	20.00% 1	20.00% 1	5	3.60
Flujo de lodo/ escombros después del incendio	20.00% 1	20.00% 1	40.00% 2	20.00% 1	5	4.00
Otro	0.00% 0	0.00% 0	50.00% 1	50.00% 1	2	5.50

Q8 ¿Tienes seguro contra inundaciones?

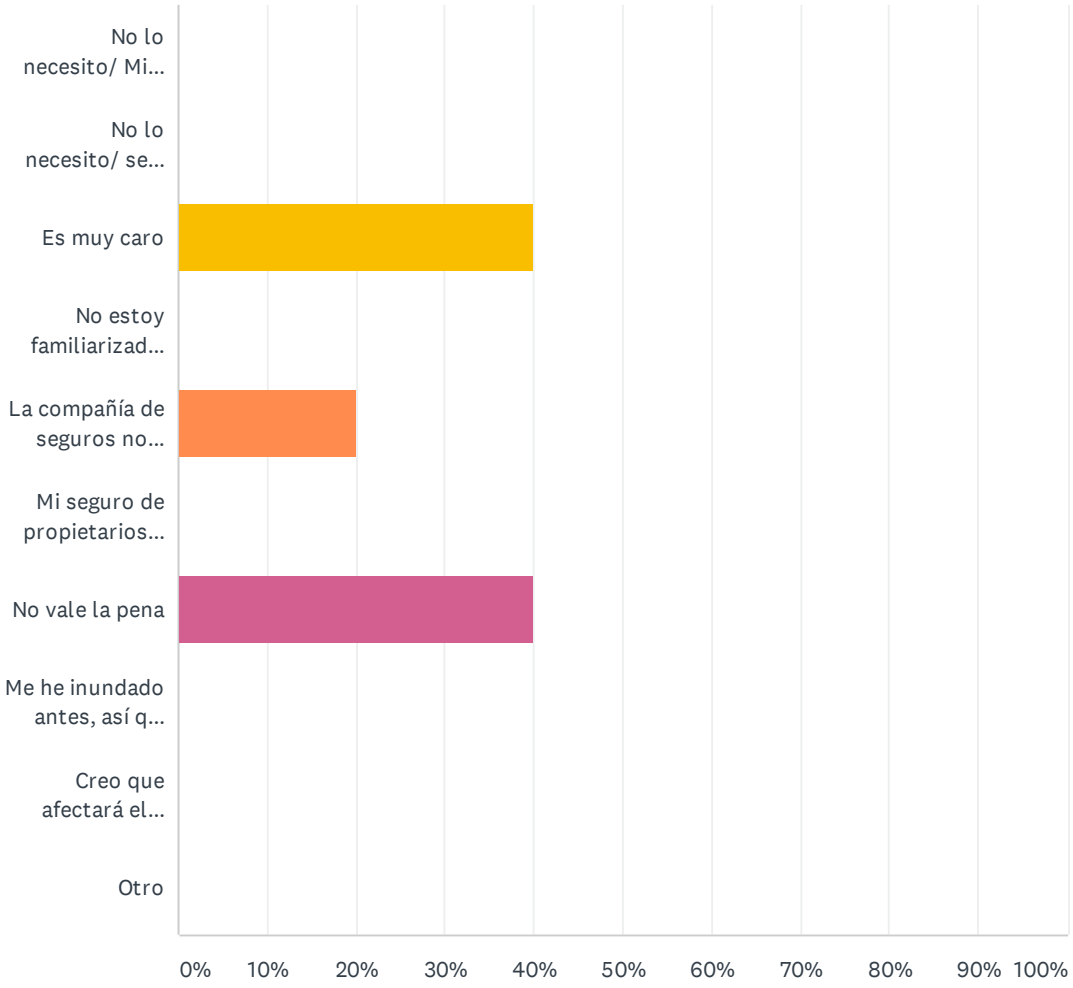
Answered: 5 Skipped: 0



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?

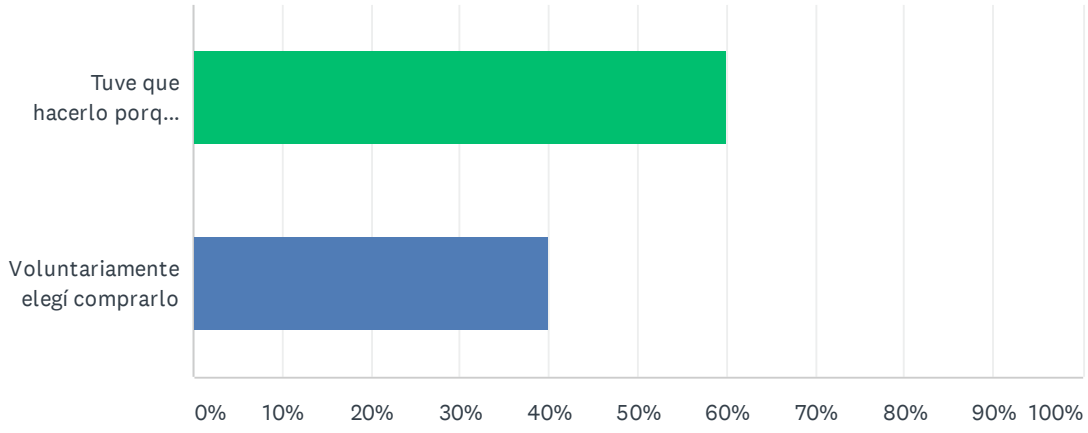
Answered: 5 Skipped: 0



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



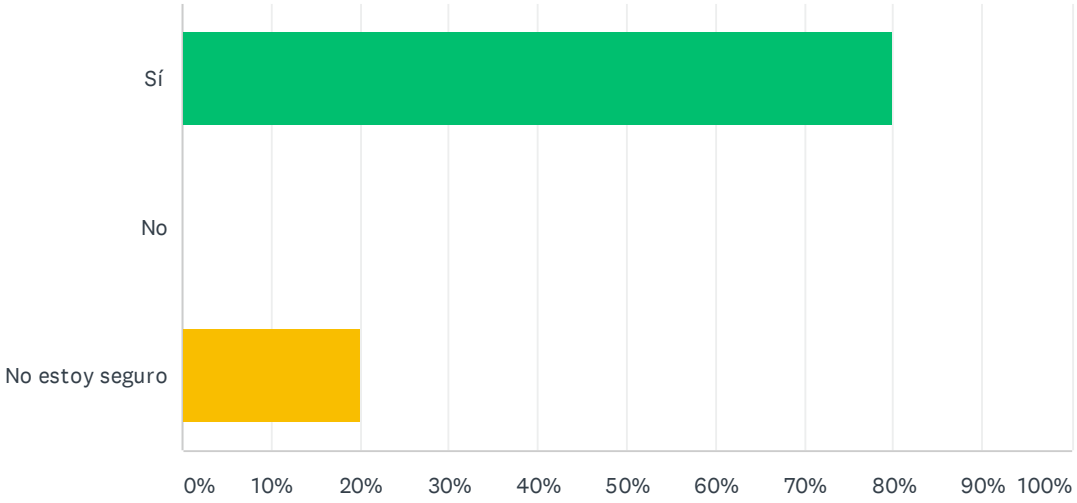
ANSWER CHOICES	RESPONSES	
Tuve que hacerlo porque estoy en un área propensa a inundaciones	60.00%	3
Voluntariamente elegí comprarlo	40.00%	2
Total Respondents: 5		

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?

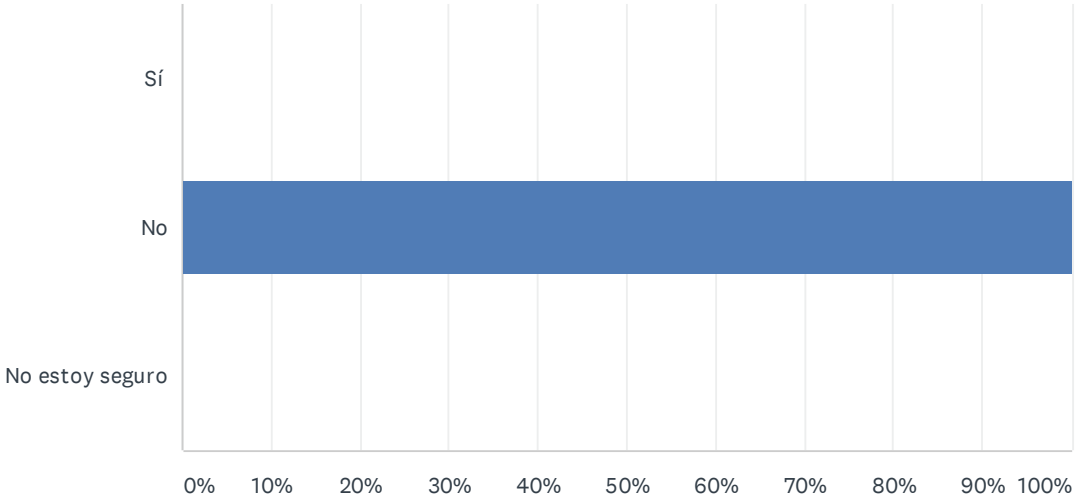
Answered: 5 Skipped: 0



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?

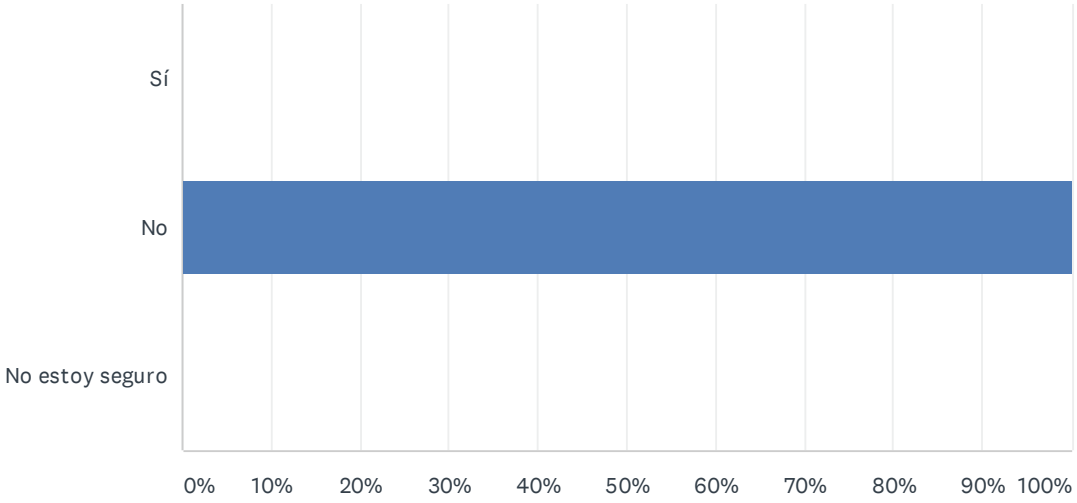
Answered: 5 Skipped: 0



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?

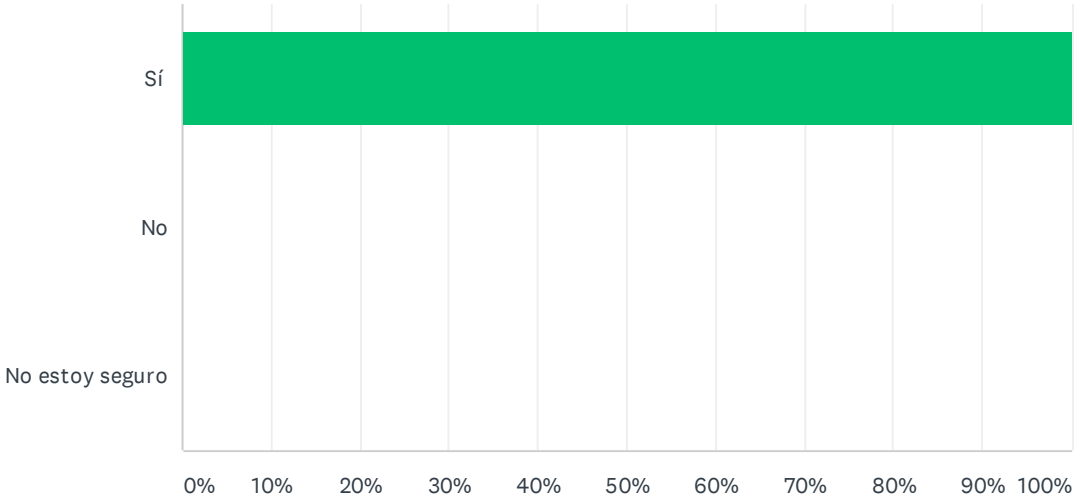
Answered: 4 Skipped: 1



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?

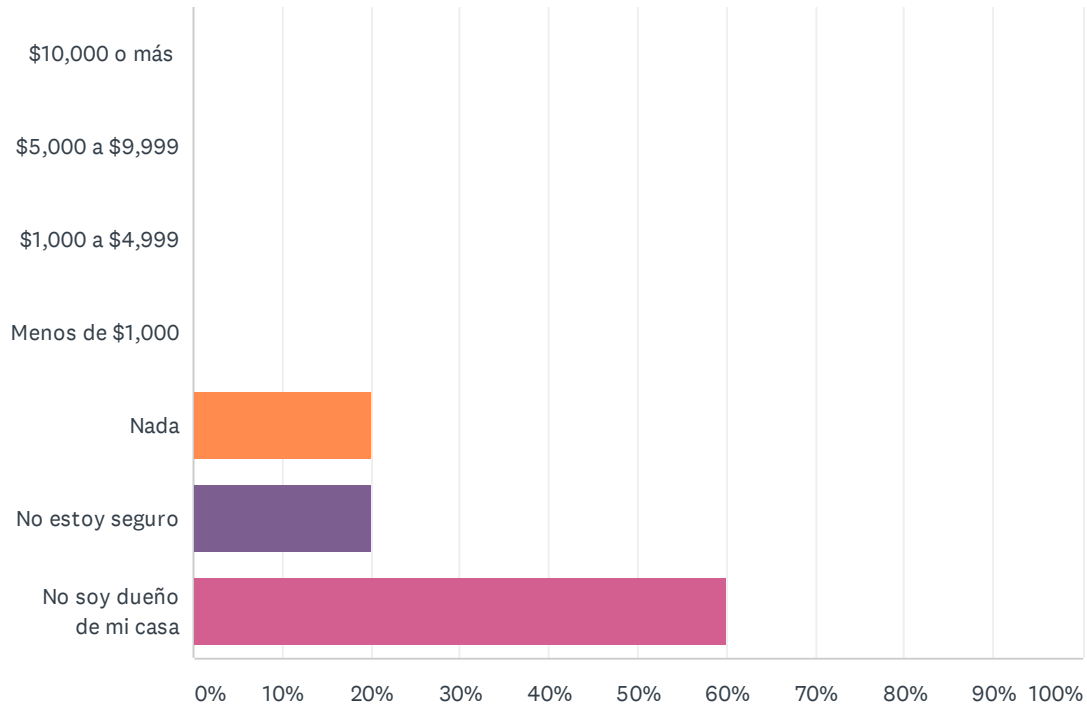
Answered: 5 Skipped: 0



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)

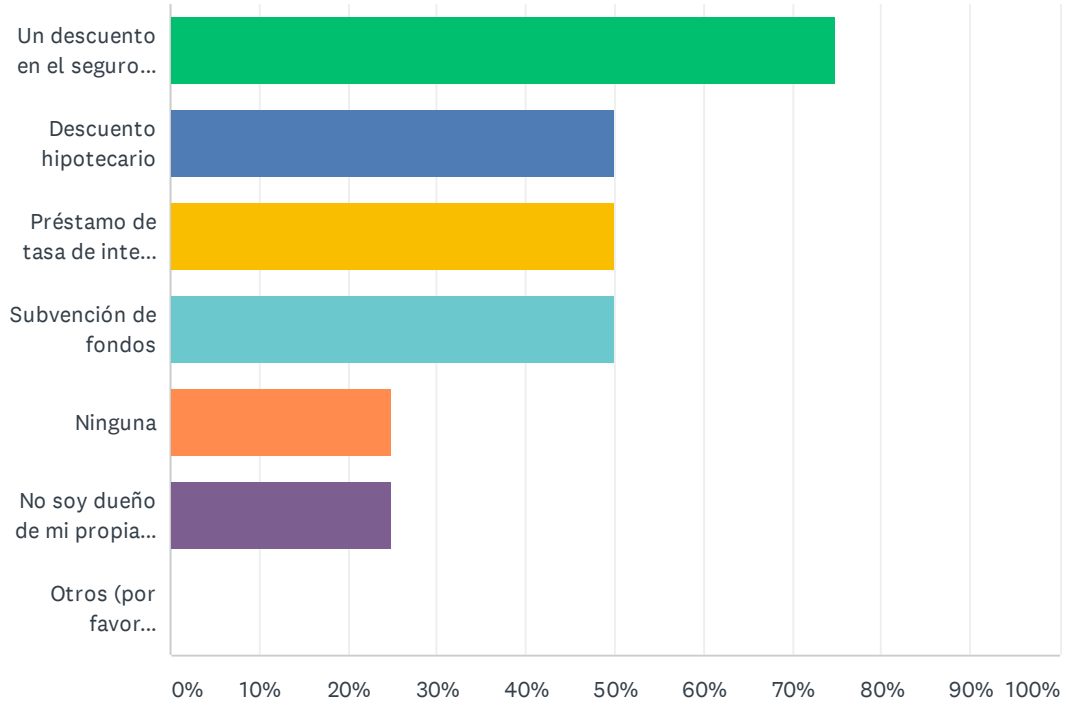
Answered: 5 Skipped: 0



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)

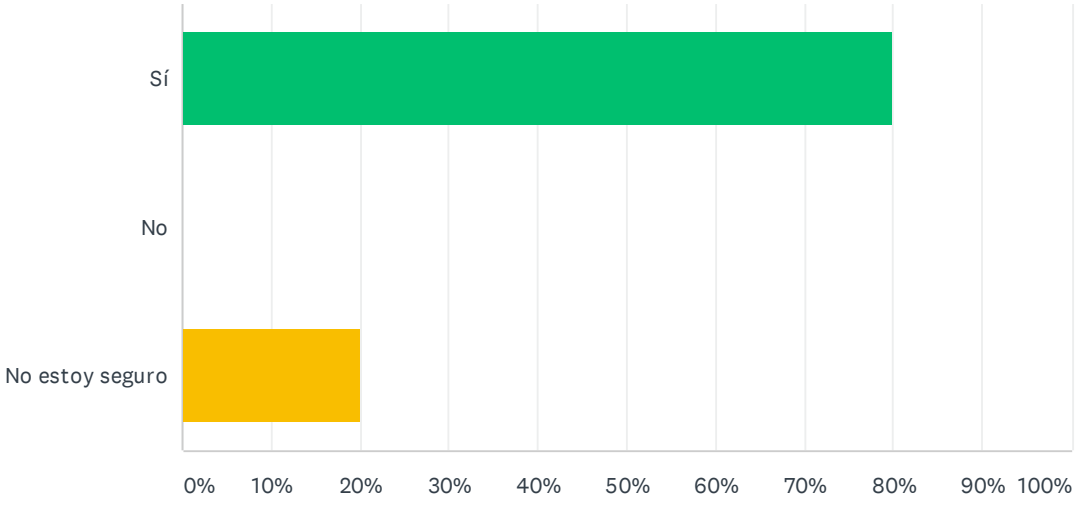
Answered: 4 Skipped: 1



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?

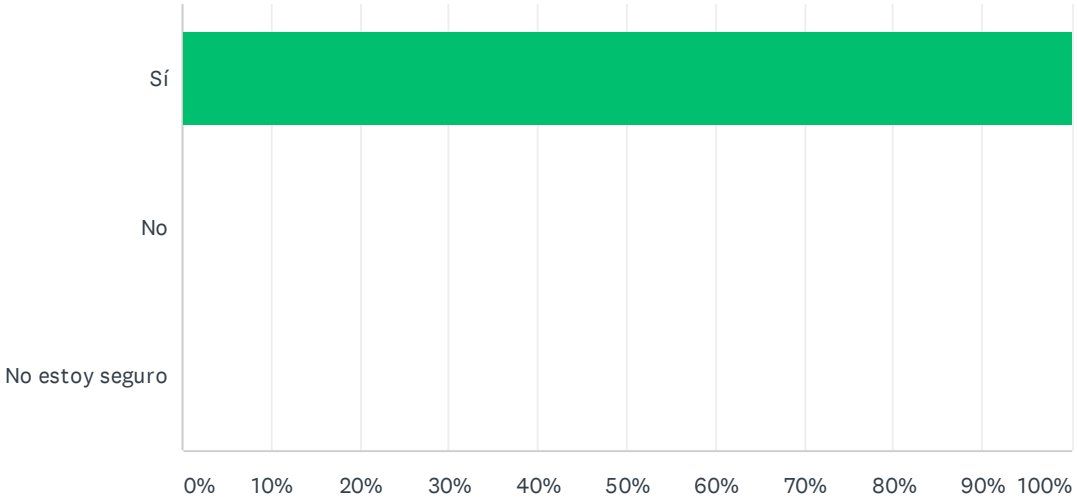
Answered: 5 Skipped: 0



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?

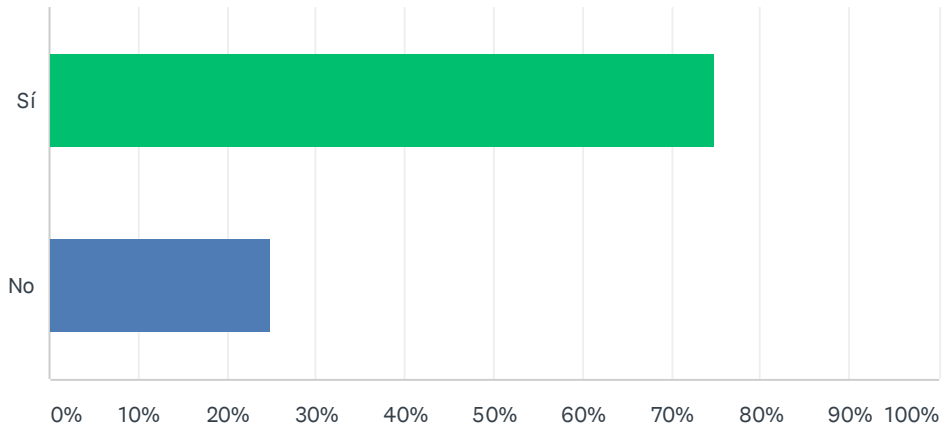
Answered: 5 Skipped: 0



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



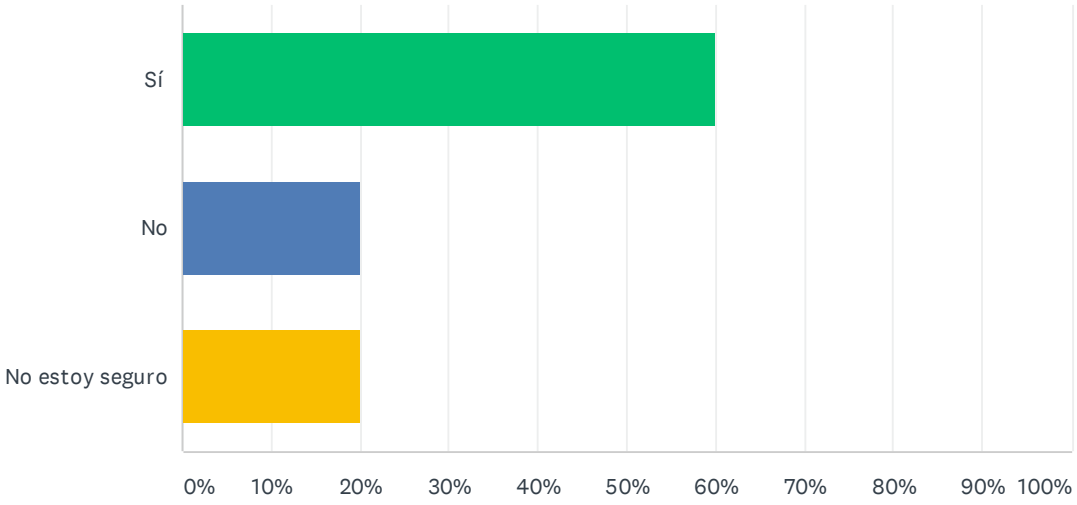
ANSWER CHOICES	RESPONSES	
Sí	75.00%	3
No	25.00%	1
TOTAL		4

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?

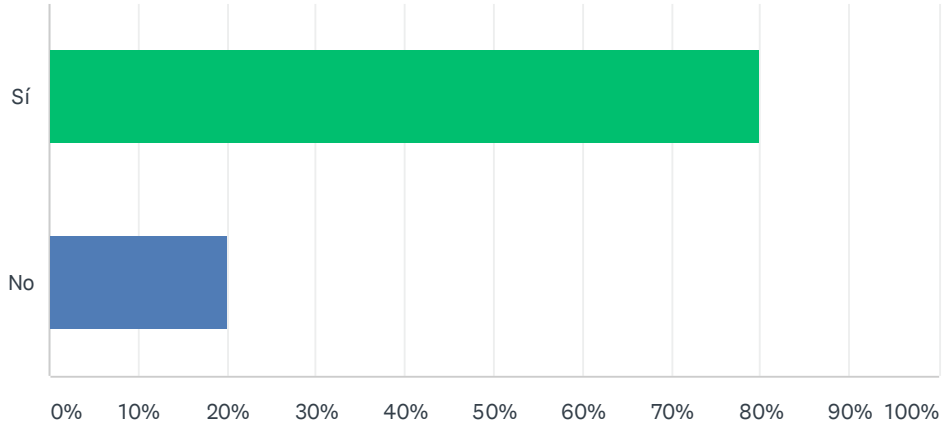
Answered: 5 Skipped: 0



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?

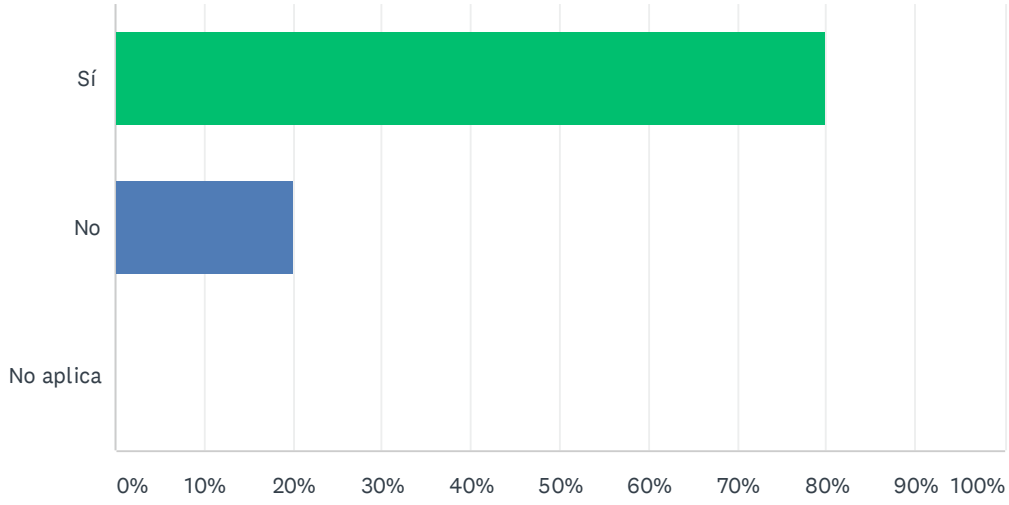
Answered: 5 Skipped: 0



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.

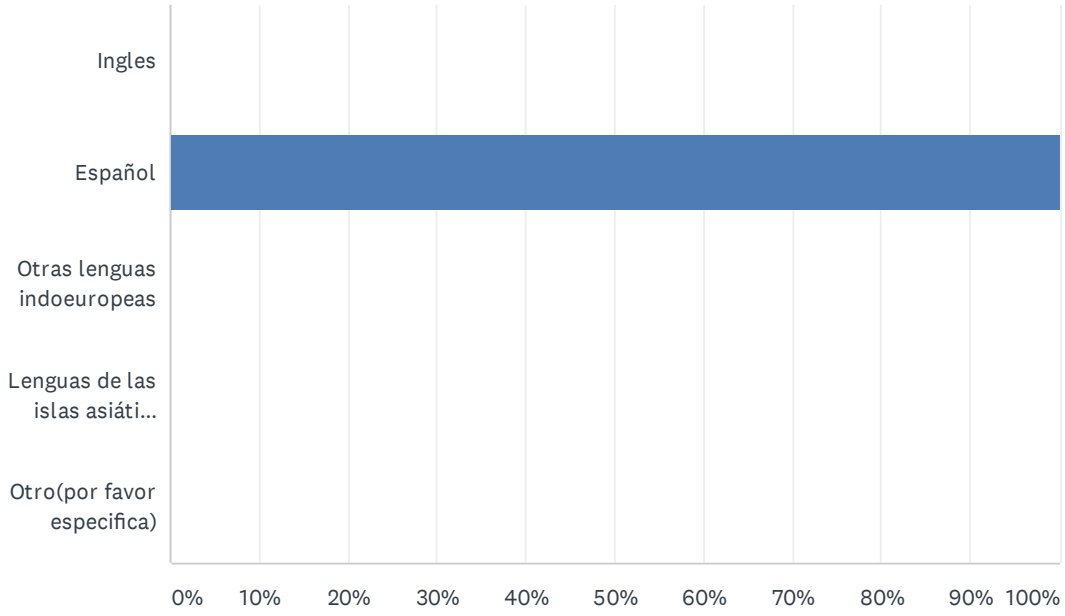
Answered: 5 Skipped: 0



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

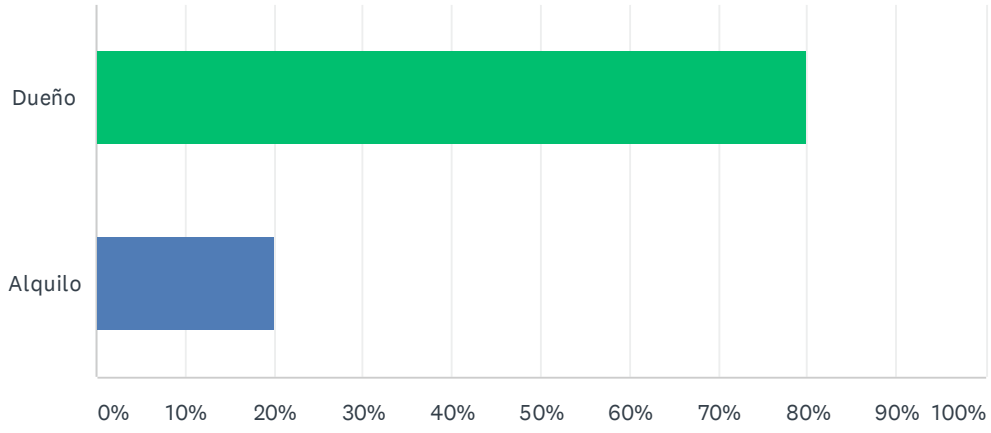
Answered: 5 Skipped: 0



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?

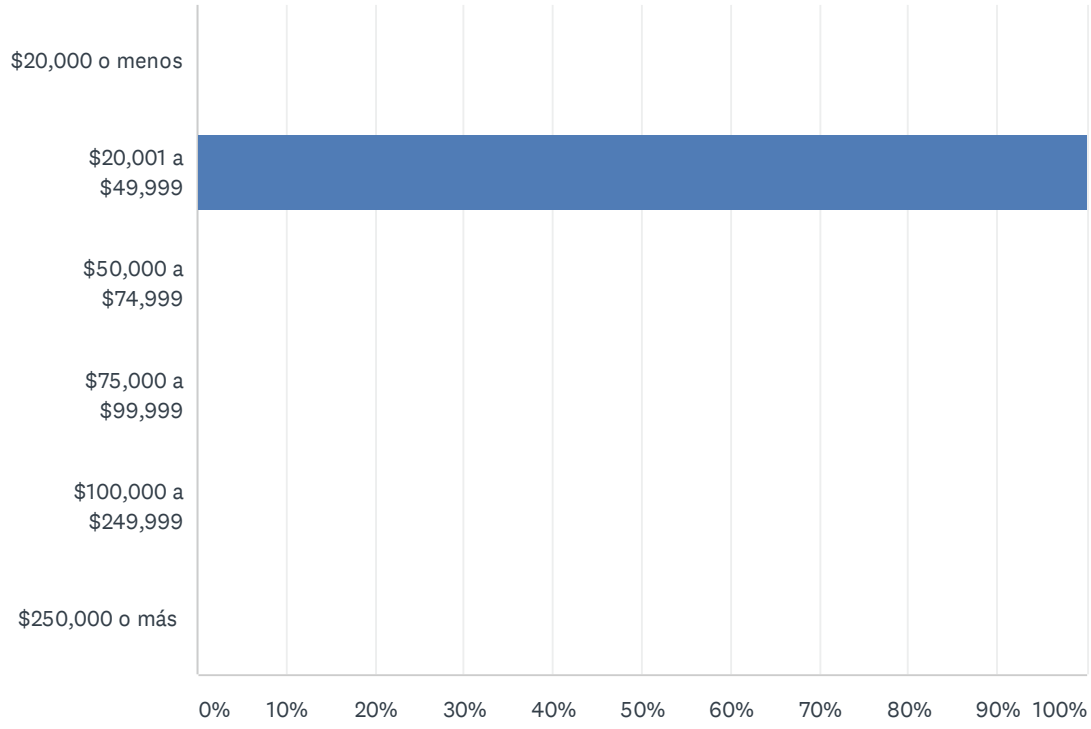
Answered: 5 Skipped: 0



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

City and County of Los Angeles
COMBINED SURVEY RESULTS

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
Q1 Which of the following steps has your household taken to prepare for a flood event? (Check all that apply)					
Identified utility shutoffs	89	2	33	**124**	**51.2%**
Obtained Sand bags	14	2	18	**34**	**14.0%**
Prepared a disaster supply kit	77	1	33	**111**	**45.9%**
Identified evacuation routes	60	0	32	**92**	**38.0%**
Identified at least 2 methods for receiving emergency notifications and information during emergencies	53	4	19	**76**	**31.4%**
Stored food and water above potential flood levels	64	2	36	**102**	**42.1%**
Stored flashlights and batteries	114	11	44	**169**	**69.8%**
Stored a battery-powered radio	74	1	25	**100**	**41.3%**
Stored medical supplies (first aid kit, medications)	86	0	34	**120**	**49.6%**
Purchased flood insurance	18	2	22	**42**	**17.4%**
None	34	2	11	**47**	**19.4%**
Other (please specify)	8	0	6	**14**	**5.8%**
Total Responses	**167**	**5**	**70**		
Q2 How prepared is your household to deal with a flood event?					
Not at All Prepared	55	1	13	**69**	**29.2%**
Somewhat Prepared			19	**19**	**8.1%**
Adequately Prepared	65	3	23	**91**	**38.6%**
Well Prepared	19	0	7	**26**	**11.0%**
Very Well Prepared			5	**5**	**2.1%**
Not Sure	25	1		**26**	**11.0%**
Total Responses	**164**	**5**	**67**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Q3 Which of the following have provided you with useful information to help you be prepared for a flood event? (Check all that apply)					
Emergency preparedness information from a government source (for example, federal, state, or local emergency man	73	5	14	**92**	**38.8%**
Personal experience with flood events	24	4	35	**63**	**26.6%**
Locally provided news or other media information	38	1	12	**51**	**21.5%**
Schools and other academic institutions	8	5	4	**17**	**7.2%**
Attended meetings that have dealt with flood preparedness	15	1	7	**23**	**9.7%**
Community Emergency Response Training (CERT)	27	0	10	**37**	**15.6%**
Faith-based institutions	5	1	1	**7**	**3.0%**
Homeowners Associations			4	**4**	**1.7%**
None	53	1	19	**73**	**30.8%**
Other (please specify)	16	0	4	**20**	**8.4%**
Total Responses	**164**	**5**	**68**	**237**	**1**
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.					
Stongly Disagree	50	1	3	**54**	**23.4%**
Somewhat Disagree			11	**11**	**4.8%**
Neither Agree nor Disagree	86	4	13	**103**	**44.6%**
Somewhat Agree			31	**31**	**13.4%**
Strongly Agree	26	0	6	**32**	**13.9%**
Total Responses	**162**	**5**	**64**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
Q5 Chose up to 5 of the following methods do you think are most effective for providing flood hazard and disaster information?					
Newspaper	45	1	17	**63**	**25.7%**
Informational Brochures	39	1	8	**48**	**19.6%**
City Newsletters	30	0	8	**38**	**15.5%**
Public Meetings	32	1	16	**49**	**20.0%**
Workshops	18	3	9	**30**	**12.2%**
Schools	22	3	7	**32**	**13.1%**
TV News	75	2	40	**117**	**47.8%**
TV Ads	31	1	5	**37**	**15.1%**
Radio News	43	1	30	**74**	**30.2%**
Radio Ads	25	0	13	**38**	**15.5%**
Internet	102	2	49	**153**	**62.4%**
Outdoor Advertisements	16	0	3	**19**	**7.8%**
Fire Department/Rescue	28	0	13	**41**	**16.7%**
Law Enforcement	14	0	7	**21**	**8.6%**
Faith-based Institutions	11	1	2	**14**	**5.7%**
Community Emergency Response Team (CERT) Classes	37	0	6	**43**	**17.6%**
Public Awareness Campaign (for example, Flood Awareness Week)	75	0	16	**91**	**37.1%**
Books	4	3	0	**7**	**2.9%**
Chamber of Commerce	12	0	2	**14**	**5.7%**
Academic Institutions	8	0	0	**8**	**3.3%**
Public Library	29	3	8	**40**	**16.3%**
Red Cross Information	23	1	2	**26**	**10.6%**
Community Safety Events	36	0	11	**47**	**19.2%**
Fair Booths	13	1	1	**15**	**6.1%**
Word of Mouth	21	4	15	**40**	**16.3%**
Social Media (Twitter, Facebook, etc.)	75	1	8	**84**	**34.3%**
Telephone Book			4	**4**	**1.6%**
Other (please specify)	10	0	3	**13**	**5.3%**
Total Responses	**168**	**5**	**72**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Q6 What method is best for you and your family to get time sensitive warning information or instructions for action?					
Land-line telephone	22	3	14	**39**	**16.0%**
Cell phone	80	3	36	**119**	**49.0%**
Text messaging	122	2	53	**177**	**72.8%**
Email	56	1	37	**94**	**38.7%**
Radio	34	4	24	**62**	**25.5%**
TV	40	4	16	**60**	**24.7%**
Social network (Twitter, Facebook, etc.)	39	0	28	**67**	**27.6%**
Other (please specify)	0	0	1	**1**	**0.4%**
Total Responses	**166**	**5**	**72**		

Q7 How concerned are you about the following flood related hazards in Los Angeles? (Check one response for each hazard)					
Climate Change Impacts					
Not Concerned	30	1	24	**55**	**22.7%**
Somewhat Concerned			10	**10**	**4.1%**
Concerned	58	1	15	**74**	**30.6%**
Very Concerned	71	2	13	**86**	**35.5%**
Extremely Concerned			8	**8**	**3.3%**
Not Sure	8	1		**9**	**3.7%**
Total Responses	**167**	**5**	**70**		
Groundwater Flooding					
Not Concerned	53	1	32	**86**	**35.8%**
Somewhat Concerned			17	**17**	**7.1%**
Concerned	69	3	18	**90**	**37.5%**
Very Concerned	26	0	1	**27**	**11.3%**
Extremely Concerned			3	**3**	**1.3%**
Not Sure	16	1		**17**	**7.1%**
Total Responses	**164**	**5**	**71**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
Coastal Flooding					
Not Concerned	62	1	41	**104**	**43.5%**
Somewhat Concerned			14	**14**	**5.9%**
Concerned	57	1	11	**69**	**28.9%**
Very Concerned	37	2	3	**42**	**17.6%**
Extremely Concerned			1	**1**	**0.4%**
Not Sure	8	1		**9**	**3.8%**
Total Responses	**164**	**5**	**70**		
Tsunami					
Not Concerned	82	1	47	**130**	**54.2%**
Somewhat Concerned			9	**9**	**3.8%**
Concerned	54	2	8	**64**	**26.7%**
Very Concerned	20	1	5	**26**	**10.8%**
Extremely Concerned			1	**1**	**0.4%**
Not Sure	9	1		**10**	**4.2%**
Total Responses	**165**	**5**	**70**		
River/Channel Migration					
Not Concerned	68	2	32	**102**	**42.7%**
Somewhat Concerned			17	**17**	**7.1%**
Concerned	55	1	15	**71**	**29.7%**
Very Concerned	25	1	1	**27**	**11.3%**
Extremely Concerned			5	**5**	**2.1%**
Not Sure	16	1		**17**	**7.1%**
Total Responses	**164**	**5**	**70**		
Streambank Erosion					
Not Concerned	77	2	32	**111**	**46.6%**
Somewhat Concerned			15	**15**	**6.3%**
Concerned	41	2	14	**57**	**23.9%**
Very Concerned	23	0	6	**29**	**12.2%**
Extremely Concerned			4	**4**	**1.7%**
Not Sure	21	1		**22**	**9.2%**
Total Responses	**162**	**5**	**71**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Stormwater Flooding [Urban Flooding/Drainage Issues in County Survey]					
Not Concerned	21	2	17	**40**	**16.7%**
Somewhat Concerned			13	**13**	**5.4%**
Concerned	76	1	18	**95**	**39.7%**
Very Concerned	58	1	14	**73**	**30.5%**
Extremely Concerned			8	**8**	**3.3%**
Not Sure	9	1		**10**	**4.2%**
Total Responses	**164**	**5**	**70**		
Infrastructure Failure (pipes, tanks)					
Not Concerned	14	1		**15**	**8.9%**
Somewhat Concerned				**0**	**0.0%**
Concerned	61	2		**63**	**37.5%**
Very Concerned	81	1		**82**	**48.8%**
Extremely Concerned				**0**	**0.0%**
Not Sure	7	1		**8**	**4.8%**
Total Responses	**163**	**5**			
Post-Fire Mud/Debris Flow					
Not Concerned	41	1	25	**67**	**27.9%**
Somewhat Concerned			14	**14**	**5.8%**
Concerned	53	1	15	**69**	**28.8%**
Very Concerned	60	2	6	**68**	**28.3%**
Extremely Concerned			11	**11**	**4.6%**
Not Sure	10	1		**11**	**4.6%**
Total Responses	**164**	**5**	**71**		
Coastal Erosion					
Not Concerned			38	**38**	**54.3%**
Somewhat Concerned			13	**13**	**18.6%**
Concerned			16	**16**	**22.9%**
Very Concerned			2	**2**	**2.9%**
Extremely Concerned			1	**1**	**1.4%**
Total Responses			**70**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Land Subsidence					
Not Concerned			36	**36**	**52.2%**
Somewhat Concerned			16	**16**	**23.2%**
Concerned			11	**11**	**15.9%**
Very Concerned			5	**5**	**7.2%**
Extremely Concerned			1	**1**	**1.4%**
Total Responses			**69**		
Mud-Flow Hazards					
Not Concerned			23	**23**	**32.4%**
Somewhat Concerned			14	**14**	**19.7%**
Concerned			17	**17**	**23.9%**
Very Concerned			10	**10**	**14.1%**
Extremely Concerned			7	**7**	**9.9%**
Total Responses			**71**		
Other					
Not Concerned	13	0	0	**13**	**26.0%**
Somewhat Concerned			0	**0**	**0.0%**
Concerned	7	0	0	**7**	**14.0%**
Very Concerned	8	1	0	**9**	**18.0%**
Extremely Concerned			0	**0**	**0.0%**
Not Sure	20	1		**21**	**42.0%**
Total Responses	**48**	**2**	**0**		

Q8 Do you have flood insurance?					
Yes	26	1	24	**51**	**21.3%**
No	114	3	36	**153**	**63.8%**
Not Sure	25	1	10	**36**	**15.0%**
Total Responses	**165**	**5**	**70**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Q9 If you do not have flood insurance, what is the primary reason?					
I don't need it/my property has never flooded	36	0	15	**51**	**27.7%**
Don't need it/ located on high ground	35	0	11	**46**	**25.0%**
It is too expensive	4	2	6	**12**	**6.5%**
Not familiar with it/don't know about it.	26	0	5	**31**	**16.8%**
Insurance company will not provide coverage	1	1	1	**3**	**1.6%**
My existing homeowners insurance provides coverage	12	0	0	**12**	**6.5%**
It is not worth it	3	2	1	**6**	**3.3%**
I have flooded before, so I did not think I qualified for coverage	1	0	1	**2**	**1.1%**
I believe it will affect the value of my property	0	0	0	**0**	**0.0%**
Other	16	0	5	**21**	**11.4%**
Flood Insurance does not provide enough coverage			0	**0**	**0.0%**
My existing renters insurance provides coverage			0	**0**	**0.0%**
I don't have a mortgage, my home is paid off			0	**0**	**0.0%**
Total Responses	**135**	**5**	**44**		

Q10 If you have flood insurance,why did you purchase it?					
I had to because I'm in a flood prone area	10	3		**13**	**35.1%**
I voluntarily chose to purchase it	22	2		**24**	**64.9%**
Total Responses	**32**	**5**			

Q11 Please tell us why you voluntarily chose to purchase flood insurance, please tell us why.

Q12 Do you or did you have problems getting homeowners/renters insurance due to flood risk?					
Yes	3	4		**7**	**4.7%**
No	103	0		**103**	**69.1%**
Not Sure	38	1		**39**	**26.2%**
Total Responses	**144**	**5**			

Q13 When you moved into your home, did you consider the impact a flood could have on your home?					
Yes	43	0	22	**65**	**29.4%**
No	107	5	32	**144**	**65.2%**
Not Sure	5	0	7	**12**	**5.4%**
Total Responses	**155**	**5**	**61**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
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?					
Yes	23	0	19	**42**	**19.1%**
No	112	4	32	**148**	**67.3%**
Not Sure	20	0	10	**30**	**13.6%**
Total Responses	**155**	**4**	**61**		
Q15 Would the disclosure of the flood hazard have influenced your decision to buy or rent a home?					
Yes	86	5	32	**123**	**55.4%**
No	40	0	20	**60**	**27.0%**
Not Sure	28	0	11	**39**	**17.6%**
Total Responses	**154**	**5**	**63**		
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)					
$10,000 or above	8	0	5	**13**	**6.0%**
$5,000 to $9,999	14	0	3	**17**	**7.8%**
$1,000 to $4,999	23	0	8	**31**	**14.2%**
Less than $1,000	12	0	7	**19**	**8.7%**
Nothing	24	1	14	**39**	**17.9%**
Not Sure	49	1	23	**73**	**33.5%**
I do not own my home	23	3		**26**	**11.9%**
Total Responses	**153**	**5**	**60**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
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)					
Insurance premium discount	69	3	24	**96**	**44.4%**
Mortgage discount	45	2		**47**	**21.8%**
Low interest rate, home-improvement loan	38	2	13	**53**	**24.5%**
Grant funding	63	2	34	**99**	**45.8%**
None	20	1	13	**34**	**15.7%**
I do not own my home	28	1		**29**	**13.4%**
Other (please specify)	9	0	8	**17**	**7.9%**
Total Responses	**153**	**4**	**59**	**216**	**1**

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?					
Yes	84	4		**88**	**55.7%**
No	20	0		**20**	**12.7%**
Not Sure	49	1		**50**	**31.6%**
Total Responses	**153**	**5**			

Q19 Do you support the regulation (restriction) of land uses within known, high risk, flood hazard areas?					
Yes	117	5	34	**156**	**71.2%**
No	12	0	17	**29**	**13.2%**
Not Sure	26	0	8	**34**	**15.5%**
Total Responses	**155**	**5**	**59**		

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?					
Yes	53	3	10	**66**	**30.0%**
No	100	1	53	**154**	**70.0%**
Total Responses	**153**	**4**	**63**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
Q21 Where in Los Angeles do you live? Please provide your zip code, nearest cross streets or neighborhood.					
Q22 Do you live [COUNTY: or own a business] in a known floodplain or an area that has been subject to flooding?					
Yes	18	3	35	**56**	**24.0%**
No	83	1	30	**114**	**48.9%**
Not Sure	51	1	11	**63**	**27.0%**
Total Responses	**152**	**5**	**76**		
Q23 Do you have any access or functional needs within your household that would require early warning or response during disasters?					
Yes	21	4	7	**32**	**14.7%**
No	132	1	52	**185**	**85.3%**
Total Responses	**153**	**5**	**59**		
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.					
Yes	16	4		**20**	**12.9%**
No	84	1		**85**	**54.8%**
Not Applicable	50	0		**50**	**32.3%**
Total Responses	**150**	**5**			
Q25 Please indicate the primary language spoken in your household.					
English	141	0		**141**	**90.4%**
Spanish	4	5		**9**	**5.8%**
Other Indo-European Languages	0	0		**0**	**0.0%**
Asian and Pacific Island Languages	3	0		**3**	**1.9%**
Other (please specify)	3	0		**3**	**1.9%**
Total Responses	**151**	**5**			

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Q26 Do you own or rent your place of residence?					
Own	113	4	50	**167**	**75.9%**
Rent	37	1	15	**53**	**24.1%**
Total Responses	**150**	**5**	**65**		

Q27 How much is your gross household income?					
$20,000 or less	10	0	2	**12**	**6.1%**
$20,001 to $49,999	13	5	8	**26**	**13.3%**
$50,000 to $74,999	14	0	8	**22**	**11.2%**
$75,000 to $99,999	19	0	10	**29**	**14.8%**
$100,000 to $249,999	60	0	22	**82**	**41.8%**
$250,000 or more	17	0	6	**23**	**11.7%**
Prefer Not to Answer	0	0	2	**2**	**1.0%**
Total Responses	**133**	**5**	**58**		

Q28 Comments

County Q2 If you answered yes to Question #1, is this property your home, residence or business?					
Home or residence			34	**34**	**63.0%**
Business			3	**3**	**5.6%**
Not applicable			17	**17**	**31.5%**
Total Responses	**0**	**0**	**54**		

County Q4 Do you have a mortgage on this property?					
Yes			37	**37**	**56.9%**
Not applicable			28	**28**	**43.1%**
Total Responses	**0**	**0**	**65**		

County Q5 How long have you lived or done business at that property?					
Less than 1 year			3	**3**	**4.7%**
1 to 5 years			16	**16**	**25.0%**
6 to 10 years			16	**16**	**25.0%**
11 to 20 years			14	**14**	**21.9%**
More than 20 years			15	**15**	**23.4%**
Total Responses	**0**	**0**	**64**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
County Q19 Do you support the preservation of natural land that contains a flood hazard?					
Do support - for all natural lands			34	**34**	**57.6%**
Do support - as long as it is not my property			17	**17**	**28.8%**
Do not support			8	**8**	**13.6%**
Total Responses	**0**	**0**	**59**		
County Q20 What types of projects do you believe the County, State or Federal government agencies should consider to reduce damage and disruption from flooding?					
Retrofit infrastructure, such as improving culverts, bridges, and local drainage.					
High			43	**43**	**71.7%**
Medium			17	**17**	**28.3%**
Low			0	**0**	**0.0%**
Total Responses	**0**	**0**	**60**		
Capital projects such as dams, levees, flood walls and drainage improvements.					
High			31	**31**	**50.8%**
Medium			25	**25**	**41.0%**
Low			5	**5**	**8.2%**
Total Responses	**0**	**0**	**61**		
Strengthen codes and regulations to include higher regulatory standards in flood hazard areas.					
High			23	**23**	**40.4%**
Medium			17	**17**	**29.8%**
Low			17	**17**	**29.8%**
Total Responses	**0**	**0**	**57**		
Acquire vulnerable properties and maintain as open space.					
High			23	**23**	**39.7%**
Medium			16	**16**	**27.6%**
Low			19	**19**	**32.8%**
Total Responses	**0**	**0**	**58**		
Assist vulnerable property owners with securing funding for mitigation.					
High			22	**22**	**37.9%**
Medium			26	**26**	**44.8%**
Low			10	**10**	**17.2%**
Total Responses	**0**	**0**	**58**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
Provide better information about flood risk to the public.					
High			30	**30**	**50.8%**
Medium			21	**21**	**35.6%**
Low			8	**8**	**13.6%**
Total Responses	**0**	**0**	**59**		
Projects that will mitigate future flood impacts caused by climate change					
High			23	**23**	**39.7%**
Medium			22	**22**	**37.9%**
Low			13	**13**	**22.4%**
Total Responses	**0**	**0**	**58**		
Other					
High			6	**6**	**31.6%**
Medium			10	**10**	**52.6%**
Low			3	**3**	**15.8%**
Total Responses	**0**	**0**	**19**		
County 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.					
Strongly Disagree			4	**4**	**6.6%**
Somewhat Disagree			4	**4**	**6.6%**
Neither Agree or Disagree			8	**8**	**13.1%**
Somewhat Agree			26	**26**	**42.6%**
Strongly Agree			19	**19**	**31.1%**
Total Responses	**0**	**0**	**61**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	Count	Percent
County 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.					
Strongly Disagree			4	**4**	**6.6%**
Somewhat Disagree			0	**0**	**0.0%**
Neither Agree or Disagree			6	**6**	**9.8%**
Somewhat Agree			24	**24**	**39.3%**
Strongly Agree			27	**27**	**44.3%**
Total Responses	**0**	**0**	**61**		
County Q27 Please indicate your age range					
Under 18			0	**0**	**0.0%**
18 to 30			7	**7**	**11.5%**
31 to 40			17	**17**	**27.9%**
41 to 50			8	**8**	**13.1%**
51 to 60			19	**19**	**31.1%**
61 or older			10	**10**	**16.4%**
Total Responses	**0**	**0**	**61**		
County Q28 Please indicate your gender					
Male			35	**35**	**58.3%**
Female			21	**21**	**35.0%**
Transgender Female			1	**1**	**1.7%**
Transgender Male			0	**0**	**0.0%**
Gender Variant/ Non-conforming			0	**0**	**0.0%**
Not Listed			0	**0**	**0.0%**
Prefer not to answer			3	**3**	**5.0%**
Total Responses	**0**	**0**	**60**		

NOTE: Orange cells denote a question or response that was not provided for the indicated survey.

	Survey			Total	
	City English	City Spanish	County	**Count**	**Percent**
County Q29 Please indicate your highest level of education					
Grade school/No schooling			1	**1**	**1.7%**
Some high school			1	**1**	**1.7%**
High school graduate/GED			8	**8**	**13.3%**
Some college/Trade school			15	**15**	**25.0%**
College degree			19	**19**	**31.7%**
Graduate degree			16	**16**	**26.7%**
Other (please specify)			0	**0**	**0.0%**
Total Responses	**0**	**0**	**60**		

Steering Committee Meetings
AGENDAS AND SUMMARIES

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Kick-Off Meeting
Wednesday, July 24, 2019
9:30 a.m. – 11:30 a.m.
500 E. Temple Street, Los Angeles, CA 90012
Training Conference Room #157

Call-in Number: 1-800-523-8437 Conference ID: 6895 8471 58 #

Welcome and Introductions

- Group Introductions
- Review Agenda

Project Overview

Workplan

1. Organize Resources
2. Risk Assessment
3. Public Information
4. Goal Setting
5. Plan Maintenance
6. Plan Development
7. Plan Submittal and Adoption

Timeline

Important Milestones

The Steering Committee Charter

- SC Role
- SC Chair and Vice-Chair
- SC Quorum
- SC Decision Making
- Public Involvement
- Meeting Date and Time
- Public Involvement
- Courtesy

Plan Review

- Review Existing FMP, HMP and Safety Element of General Plan

Public Outreach

- Public Engagement Meetings
- Additional Outreach Capabilities

Action Items and Next Steps

Adjourn

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Kick-Off Meeting
Wednesday, July 24, 2019
9:30 a.m. – 11:30 a.m.
500 E. Temple Street, Los Angeles, CA 90012
Training Conference Room #157

The 2015 SC identified a mission statement, goals and objectives for the FMP. 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.

Mission Statement

Through partnerships and careful planning, identify and reduce flood hazards to protect the health, safety, quality of life, environment, and economy of the City of Los Angeles.

Goals

1. Protect life.
2. Protect property.
3. Increase resilience of critical facilities and infrastructure.
4. Increase public awareness.
5. Pursue cost-effective and environmentally sound mitigation measures.
6. Coordinate with other programs that can support or enhance flood mitigation

Objectives

1. Provide, improve and maintain flood protection.
2. Use the best available data, science and technologies to improve understanding of the locations and potential impacts of flood hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life and safety.
3. Minimize the impacts of flood hazards on current and future land uses through implementation of appropriate codes, standards, and ordinances.
4. Retrofit, purchase, and relocate structures that are in flood hazard areas, especially those known to be repetitively damaged.
5. Maintain or enhance early warning emergency response systems, evacuation procedures, training and equipment.
6. Increase resilience and continuity of operations of critical facilities and infrastructure.
7. Pursue effective and efficient approaches to reducing stormwater runoff, protecting water quality and water resources.
8. Increase public awareness of existing flood risks and the means to reduce these risks by conducting educational and outreach programs.
9. Encourage and support leadership within the private sector, nonprofit agencies and community-based organizations to promote and implement local flood hazard mitigation activities.
10. Review future effects of global climate change on flood risks.

City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #1
Tuesday, July 24, 2019, 9:30 a.m. to 11:30 p.m.

Meeting Participants

1.	Government	Frazier, Quentin	Port of Los Angeles
	Government	Reed, Lynette	Alternate, Port of Los Angeles
2.	Government	Gross, Aaron	Chief Resiliency Officer-Mayor's Ofc.
3.	Government	Affeldt, Michael	Director, LA RiverWorks – Mayor's Office
4.	Government	Nepomuceno-Juacalla, Carolynn	*Alternate*-Department of Building and Safety
	Government	Perez, Michael	*Alternate*-Department of Building and Safety
5.	Government	Neville, Robert	*Alternate*, Los Angeles Police Department
6.	Government	Ignatczyk, John	Los Angeles Fire Department
7.	Government	Scaduto, Michael	*Alternate*-LA Sanitation & Environment
8.	Government	Pijuan, Alen	*Alternate*-Emergency Management Department
9.	Government	Pallini, Conni	Department of City Planning
	Government	Phinouwong, Nina	*Alternate*-Department of City Planning
10.	Government	Shu, Susan	Bureau of Engineering
	Government	Lin, Chang	*Alternate*-Bureau of Engineering
11.	Government	Tan, Emmanuel	Department of Water and Power
	Government	Plumb, Cliff	*Alternate*-Department of Water and Power
	Government	Hu, JianPing	*Alternate*-Department of Water and Power
	Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
	Government (NV)	Nemick, Mary	Bureau of Engineering Public Relations
1.	Non-Government	Duong, Tina	*Alternate*-U.S. Army Corp of Engineers
2.	Non-Government	Duboff, Jessica	Los Angeles Chamber
3.	Non-Government	Ellis, Dr. Andre	CSULA Geosciences & Environment
4.	Non-Government	Greenspan, Mike	Resident
5.	Non-Government	McOmber, Britta	UCLA Luskin School of Public Affairs
6.	Non-Government	Robinson, Prof. Alex	USC Landscape Architecture
7.	Non-Government	Garcia-Ruiz, Joselito	*Alternate*-Red Cross of Greater Los Angeles
8.	Non-Government	Wood, Patricia	Los Angeles County Flood Control District
	Non-Government	Tran, Larry	*Alternate*-Los Angeles County Flood Control District
9.	Non-Government	Mejia, Stephen	Friends of Los Angeles River
	Non-Government	Gomez, Manny	*Alternate*-Friends of Los Angeles River
	Non-Government	Griego, Liliana	*Alternate*-Friends of Los Angeles River
	Public	Winter, Melanie	The River Project
	Planning Team	Artz, Ira	Tetra Tech, Inc.
	Planning Team	Davis, Denise	Tetra Tech, Inc.
	Planning Team	Flaner, Rob	Tetra Tech, Inc.
	Planning Team	Parker, Steve	Tetra Tech, Inc.
	Planning Team	Cindy Suh	KPA
	Planning Team	Lorena Hernandez	KPA

Welcome and Introductions

Susan Shu, Bureau of Engineering, welcomed everyone to the meeting. Chang Lin is the Project Manager for this plan revision along with Tetra Tech, which is the consulting company performing the update. Chang and Susan will oversee the City's participation in the National Flood Insurance Program. The Steering Committee (SC) participated in self-introductions, along with SC members on the conference call. Rob Flaner with Tetra Tech will serve as the Lead Project Planner, was introduced and reviewed the agenda.

Rob said the SC will go through the agenda today, which will explain the SC's responsibilities throughout the project.

Project Overview

Rob stated the objective of the revision process is to update the 2015 Floodplain Management Plan (FMP) and will follow an arduous process laid out by 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 an 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.

Property owners that have a federally backed mortgage and live in a floodplain, or need disaster assistance after an emergency, are required to have flood insurance as a condition of the mortgage or disaster assistance. The CRS states if the City goes above and beyond the minimum standards of the program, property owners will be rewarded by a reduction in the cost of flood insurance in each participating community.

The City Los Angeles developed the first FMP in 2001. This will be the third iteration of the FMP. Developing the FMP is one of 19 ways to accrue points for the CRS program. The more points the City accrues in the different levels of classification, there is a corresponding insurance premium reduction. A lot of credit comes from this plan, driven by numerous other elements the City is getting credits for.

Workplan

The workplan is tied to the CRS requirements and has a seven-phase scope of work which determines the process for this project. The project is very process oriented!

1. **Organize resources**. The SC will be providing oversight to the process to meet requirements of the CRS. The FMP will describe the work plan and process used to revise the previous plan. Each SC member has been handpicked to create the diversity needed for the makeup of the SC. Both government and non-government representatives are required to oversee the planning process. The Core Planning Team (CPT) is made up of City representatives and Tetra Tech. The CPT pre-determined a committee that has a 50/50 ratio of governmental to non-governmental members. Governmental members are associated with permit authority of the City of Los Angeles and have the ability to regulate codes and ordinances that are in effect in the city. Non-governmental members will not have any association with permit authority, even if working for a government agency, i.e., Army Corp of Engineers. Over the next six to nine months, we will be revising the plan, which all falls under organizing resources.

2. **Risk assessment**. The risk assessment is the "hub of the wheel." It is the most important part of the plan. A comprehensive assessment will be conducted on flooding from the varying sources within the city to see if the risk has changed. A comparative analysis will be done to determine not only what has changed but why it has changed. Risk cannot be reduced if we don't know

what the risk is. The risk assessment will also include an enhanced look at the repetitive flood loss properties in the city. Repetitive loss is distinctly defined by FEMA. Certain properties within the city have been identified based on their flood loss history. If a property owner has had two or more claims of more than $1,000 paid by the NFIP within a ten-year period, their property is identified as being a repetitive loss property. This plan's risk assessment will look at where those properties are and why they are getting repetitive claims.

3. **Public information**. This phase includes outreach to the public to fulfill CRS mandates that all phases of the plan development are open to the public. Todays meeting was not advertised as a public meeting because we are organizing the planning process, but all subsequent SC meetings will be advertised and open to the public. Typically, not many public members attend the meetings, but it is possible, and we encourage it. The public will be specifically engaged on two occasions; 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. The SC will develop a public outreach strategy as we are updating this plan.

4. **Goal setting**. The plan has a mission statement, goals and objectives. The SC will look at these to determine if they are still current or need to be revised. Resilience is a new buzz word for goals and objectives. FEMA's definition of resilience is not well defined.

5. **Plan maintenance**. CRS requires a dynamic plan. The City must conduct progress reporting during the plan's five-year cycle to maintain the plan. The SC could be convened to review the FMP and make recommendations once the City determines how it's going to review the plan each year and make recommendations. We may conduct an enhanced look at repetitive loss properties this time around.

6. **Plan development**. During this phase the plan will be assembled and go through a series of reviews. The first will be an internal review by the SC as the oversight committee. The SC will provide advice on any changes, additions or deletions that you would like to see. The City will also conduct an internal review and once approved, the draft is made available to the public for review. We have to have an extensive public engagement process with the draft plan for the minimum two-week public comment period.

7. **Plan submittal and adoption.** Finally, we submit the plan, first to the State of California Office of Emergency Services, and then to the Insurance Services Office (ISO), the program coordination contractor that administers the program for FEMA. The ISO assigns a technical reviewer to conduct a technical review as it pertains to CRS. Tetra Tech will fill out a crosswalk and provide the ten steps and the elements for the review. CRS classification breaks are 500 points per class. The maximum points you can get for this plan is 500 points.

   This is what we want to do to have a draft plan ready for the political process and adoption by late spring, 2020. For 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, the CPT will present you with factors that we need to address and milestones that we need to complete. You will develop a charter to facilitate the method to make these decisions.

Timeline

Rob stated the City would like to submit the plan in early March of 2020. The City is having an audit and would like to get the plan submitted prior to the audit. Once the plan is submitted, it could take several

months for the approval process. With a March submittal, the approval and adoption of the plan could be in June or July of 2020, long before the 2015 FMP expires in October 2020.

Important Milestones
Important milestones include the risk assessment to see if the flood risk has changed. I can tell you (Rob indicated) that the flood risk always changes. Risk is defined as probability times impact. The impacts are on people, property, the economy and the environment. Impacts are measured by the 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. There also could be new hazard data that shows new buildings are at risk. We will look to see if the flood risk is deeper, or more intense, at the impact from climate change and 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. The important milestones are: (1) the risk assessment, which will determine when we can do the first phase of the outreach; (2) which data we want to share with the public first to receive input from the public; (3) determine if the goals and objectives are appropriate based on the risk; (4) assembling the draft plan and getting the draft to point where the SC feels it has all the proper components. 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 City.

Steering Committee Charter
The next item on the agenda is development of a SC charter. The project needs to be organized and have 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 planning process.

SC Role: First thing on the charter is the SC's role. The SC is an advisory body, not a political body. The City is able to accept the direction of the SC or not. It is the City's choice. CRS wants all phases of the process to be open to the public.

SC Chair and Vice Chair: The SC needs to have a chair to assist in organizing the meetings, address the public, keep the meetings moving forward, and continue the discussion topics. The chair must be one of the SC members. Tetra Tech will provide agendas and meeting summaries. Aaron Gross, Chief Resiliency Officer in the Mayor's Office was elected to be the chair of the SC and accepted the nomination.

A vice-chair is needed in case the chair is not available. The vice-chair can be any person from the SC (not under the City member requirement). Rob asked if there was anyone in the room that would like to be designated as the vice-chair. Conni Pallini was nominated as the Vice Chair and accepted the nomination. Once the charter is finalized, it will be posted on the FMP website.

Quorum: A quorum needs to be established for the decision-making process. 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 (between five and 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? The SC agreed that 50%+1 was acceptable. Alternates can also be used as voting members. Alternates can either be completely interchangeable or acting as a proxy. A SC member and associated alternatives only receive one vote (ie. one vote per represented organization). If a SC member has multiple alternates, they should be kept apprise of issues and the direction of the SC so they can be familiar enough to confidently vote if necessary. All SC members, primary and alternates, will be sent the meeting information and notices to keep them abreast of what is going on throughout the process.

There was a recommendation made from the Friends of the Los Angeles River that a representative from The River Project be added to the SC. Rob stated the SC had been set by the City and there were no more representatives needed. However, the Chair of the SC requested that the LA RiverWorks representative be changed from an Alternate of the Mayor's Office to a Primary SC member. A vote was held in agreement, with an additional spot held open for a non-government SC member to be added that has been a pending request when a previous non-Governmental representative dropped out.

Decision Making: Decision making will be made through consensus first, and secondly through a majority vote. If an SC member has a dissenting opinion during a meeting, the opinion will be recorded 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. Tetra Tech 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. Vanessa Bulkacz, Public Affairs, Department of Public Works, was asked if she would fill this position and she agreed. Vanessa will work with representatives from KPA, a consulting company contracted through the project to conduct public outreach for the project.

Standard Meeting Date and Time: A standard meeting date and time is needed for SC members and to advertise to the public on the website. The venue may need to change, depending on the availability of the room, dates and times. Rob stated generally the meetings are two hours. The second Thursday of every month from 9:30 a.m. to 11:30 a.m. was suggested. Rob stated that would be only a couple of weeks away. It was agreed the meetings will be on the second Thursday of every month from 9:30 a.m. to 11:30 a.m. with the next meeting on August 8, 2019.

Meeting Attendance: Attendance will be addressed if a member or alternate misses two consecutive meetings. If an SC member needs to miss a meeting, please arrange for an alternate to attend and let the City or Tetra Tech know that you are unable to attend. Rob stated the SC may meet for the next six to seven months and may skip the month of December. The target date to have the first draft of the plan is March of 2020.

Public Involvement: Rob stated the last item to cover is public involvement. We need to have the public comment protocol written in the charter, compliant with the Brown Act. This protocol should include when the public would speak, how much time would they get, etc. Rob asked if the City has a protocol for this that we could replicate. The City CPT members stated they would provide this and present it at the next meeting. Rob stated there will be a sign in sheet for public members as well.

Courtesy: Please give courtesy to each other and any public members during the meetings.

Personal Contact Information: The CPT has a roster of the steering committee with contact information. A list of SC member names and their department/organization title is in the charter. Is there anyone, including non-governmental members, who has a problem with having their name and department/organization contact information in the charter? No one replied they have a problem with that. SC members should update this information as needed.

Plan Review

The SC will have homework to review the 2015 FMP mission statement, goals and objectives to make sure they are still relevant or need to be adjusted. Each SC member will be sent a link to the 2015 FMP on the City of Los Angeles Bureau of Engineering 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. Please review the 2015 FMP prior to the next meeting.

Public Outreach

Rob asked what is the best way to engage the community in the City of Los Angeles? We will be discussing that at the next meeting so please give that some thought. KLCS, an LA PBS station, and LA Cityview Channel 35, were mentioned as a way to reach the public. Discussion about outreach included a press release and getting the FMP website up as soon as possible. Rob stated next meeting the SC will lock down the public engagement strategy. Rob mentioned the company KPA has been contracted to provide outreach messaging and strategies for the project.

Action Items

- The SC Charter will be carried over to the next meeting to complete pending discussion on the make-up of the SC.
- There will be an attempt to post SC meeting summaries two weeks after each meeting.
- SC Meetings will take place on the second Thursday of each month from 9:30 a.m. to 11:30 a.m. The meeting location is to be determined. The next SC meeting will be August 8, 2019.
- SC Members to will be sent the link to the Bureau of Engineering FMP webpage to review the 2015 FMP prior to the next meeting.
- SC members should designate any additional alternates as soon as possible.

Next Meeting Date

- The next SC meeting date will be August 8, 2019 9:30 a.m. to 11:30 a.m. A meeting invitation will be sent to the SC with the meeting location and agenda (agenda sent prior to the meeting).

Adjourn

The meeting adjourned at 11:30 a.m.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Kick-Off Meeting
Thursday, August 8, 2019
9:30 a.m. – 11:30 a.m.
500 E. Temple Street, Los Angeles, CA 90012
Training Conference Room #157

Call-in Number: 1-800-523-8437 Conference ID: 7432998389

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #1 summary
- SC Final Roster
- 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***
    - Review Mission Statement
        - Changes?
    - Review Goals
        - Changes?
    - Review Objectives
        - Changes?

- ***Public Outreach Strategy***
    - The 2 phases of outreach, the CRS requirements
    - Review KPA proposed strategy
    - Additions, deletions, changes?
    - Additional Outreach Capabilities

- ***Action Items and Next Steps***

- ***Adjourn***
    - Next Meeting: September 12, 2019 9:30 a.m. – 11:30 a.m.

City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #2
Thursday, August 8, 2019, 9:30 a.m. to 11:30 a.m.

Meeting Participants

Government	Affeldt, Michael	Director, LA RiverWorks – Mayor's Office
Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
Government	Reed, Lynette	Alternate, Port of Los Angeles
Government	Gross, Aaron	Chief Resiliency Officer-Mayor's Ofc.
Government	John Campos	*Alternate*, Los Angeles Police Department
Government	Nepomuceno-Juacalla, Carolynn	*Alternate*-Department of Building and Safety
Government	Ignatczyk, John	City of Los Angeles Fire Department
Government	Orval Hernandez-Marcial	*Alternate*-LA Sanitation & Environment
Government	Munongo, Patrick	*Alternate*-Emergency Management Department
Government (NV)	Nemick, Mary	Bureau of Engineering
Government	Pallini, Conni	Department of City Planning
Government	Shu, Susan	Bureau of Engineering
Government	Lin, Chang	*Alternate*-Bureau of Engineering
Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Tan, Emmanuel	Department of Water and Power
Non-Government	Alexander, Desmian	USC Public Policy
Non-Government	Manny Gonez	Friends of the Los Angeles River
Non-Government	Duboff, Jessica	Los Angeles Chamber of Commerce
Non-Government	Ellis, Andre	CSULA Geosciences & Environment
Non-Government	Greenspan, Mike	Resident
Non-Government	McOmber, Britta	UCLA Luskin School of Public Affairs
Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
Non-Government	Brian Baldauf	*Alternate*-Mountains Recreation & Conservation Authority
Non-Government	Robinson, Alex	USC Landscape Architecture
Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
Non-Government	Wood, Patricia	Los Angeles County Flood Control District
Non-Government	Tran, Larry	*Alternate*-Los Angeles County Flood Control District
PUBLIC		
Team Support	Artz, Ira	Tetra Tech, Inc.
Team Support	Flaner, Rob	Tetra Tech, Inc.
Team Support	Hernandez, Lorena	KPA
Team Support	Padilla, Katherine	KPA
Team Support	Parker, Steve	Tetra Tech, Inc.
Team Support	Schloss, Melissa	Tetra Tech, Inc.

(NV) = non-voting

Planning Process

Welcome and Introductions
Aaron Gross, Chief Resilience Officer welcomed attendees, and everyone introduced themselves.

Review Agenda
Rob Flaner, Tetra Tech welcomed attendees and noted this is the first meeting to start the planning process and all upcoming agendas will be organized this way; New and Old Business. Rob introduced Melissa Schloss as the newest member of the Tetra Tech team to replace Denise Davis.

Approve SC Meeting #1 Summary
Rob Flaner stated that the Mayor's office has reviewed and approved the Charter's roster. The City indicated that a few Alternates need to be edited.

Review/Approve Final Charter

> *MOTION by Michael Affeldt to approve the Steering Committee Charter and second by Aaron Gross. Motion carried 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-Prior Plan Review
A SC member asked if the plan would include an internal document as well as an external (public facing) document as well as creating an add-on public comprehensive handbook as the executive summary and bookmarks and the SC agreed. A SC member suggested widening the flood mitigation action tables.

Rob Flaner noted the BAT Tool can be used to monitor the progress of the plan and action items and he will demonstrate how the BAT Tool works and will provide City Planning with access.

Review Table of Contents for Proposed Plan
Rob Flaner stated that this FMP update will mirror the City's HMP since the two should work together. He also stated this FMP update can also be used as a functional annex to the City's next HMP update.

Review Prior Action Plan
Rob Flaner stated that the SC needs to understand what priorities were set in the old plan so we have a starting point for the update. He also stated the RLAA will be a component for the 2020 plan as a functional annex

Mission Statement and Goal Setting
Rob Flaner, Tetra Tech 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: "Improve community resilience to flood hazards and protect the health, safety, quality of life, environment and economy of the City of Los Angeles through partnerships and integrated planning."

MOTION by Michael Affeldt to approve the above mission statement and second by Conni Pallini. Motion carried unanimously.

Review Goals and Objectives
Rob Flaner, Tetra Tech reviewed the previous FMP's goals and objectives and the SC had a long discussion on how to update them. Of note was whether to include "social equity" as a goal, which would necessitate a cascade through all of the objectives and subsequent action items, or to include it as an objective, to which certain action items would be impacted. Rob Flaner highly recommended putting social equity as an objective rather than a goal. After debate, the new Goals were finalized as follows:

1. Reduce flood risk.
2. Protect life.
3. Protect property.
4. Increase resilience of critical facilities and infrastructures.
5. Increase community awareness and public education.
6. Pursue cost effective, environmentally sound and multi-benefit mitigation measures.
7. Coordinate with other programs that can support or enhance flood mitigation.
8. Pursue social equity.

MOTION by Manny Gomez to approve the above goals and second by Scott Underwood. Motion carried unanimously.

Updating the objectives were tabled due to time and the SC was given homework: the generation of a matrix to cross reference the existing objectives to the goals, and potentially suggest new objectives to align with the new "social equity" goal.

Public Outreach Strategy
Katherine Padilla of KPA, subcontractor for Tetra Tech presented the proposed outreach strategy. Approving the proposed outreach strategy was tabled due to time, and its review was given as homework to the SC.

Action Items and Next Steps
Tetra Tech to provide the minutes of this meeting for SC review prior to the next meeting. SC to review the previous plans objectives (crosswalk them to the new goals) and proposed public outreach strategy and provide comments for the next meeting. Provide City Planning with access to BAT.

Adjourn
Next Meeting: September 12, 2019 9:30 a.m. – 11:30 a.m.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #3
Thursday, September 12, 2019
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 7432998389

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #2 summary
- Receive Public Comment

New Business

- ***SC Homework-Review Objectives***
    - Objectives Review-Finalization
- ***Critical Facilities/ Infrastructure***
    - FEMA's new BRIC initiative
        - What is a "lifeline"?
    - The 2015 Plan CF/CI definition
        - Confirm the definition for the 2020 plan
- ***Public Outreach Strategy***
    - The 2 phases of outreach, the CRS requirements
    - Review KPA proposed strategy
        - Additions, deletions, changes?
    - Additional Outreach Capabilities
- ***Action Items and Next Steps***
- ***Adjourn***
    - Next Meeting: October 10, 2019 9:30 a.m. – 11:30 a.m. location TBD

City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #3
Thursday, September 12, 2019, 9:30 a.m. to 11:30 a.m.

Meeting Participants

1. Government	Affeldt, Michael	Director, LA RiverWorks – Mayor's Office
2. Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
3. Government	Campos, John	*Alternate*, Los Angeles Police Department
Government	Galassi, Romano	*Alternate*-Bureau of Engineering
4. Government	Gross, Aaron	Chief Resiliency Officer-Mayor's Ofc.
5. Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
6. Government	Ignatczyk, John (P)	City of Los Angeles Fire Department
7. Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Mik, Lena	*Alternate*-Department of City Planning
8. Government	Nepomuceno-Juacalla, Carolynn (P)	*Alternate*-Department of Building and Safety
9. Government	Pallini-Tipton, Conni	Department of City Planning
Government	Phinouwong, Nina	*Alternate*-Department of City Planning
10. Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
11. Government	Reed, Lynette	*Alternate*-Port of Los Angeles
1. Non-Government	Alexander, Desmian (P)	USC Public Policy
2. Non-Government	Duboff, Jessica (P)	Los Angeles Chamber of Commerce
3. Non-Government	Ellis, Andre (P)	CSULA Geosciences & Environment
4. Non-Government	Greenspan, Mike (P)	Resident
5. Non-Government	Griego, Liliana	*Alternate*-Friends of the Los Angeles River
6. Non-Government	McOmber, Britta (P)	UCLA Luskin School of Public Affairs
7. Non-Government	Miranda, Solomon	CA Department of Water REsources
8. Non-Government	Robinson, Alex (P)	USC Landscape Architecture
9. Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
10. Non-Government	Wood, Patricia (P)	Los Angeles County Flood Control District
Team Support	Artz, Ira	Tetra Tech, Inc.
Team Support	Flaner, Rob	Tetra Tech, Inc.
Team Support	Herrera, Thelma (P)	KPA
Team Support	Padilla, Katherine (P)	KPA
Team Support	Parker, Steve (P)	Tetra Tech, Inc.
Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.

(NV) = non-voting
(P) = attendance by phone

Planning Process

Welcome and Introductions

Aaron Gross, Chief Resilience Officer 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.

Approve SC Meeting #2 Summary
Rob Flaner asked the SC if they had any edits to the August 8, 2019 meeting summary. An edit to the spelling of Mr. Gonez's name was requested.

> *MOTION by Scott Underwood to approve the August 8, 2019 meeting summary with the abovementioned edit and second by Conni Pallini-Tipton. Motion carried unanimously.*

Receive Public Comment
Rob Flaner asked members of the public if they wished to address the committee. No public comments were expressed.

<u>New Business</u>

SC Homework- Review Objectives
Rob Flaner reviewed the goals that were finalized at the August 8, 2019 SC meeting. Aaron Gross stated that the eighth goal, "Pursue social equity" would be moved to be an objective to make it more of a measurable component rather than an over-arching impact on other plans the City has/will create(d).

The SC had a great discussion about editing the objectives. Romano Galissi noted that repetitive loss properties tend to be of high value hillside dwellings. Aaron Gross suggested to add a vulnerability factor to the objectives. A suggestion was made to add an 11th objective to read, "Minimize adverse impacts from flood risk to vulnerable communities."

> *MOTION by Michael Affeldt to remove goal eight and add an 11th objective to read, "Minimize adverse impacts from flood risk to vulnerable communities" second by Conni Pallini-Tipton. Motion carried unanimously.*

A suggestion was made to edit objective #10 to read, "Anticipate and minimize effects of climate change on flood risk."

> *MOTION by Lynette Reed to approve the objectives with the abovementioned edit and second by Solomon Miranda. 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.

Rob Flaner explained it would be in the city'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.

The SC decided to table approval of the critical facilities/ infrastructure definition until the next meeting. Tetra Tech will amend the critical facilities/ infrastructure definition to make one categorical bullet for each of the seven BRIC lifelines and present recommendations at the next meeting.

Public Outreach Strategy

Rob Flaner explained the outreach strategy as presented at the last meeting. Great discussion was had about the location and date to hold the first public outreach meeting. The SC agreed it would be best to tag-along to an existing public outreach function, in order to maximize the number of outreach participants.

Potential venues discussed included: the City's P-22 Day, using RYLAN (Ready Your LA Neighborhood) service, La Tuna Community evacuation event or the event for Franklin Canyon. Katherine Padilla and Scott Underwood to follow up with Tetra Tech on City events going on in the near future.

Action Items and Next Steps

- Tetra Tech to edit the August 8, 2019 Summary to correct the spelling of Mr. Gonez's name.
- Tetra Tech will amend the critical facilities/infrastructure definition to make one categorical bullet for each of the seven BRIC lifelines and present recommendations at the next meeting.
- Tetra Tech to work with the SC to book the first public outreach event.
- Tetra Tech to provide the minutes of this meeting for SC review prior to the next meeting.

Adjourn

Next Meeting: October 10, 2019 9:30 a.m. – 11:30 a.m. Location TBD.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #4
Thursday, October 10, 2019
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

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
  - GBS Status report

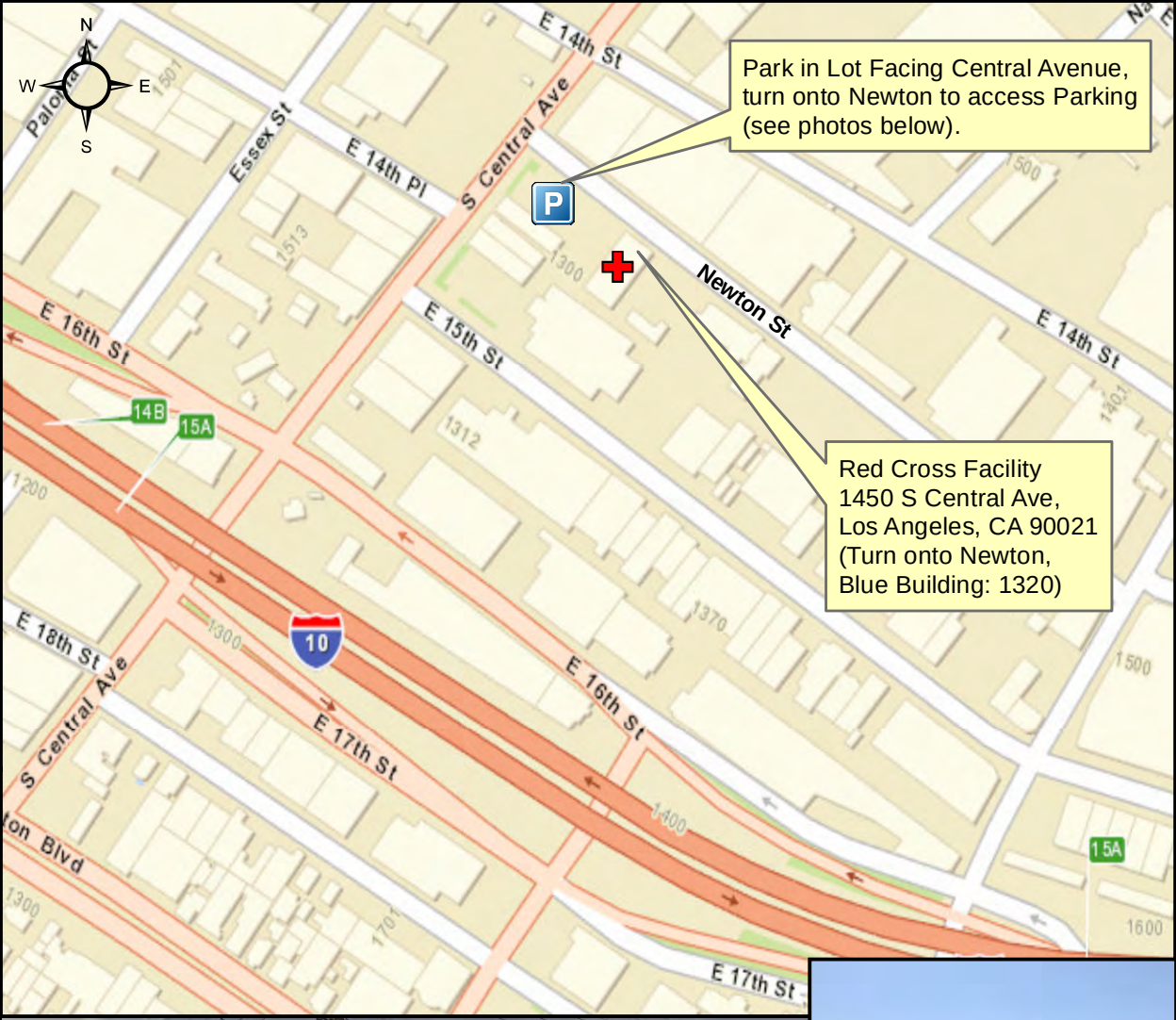
- ***Critical Facilities/ Infrastructure***
  - Critical Facilities/ Infrastructure (CF/CI) definition finalization

- ***Public Outreach Strategy***
  - Survey Update
  - First Public Outreach Meeting
    - P-22 Day Festival 10/19 at Griffith Park
  - Phase 2 outreach
    - Website
    - Survey
    - 2nd Public Meeting-When, Where?

- ***Action Items and Next Steps***

- ***Adjourn***

  - Next Meeting: November 14, 2019 9:30 a.m. – 11:30 a.m. location TBD



ENGINEERING
CITY OF LOS ANGELES

Data Source: Red Cross 2019
Map Source: ESRI 2019

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City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #4
Thursday, October 10, 2019, 9:30 a.m. to 11:40 a.m. PT

Meeting Participants

	Government	Affeldt, Michael	Director, LA RiverWorks – Mayor's Office
1.	Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
2.	Government	Burton, Anna	Port of Los Angeles
	Government	Campos, John	*Alternate*, Los Angeles Police Department
	Government	Chen, Caroline	City of Los Angeles Planning Department
3.	Government	Galassi, Romano	*Alternate*-Bureau of Engineering
4.	Government	Gathuka, Bryan	*Alternate*-Bureau of Engineering
5.	Government	Gross, Aaron	Chief Resiliency Officer-Mayor's Ofc.
	Government	Hammett, Mike	Los Angeles Police Department
	Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
	Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
	Government	Hu, JianPing	*Alternate*- Department of Water and Power
	Government	Huynh, Charmie	Department of Building and Safety
	Government	Ignatczyk, John	City of Los Angeles Fire Department
	Government	Kharaghani, Shahram	Los Angeles Sanitation & Environment
	Government	Le, Tuyen	*Alternate*-Bureau of Engineering
	Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
	Government	McDowell, Jennifer	*Alternate*- Mayor's Office- LA RiverWorks
6.	Government	Maesami, Ida	Los Angeles Sanitation & Environment
	Government	Mik, Lena	*Alternate*-Department of City Planning
	Government	Munongo, Patrick	*Alternate*- Emergency Management Department
	Government (NV)	Nemick, Mary	City of Los Angeles Bureau of Engineering
7.	Government	Nepomuceno-Juacalla, Carolynn (P)	*Alternate*-Department of Building and Safety
8.	Government	Pallini-Tipton, Conni	Department of City Planning
	Government	Perez, Michael	*Alternate*- Department of Building and Safety
9.	Government	Phinouwong, Nina	*Alternate*-Department of City Planning
10.	Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
11.	Government	Plumb, Cliff	Department of Water and Power
	Government	Reed, Lynette	*Alternate*-Port of Los Angeles
	Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
	Government	Scaduto, Michael	*Alternate*- Los Angeles Sanitation & Environment
	Government	Shu, Susan	City of Los Angeles Bureau of Engineering
12.	Government	Tan, Emmanuel	Department of Water and Power
	Government	Wall, Brian	City of Los Angeles Fire Department
1.	Non-Government	Alexander, Desmian (P)	USC Public Policy
2.	Non-Government	Asuncion, Kendal (P)	Los Angeles Chamber of Commerce
3.	Non-Government	Baldauf, Brian	*Alternate*- Mountain Recreation & Conservation Authority
	Non-Government	Demesa, Ed	U.S. Army Corps of Engineers

Non-Government	Ellis, Andre	CSULA Geosciences & Environment
4. Non-Government	Garcia-Ruiz, Joselito	*Alternate*- Red Cross of Greater Los Angeles
Non-Government	Gonez, Manny	Friends of the Los Angeles River
5. Non-Government	Greenspan, Mike (P)	Resident
Non-Government	Griego, Liliana	*Alternate*-Friends of the Los Angeles River
6. Non-Government	McOmber, Britta (P)	UCLA Luskin School of Public Affairs
7. Non-Government	Miranda, Solomon (P)	CA Department of Water Resources
Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
8. Non-Government	Robinson, Alex (P)	USC Landscape Architecture
Non-Government	Tran, Larry	*Alternate*- Los Angeles County Flood Control District
9. Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
10. Non-Government	Wood, Patricia	Los Angeles County Flood Control District
Team Support	Artz, Ira	Tetra Tech, Inc.
11. Team Support	Flaner, Rob	Tetra Tech, Inc.
Team Support	Hernandez, Lorena	KPA
Team Support	Herrera, Thelma	KPA
12. Team Support	Padilla, Katherine (P)	KPA
13. Team Support	Parker, Steve	Tetra Tech, Inc.
14. Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.
15. Team Support	Subbio, Tony	Tetra Tech, Inc.
Team Support	Suh, Cindy	KPA

(NV) = non-voting
(P) = attendance by phone

<u>Planning Process</u>

Welcome and Introductions
Aaron Gross, Chief Resilience Officer welcomed attendees, thanked American Red Cross for hosting the facility, 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.

Approve SC Meeting #3 Summary
Rob Flaner asked the SC if they had any edits to the September 12, 2019 meeting summary. An additional comment from Romano Galassi regarding conversation that Repetitive Loss (RL) properties tend to be of high value hillside dwellings was requested.

MOTION by Aaron Gross to approve the September 12, 2019 meeting summary with the abovementioned edit and second by Conni Pallini-Tipton. Motion carried 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 as the Tetra Tech staff member leading the RLAA effort.

New Business

Risk Assessment Update
Hazard Area Maps
Rob Flaner explained that this plan is utilizing LiDAR mapping data at three-foot resolution to create the depth grids. Rob discussed this data will output 10, 50, 100, and 500-year flood events where data is available.

GBS Status Report
Rob Flaner explained that Tetra Tech has 37,000 general building stock (GBS). He explained this data will be useful to the citizens of City of Los Angeles to understand how extensive flood risk can potentially be and how that can substantially impact them. Rob stated Tetra Tech will send data to the SC to review for the next meeting.

Discussion was had about the ongoing 51-mile master plan for the LA River and whether the existing condition models for that effort can be utilized for additional depth grid mapping. Tetra Tech to look into potentially using that data for this Plan.

Critical Facilities/Infrastructure
Rob Flaner explained it would be in the city'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.

The SC discussed the pros and cons to incorporating BRIC initiatives and its alignment with resilience into the critical facilities / infrastructure definition.

The SC agreed upon the following critical facilities / infrastructure definition:

> 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:

1. Safety and Security: Law Enforcement/Security, Search and Rescue, Fire Services, Government Service, Responder Safety, and Imminent Hazard Mitigation
2. Food, Water and Sheltering: Evacuations, Schools, Food/Potable Water, Shelter, Durable Goods, Water Infrastructure, and Agriculture
3. Health and Medical: Medical Care/Hospitals: Patient Movement, Public Health, Fatality Management, Health Care, and Supply Chain
4. Energy: Power (Grid), Temporary Power and Fuel

5. Communications: Infrastructure, Alerts, Warnings, Messages, 911 and Dispatch, Responder Communications and Financial Services
6. Transportation: Highway/Roadway, Mass Transit, Railway, Aviation, Maritime and Pipeline
7. Hazardous Materials: Facilities, Hazardous Debris, Pollutants and Contaminants

MOTION by Aaron Gross to approve the critical facilities / infrastructure definition and second by Cliff Plumb. Motion carried unanimously.

Public Outreach Strategy
Survey Update
Rob Flaner announced the first public outreach event will be the City's P-22 Day on October 19, 2019 at Griffith Park from 11:00 a.m. to 4:00 p.m. (set up at 9:00 a.m.).

The SC reviewed the public outreach survey that was used in the last FMP cycle and discussed updates:

- Change the word, "citizen" to "resident" throughout.
- #6: add a box about post-fire flood conditions and change language from, "flood" to "flood and debris flows" and reduce the number of answer options.
- #8 will activate if the respondent answers "yes" to #7, which will then activate #9.
- Delete the word bank box underneath question #24 indicating City plans the respondent may be aware of.
- Delete #19, 20, 21, 23, 27, 30, 32, 33, 34, 37
- Move #22 to #3
- Strike the word, "special" from #28 add the activation feature to it.
- #29: change the word "district" to "City Emergency Management"

Rob Flaner will make the suggested edits to the survey and send out to the SC before the first public outreach meeting.

First Public Outreach Meeting
The first Public Outreach Meeting will be held Saturday, October 19 at Griffith Park for P-22 Day from 11:00 a.m. to 4:00 p.m. with set up beginning at 9:00 a.m.

Phase 2 Outreach
This section of the agenda was not discussed due to time constraints.

Action Items and Next Steps

- Tetra Tech to edit the September 12, 2019 Summary.
- Tetra Tech to revise the public outreach survey and send to SC for one more review prior to use at the Public Outreach meeting.
- Tetra Tech to review 51-mile LA River data for potential plan incorporation.
- Tetra Tech to provide the minutes of this meeting for SC review prior to the next meeting.

Adjourn
Next Meeting: November 14, 2019 9:30 a.m. – 11:30 a.m. at American Red Cross.

MOTION by Cliff Plumb and second by Conni Pallini-Tipton to adjourn. Motion carried unanimously.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #5
Thursday, November 14, 2019
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Agenda
- Approve SC meeting #4 summary
- Receive Public Comment

New Business

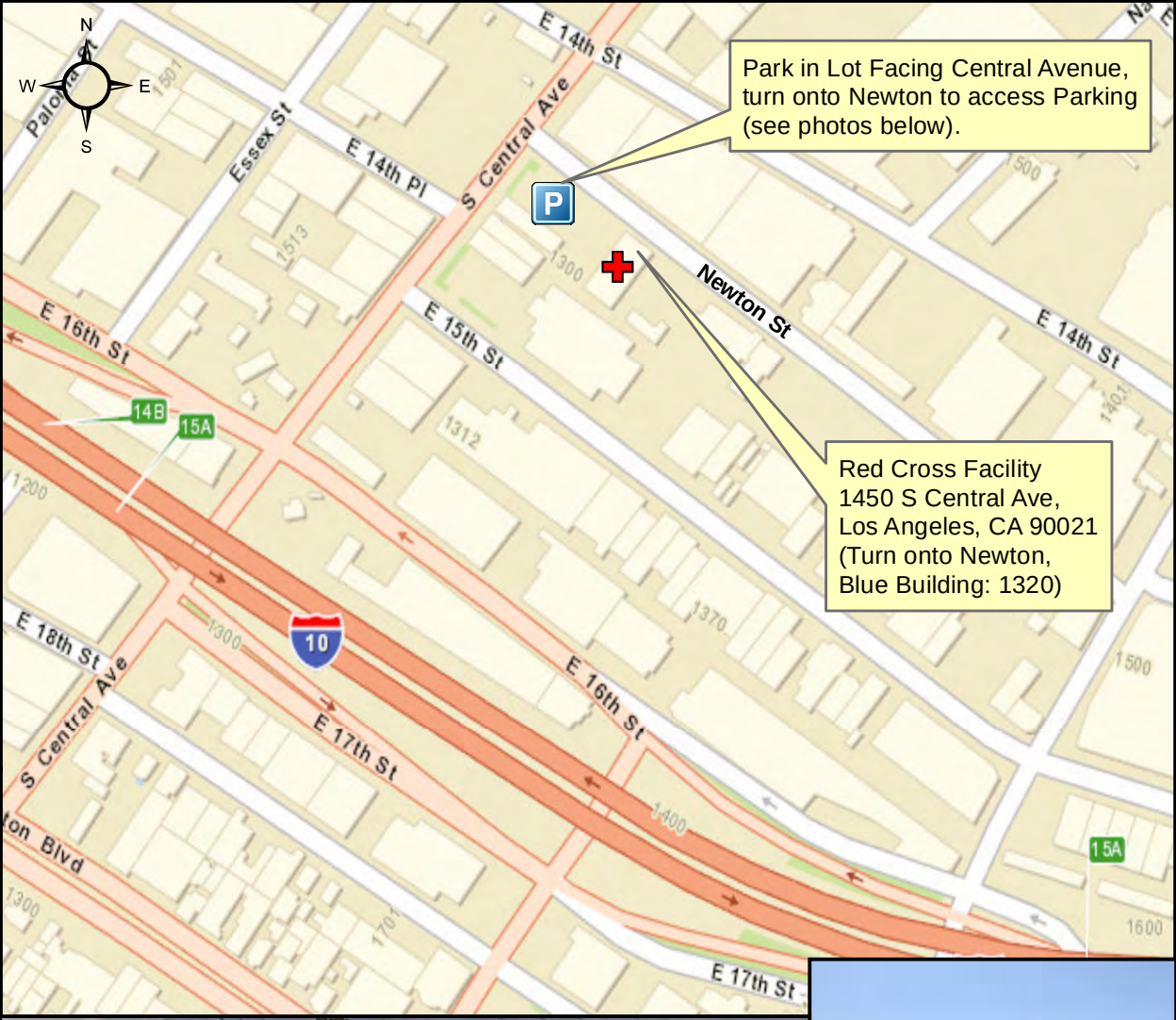
- ***Core Capabilities Exercise***

- ***Public Outreach Strategy***
  - Survey Update
  - First Public Outreach Meeting P-22 Day Festival 10/19 at Griffith Park
    - What went well?
    - What should we do differently next time?
  - Phase 1 outreach
    - Website
    - Survey
    - 2nd Public Meeting-When, Where?

- ***Action Items and Next Steps***

- ***Adjourn***

  - Next Meeting: December 12, 2019 9:30 a.m. – 11:30 a.m. location TBD



ENGINEERING
CITY OF LOS ANGELES

Data Source: Red Cross 2019
Map Source: ESRI 2019

Feet
0 200 400

City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #5
Thursday, November 14, 2019, 9:30 a.m. to 11:40 a.m. PT

Meeting Participants

All Steering Committee members are listed but only the numbered members attended the meeting.			
1.	Government	Affeldt, Michael	Director, LA RiverWorks – Mayor's Office
	Government	Allen, Randy (temp)	Port of Los Angeles
2.	Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
3.	Government	Campos, John	*Alternate*, Los Angeles Police Department
4.	Government (NV)	Galassi, Romano	*Alternate*-Bureau of Engineering
5.	Government	Gross, Aaron Chair	Chief Resiliency Officer-Mayor's Ofc.
	Government	Hammett, Mike	Los Angeles Police Department
6.	Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
	Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
7.	Government (NV)	Hu, JianPing (P)	*Alternate*- Department of Water and Power
	Government	Huynh, Charmie	Department of Building and Safety
8.	Government	Ignatczyk, John (P)	City of Los Angeles Fire Department
	Government	Kharaghani, Shahram	City of Los Angeles Sanitation
	Government	Le, Tuyen	*Alternate*-Bureau of Engineering
9.	Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
	Government	McDowell, Jennifer	*Alternate*- Mayor's Office- LA RiverWorks
	Government	Maesami, Ida	Los Angeles Sanitation & Environment
	Government	Mik, Lena	*Alternate*-Department of City Planning
	Government	Munongo, Patrick	*Alternate*- Emergency Management Department
	Government	Natoli, Gina Vice-Chair	LA County Regional Planning
	Government (NV)	Nemick, Mary	City of Los Angeles Bureau of Engineering
10.	Government	Nepomuceno-Juacalla, Carolynn (P)	*Alternate*-Department of Building and Safety
	Government	Pallini-Tipton, Conni	Department of City Planning
	Government	Perez, Michael	*Alternate*- Department of Building and Safety
11.	Government	Phinouwong, Nina	*Alternate*-Department of City Planning
	Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
	Government	Plumb, Cliff	Department of Water and Power
12.	Government	Reed, Lynette	*Alternate*-Port of Los Angeles
	Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
	Government	Scaduto, Michael	*Alternate*- City of Los Angeles Sanitation
	Government	Shu, Susan	City of Los Angeles Bureau of Engineering
13.	Government	Tan, Emmanuel (P)	Department of Water and Power
	Government	Wall, Brian (P)	City of Los Angeles Fire Department
1.	Non-Government	Alexander, Desmian	USC Public Policy
2.	Non-Government	Asuncion, Kendal (P)	Los Angeles Chamber of Commerce
3.	Non-Government	Baldauf, Brian (P)	*Alternate*- Mountain Recreation & Conservation Authority
	Non-Government	Demesa, Ed	U.S. Army Corps of Engineers

4. Non-Government	Ellis, Andre (P)	CSULA Geosciences & Environment
Non-Government	Garcia-Ruiz, Joselito	*Alternate*- Red Cross of Greater Los Angeles
Non-Government	Gonez, Manny	Friends of the Los Angeles River
5. Non-Government	Greenspan, Mike (P)	Resident
6. Non-Government	Griego, Liliana	*Alternate*-Friends of the Los Angeles River
7. Non-Government	McOmber, Britta (P)	UCLA Luskin School of Public Affairs
Non-Government	Miranda, Solomon	CA Department of Water Resources
Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
8. Non-Government	Robinson, Alex	USC Landscape Architecture
9. Non-Government	Tran, Larry (P)	*Alternate*- Los Angeles County Flood Control District
10. Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
Non-Government	Wood, Patricia	Los Angeles County Flood Control District
1. Team Support	Artz, Ira	Tetra Tech, Inc.
2. Team Support	Flaner, Rob	Tetra Tech, Inc.
3. Team Support	Hernandez, Lorena (P)	KPA
Team Support	Herrera, Thelma	KPA
4. Team Support	Padilla, Katherine (P)	KPA
5. Team Support	Parker, Steve	Tetra Tech, Inc.
6. Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.
Team Support	Subbio, Tony	Tetra Tech, Inc.
Team Support	Suh, Cindy	KPA

(NV) = non-voting member, or member with duplicate organizational attendance this month
(P) = attendance by phone

<u>Planning Process</u>

Welcome and Introductions
Nina Phinouwong welcomed attendees, and everyone introduced themselves. Craig Lapuley, a City of LA disaster consultant, also attended and was introduced by Aaron Gross.

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.

Approve SC Meeting #4 Summary
Rob Flaner asked the SC if they had any edits to the October 10, 2019 meeting summary. No edits were requested.

> *MOTION by Scott Underwood to approve the October 10, 2019 meeting summary and second by Mike Greenspan. Motion carried 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

Public Outreach Strategy
Rob Flaner explained that the general building stock (GBS) data will be provided to the SC to review for the next meeting.

The SC discussed the first public outreach event held the City's P-22 Day on October 19, 2019 at Griffith Park. The SC discussed where and when the next public outreach event should be held. There was consensus to wait until January due to the current wildfire events and upcoming holidays.

The SC also discussed possible locations for the second public outreach meeting. Katherine Padilla suggested holding it Jan 7, 8, or 9, 2020 at Griffith Park. She will organize a potential venue in coordination with Bureau of Engineering Public Relations and report back to the SC. There is also the potential to piggy back on local debris flow risk awareness neighborhood meetings. As more information about the timing of these events comes to light, this will be looked at also as a public outreach opportunity.

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 the City of Los Angeles. 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 an opportunity to participate.

Action Items and Next Steps
- Tetra Tech to provide the SC with a survey monkey link so those on the phone can participate in the Core Capability Exercise.
- Tetra Tech will provide results of the Core Capability Exercise once all SC members have had the opportunity to participate.
- Katherine Padilla to arrange date and location of second Public Outreach Meeting.
- Tetra Tech to provide the minutes of this meeting for SC review prior to the next meeting.

Adjourn
Next Meeting: January 9, 2019 9:30 a.m. – 11:30 a.m. at American Red Cross.

MOTION by Romano Galassi and second by Michael Affeldt to adjourn. Motion carried unanimously.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #6
Thursday, January 9, 2020
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

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
    - 3rd 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 11, 2020 9:30 a.m. – 11:30 a.m. location TBD

City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #6
Thursday, January 9, 2020, 9:30 a.m. to 11:40 a.m. PST

Meeting Participants

All Steering Committee members are listed but are faded-out if not in attendance; voting representatives in attendance are numbered		
1. Government	Affeldt, Michael	Mayor's Office - LA River Works
Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
2. Government	Burton, Anna	Port of Los Angeles
3. Government	Campos, John (P)	*Alternate*, Los Angeles Police Department
Government	Galassi, Romano	*Alternate*-Bureau of Engineering
Government	Gross, Aaron Chair	Chief Resiliency Officer-Mayor's Ofc.
Government	Hammett, Mike	Los Angeles Police Department
4. Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
Government (NV)	Hu, JianPing (P)	*Alternate*- Department of Water and Power
Government	Huynh, Charmie	Department of Building and Safety
5. Government	Ignatczyk, John (P)	City of Los Angeles Fire Department
Government	Kharaghani, Shahram	City of Los Angeles Sanitation
Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Lam, Raymond	*Alternate*- Bureau of Engineering
6. Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
Government	Maesami, Ida	Los Angeles Sanitation & Environment
Government	McDowell, Jennifer	*Alternate*- Mayor's Office- LA RiverWorks
Government	Mik, Lena	*Alternate*-Department of City Planning
7. Government	Munongo, Patrick	*Alternate*- Emergency Management Department
Government	Natoli, Gina	LA County Regional Planning
Government	Nemick, Mary	City of Los Angeles Bureau of Engineering
Government	Nepomuceno-Juacalla, Carolynn (P)	*Alternate*-Department of Building and Safety
8. Government	Nguyen, Celeste (P)	*Alternate*-Department of Building and Safety
9. Government	Pallini-Tipton, Conni Vice-Chair	Department of City Planning
Government	Perez, Michael	*Alternate*- Department of Building and Safety
Government	Phinouwong, Nina	*Alternate*-Department of City Planning
Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
Government	Plumb, Cliff (P)	*Alternate*-Department of Water and Power
Government	Reed, Lynette	*Alternate*-Port of Los Angeles
Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
Government	Scaduto, Michael	*Alternate*- City of Los Angeles Sanitation
Government	Shu, Susan	City of Los Angeles Bureau of Engineering
10. Government	Tan, Emmanuel (P)	Department of Water and Power
Government	Wall, Brian (P)	City of Los Angeles Fire Department
1. Non-Government	Alexander, Desmian	USC Public Policy
Non-Government	Asuncion, Kendal (P)	Los Angeles Chamber of Commerce

Non-Government	Baldauf, Brian (P)	*Alternate*- Mountain Recreation & Conservation Authority
Non-Government	Demesa, Ed	U.S. Army Corps of Engineers
1. Non-Government	Ellis, Andre (P)	CSULA Geosciences & Environment
2. Non-Government	Garcia-Ruiz, Joselito	Red Cross of Greater Los Angeles
3. Non-Government	Greenspan, Mike (P)	Resident
Non-Government	Griego, Liliana	Friends of the Los Angeles River
Non-Government	McOmber, Britta (P)	UCLA Luskin School of Public Affairs
4. Non-Government	Miranda, Solomon (P)	CA Department of Water Resources
5. Non-Government	Oliver, Susan	*Alternate*-Friends of the Los Angeles River
Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
Non-Government	Robinson, Alex	USC Landscape Architecture
6. Non-Government	Tran, Larry (P)	*Alternate*- Los Angeles County Flood Control District
Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
Non-Government	Wood, Patricia	Los Angeles County Flood Control District
1. Team Support	Artz, Ira	Tetra Tech, Inc.
2. Team Support	Flaner, Rob	Tetra Tech, Inc.
3. Team Support	Hernandez, Lorena (P)	KPA
Team Support	Herrera, Thelma	KPA
Team Support	Padilla, Katherine	KPA
4. Team Support	Parker, Steve (P)	Tetra Tech, Inc.
5. Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.
Team Support	Subbio, Tony	Tetra Tech, Inc.
Team Support	Suh, Cindy	KPA

(NV) = non-voting member
Members with duplicate organizational attendance are not counted as voting representatives
(P) = attendance by phone

<u>Planning Process</u>

Welcome and Introductions
Conni Pallini-Tipton 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.

Approve SC Meeting #5 Summary
Rob Flaner asked the SC if they had any edits to the November 14, 2019 meeting summary. No edits were requested.

MOTION by Conni Pallini-Tipton to approve the November 14, 2019 meeting summary and second by Alen Pijuan. Motion carried 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 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 data was segregated into the BRIC lifeline categories. The results for the GBS will be presented at the next meeting. Rob explained that this is the first time the City has done an RLAA. He explained how the data was retrieved from FEMA and why the 2018 data is used instead of the 2019 data. Rob also explained how important the analysis will be to the City as it looks at where the buildings are and to see their proximity to the potential impact areas. The areas should be delineated and mapped out by the next meeting.

Core Capability Exercise
Rob Flaner discussed the importance of the exercise is in informing the City on their strengths and gaps and discussed the exercise results. Rob explained how the "strengths" need to be leveraged to address the "gaps." The "reds" should be addressed for the next 5-year period at the next meeting.

Public Outreach Strategy
Lorena of KPA and Rob reminded all attendees of the public outreach meeting scheduled for that evening from 6:00-8:00pm at the Studio City Library and Channel 35 may also be in attendance. Also, Rob mentioned that more responses are needed for the survey and everyone discussed how to obtain more responses for the surveys. At the next meeting, the committee will determine if and when there will be a third public meeting.

Plan Update
Rob Flaner asked the SC members to review the draft Chapter 4 section and provide their comments.

Action Items and Next Steps
- Melissa Schloss to send the SC the draft Agency Contact List for their final review.
- SC to review and provide comments of Chapter 4 to Tetra Tech.
- SC to attend the Public Outreach event if they are available to do so.

Adjourn
Rob notified attendees that the next meeting will likely be our last.

Next Meeting: February 13, 2019 9:30 a.m. – 11:30 a.m. at American Red Cross.

MOTION by Conni Pallini-Tipton and second by Michael Affeldt to adjourn. Motion carried unanimously.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #7
Thursday, February 13, 2020
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Previous Meeting Summary
- Approve SC meeting #6 summary
- Receive Public Comment

New Business

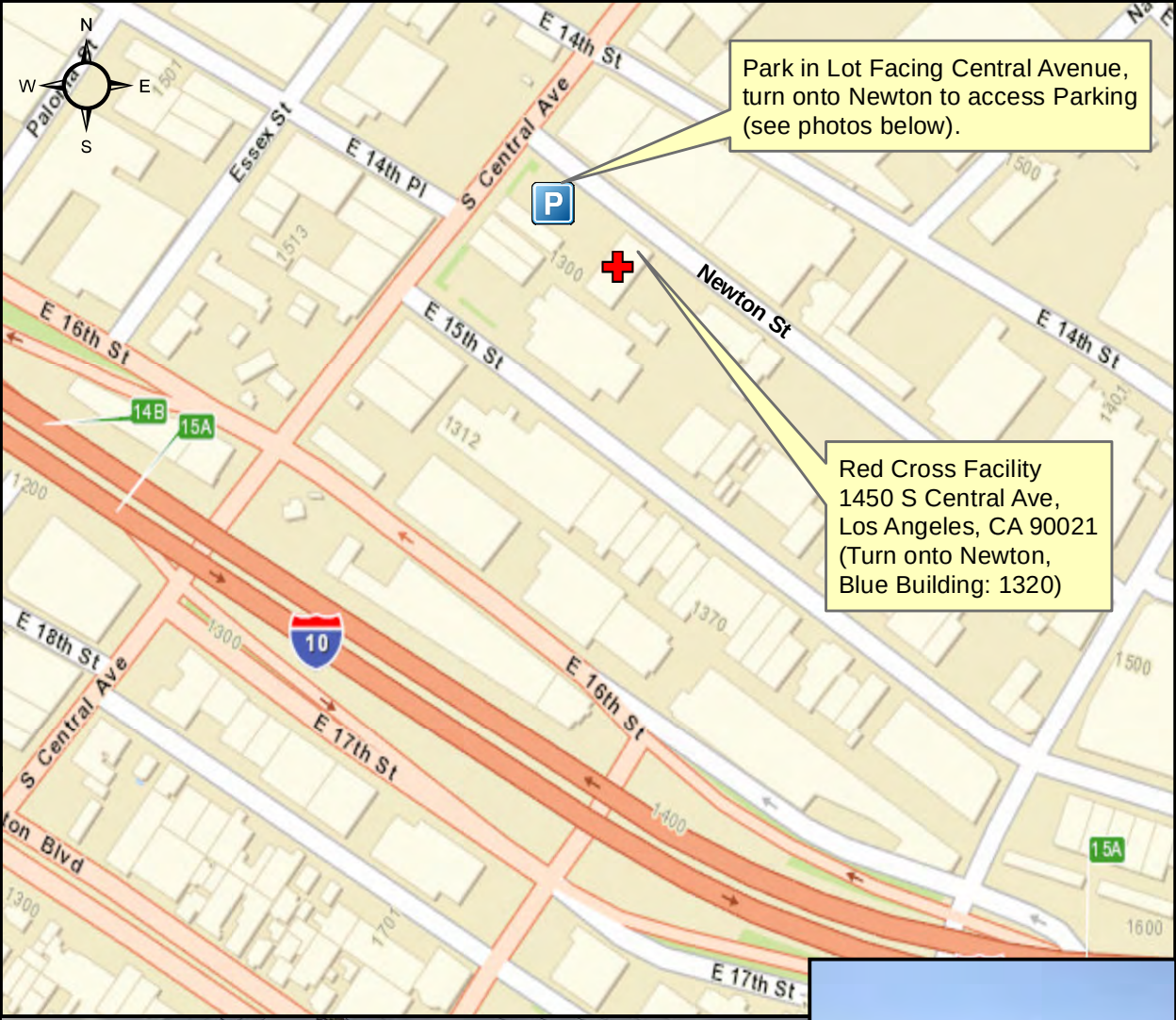
- ***Risk Assessment Update***
  - Repetitive Loss Area Analysis (RLAA)
  - General Building Stock (GBS) HAZUS
  - Critical Facilities Analysis

- ***Public Outreach Strategy***
  - Phase 1 outreach
    - Survey

- ***Plan Update***
  - Draft FMP Report
  - Prior Action Review-Progress Report

- ***Action Items and Next Steps***

- ***Adjourn***
  - Next Meeting: March 12, 2020 9:30 a.m. – 11:30 a.m. at American Red Cross.



ENGINEERING
CITY OF LOS ANGELES

Data Source: Red Cross 2019
Map Source: ESRI 2019

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City of Los Angeles Bureau of Engineering
2020 Floodplain Management Plan Revision
Steering Committee Meeting #7
Thursday, February 13, 2020, 9:30 a.m. to 11:30 a.m. PST

Meeting Participants

All Steering Committee members are listed but are faded-out if not in attendance; voting representatives in attendance are numbered		
1. Government	Affeldt, Michael (P)	Mayor's Office - LA River Works
Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
2. Government	Burton, Anna (P)	Port of Los Angeles
3. Government	Campos, John (P)	*Alternate*, Los Angeles Police Department
Government	Galassi, Romano	*Alternate*-Bureau of Engineering
Government	Gross, Aaron Chair	Chief Resiliency Officer-Mayor's Ofc.
Government	Hammett, Mike	Los Angeles Police Department
Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
Government	Hu, JianPing	*Alternate*- Department of Water and Power
Government	Huynh, Charmie	Department of Building and Safety
Government	Ignatczyk, John	City of Los Angeles Fire Department
Government	Kharaghani, Shahram	City of Los Angeles Sanitation
Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Lam, Raymond	*Alternate*- Bureau of Engineering
Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
Government	Maesami, Ida	Los Angeles Sanitation & Environment
Government	McDowell, Jennifer	*Alternate*- Mayor's Office- LA RiverWorks
Government	Mik, Lena	*Alternate*-Department of City Planning
Government	Munongo, Patrick	*Alternate*- Emergency Management Department
Government	Natoli, Gina	LA County Regional Planning
Government	Nemick, Mary	City of Los Angeles Bureau of Engineering
Government	Nepomuceno-Juacalla, Carolynn	*Alternate*-Department of Building and Safety
4. Government	Nguyen, Celeste (P)	*Alternate*-Department of Building and Safety
5. Government	Pallini-Tipton, Conni Vice-Chair	Department of City Planning
Government	Perez, Michael	*Alternate*- Department of Building and Safety
Government	Phinouwong, Nina	*Alternate*-Department of City Planning
Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
6. Government	Plumb, Cliff	*Alternate*-Department of Water and Power
7. Government	Reed, Lynette	*Alternate*-Port of Los Angeles
Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
Government	Scaduto, Michael	*Alternate*- City of Los Angeles Sanitation
8. Government	Shu, Susan	City of Los Angeles Bureau of Engineering
Government	Tan, Emmanuel	Department of Water and Power
Government	Wall, Brian	City of Los Angeles Fire Department
1. Non-Government	Alexander, Desmian	USC Public Policy
2. Non-Government	Asuncion, Kendal (P)	Los Angeles Chamber of Commerce

Non-Government	Baldauf, Brian	*Alternate*- Mountain Recreation & Conservation Authority
Non-Government	Demesa, Ed	U.S. Army Corps of Engineers
Non-Government	Ellis, Andre	CSULA Geosciences & Environment
3. Non-Government	Garcia-Ruiz, Joselito	Red Cross of Greater Los Angeles
4. Non-Government	Greenspan, Mike (P)	Resident
Non-Government	Griego, Liliana	Friends of the Los Angeles River
5. Non-Government	McOmber, Britta (P)	UCLA Luskin School of Public Affairs
6. Non-Government	Miranda, Solomon (P)	CA Department of Water Resources
7. Non-Government	Oliver, Susan	*Alternate*-Friends of the Los Angeles River
Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
8. Non-Government	Robinson, Alex	USC Landscape Architecture
9. Non-Government	Tran, Larry (P)	*Alternate*- Los Angeles County Flood Control District
Non-Government	Underwood, Scott	Red Cross of Greater Los Angeles
Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
Non-Government	Wood, Patricia	Los Angeles County Flood Control District
1. Team Support	Artz, Ira	Tetra Tech, Inc.
2. Team Support	Flaner, Rob	Tetra Tech, Inc.
Team Support	Hernandez, Lorena	KPA
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3. Team Support	Padilla, Katherine (P)	KPA
4. Team Support	Parker, Steve	Tetra Tech, Inc.
5. Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.
Team Support	Subbio, Tony	Tetra Tech, Inc.
Team Support	Suh, Cindy	KPA

(NV) = non-voting member
Members with duplicate organizational attendance are not counted as voting representatives
(P) = attendance by phone

<u>Planning Process</u>

Welcome and Introductions
Conni Pallini-Tipton 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.

<u>Old Business</u>

Approve SC Meeting #6 Summary
Rob Flaner asked the SC if they had any edits to the January 9, 2020 meeting summary. It was requested that the heading of Old Business be added before the Approve SC Meeting Summary section.

MOTION by Cliff Plumb to approve the January 9, 2020 meeting summary and second by Conni Pallini-Tipton. Motion carried 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 comments were expressed.

New Business

Risk Assessment Update
Rob Flaner explained that the RLAA is a simultaneous project to the FMP and it is segregated by planning areas that the City already uses. This includes structure value, economic value output, debris estimation, displaced households, short term shelter needs, etc. Rob explained that this data will support properties at risk and will in turn inform the actions of the plan.

General Building Stock (GBS) HAZUS
Rob Flaner reviewed the Loss Matrix results, which included the estimated building exposure and the 10-year flood impact on people, property and the economy of the City of Los Angeles. It was only finalized immediately prior to the meeting and will be sent to the Steering Committee.

Critical Facilities Analysis
Rob noted that all the buildings have been plotted and the majority of them are not within a floodplain. The Analysis will review buildings within the 100-year flood as well as look at functional downtime. These models make estimates based upon use and time it will take to restore to 100% functionality.

Public Outreach Strategy
Rob noted that as of today, 163 surveys have been completed. 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.

The SC discussed the survey outreach push that was made with City of LA Department PIOs. Mike Affeldt of the Mayor's office noted he will send an email blast to ask City employees to take the survey if they have not already. There was discussion about possibly adding the survey link to the RLAA mailer as well as sending out with DWP bills to the public.

The SC discussed where and when to hold the next public outreach meeting. The SC decided Atwater Village would be a good location and an additional public meeting to coincide with Earth Day.

Plan Update
Rob Flaner asked the SC members to review the 2018 Annual Report handout and provide action item suggestions based on each members' individual expertise.

Prior Action Review- Progress Report
Rob asked the SC members to review the 2018 Annual report and provide comments/revisions on the actions, the responsible lead agency and secondary agency updates, to Chang-Shien Lin and Romano Galassi by Friday, February 28, 2020.

Tentative Draft Release Timeline for 2020 FMP
Draft to be release for public review by Friday, April 3
Public Comment Period to be 3 weeks + 1 day (Same as LA County)
Third public meeting to be scheduled within the first 2 weeks of April
Fourth public meeting to be on Earth Day, April 25th

Action Items and Next Steps

- TetraTech to send the SC the draft Agency Contact List for their final review.
- TetraTech to send the SC the Loss Matrix.
- Michael Affeldt to resend survey to City employees.
- SC to review and provide action item suggestions based on the 2018 Annual Report to Steve Parker, Tetra Tech.
- SC to provide action item updates from the 2018 Progress Report to Chang-Shien Lin and Romano Galassi by Friday, February 28, 2020.

Adjourn
Rob notified attendees that the next meeting will likely be our last.

MOTION by Cliff Plumb and second by Romano Galassi to adjourn. Motion carried unanimously.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #8
Thursday, March 12, 2020
9:30 a.m. – 11:30 a.m. PT
Red Cross Building (see map)
1450 S Central Ave, Los Angeles, CA 90021

Call-in Number: 1-800-523-8437 Conference ID: 6893848651

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Previous Meeting Summary
- Receive Public Comment

Old Business

- Approve SC meeting #7 summary

New Business

- ***Risk Assessment Update***
    - Repetitive Loss Area Analysis (RLAA)
    - General Building Stock (GBS) HAZUS
    - Critical Facilities Analysis
    - Loss Matrix

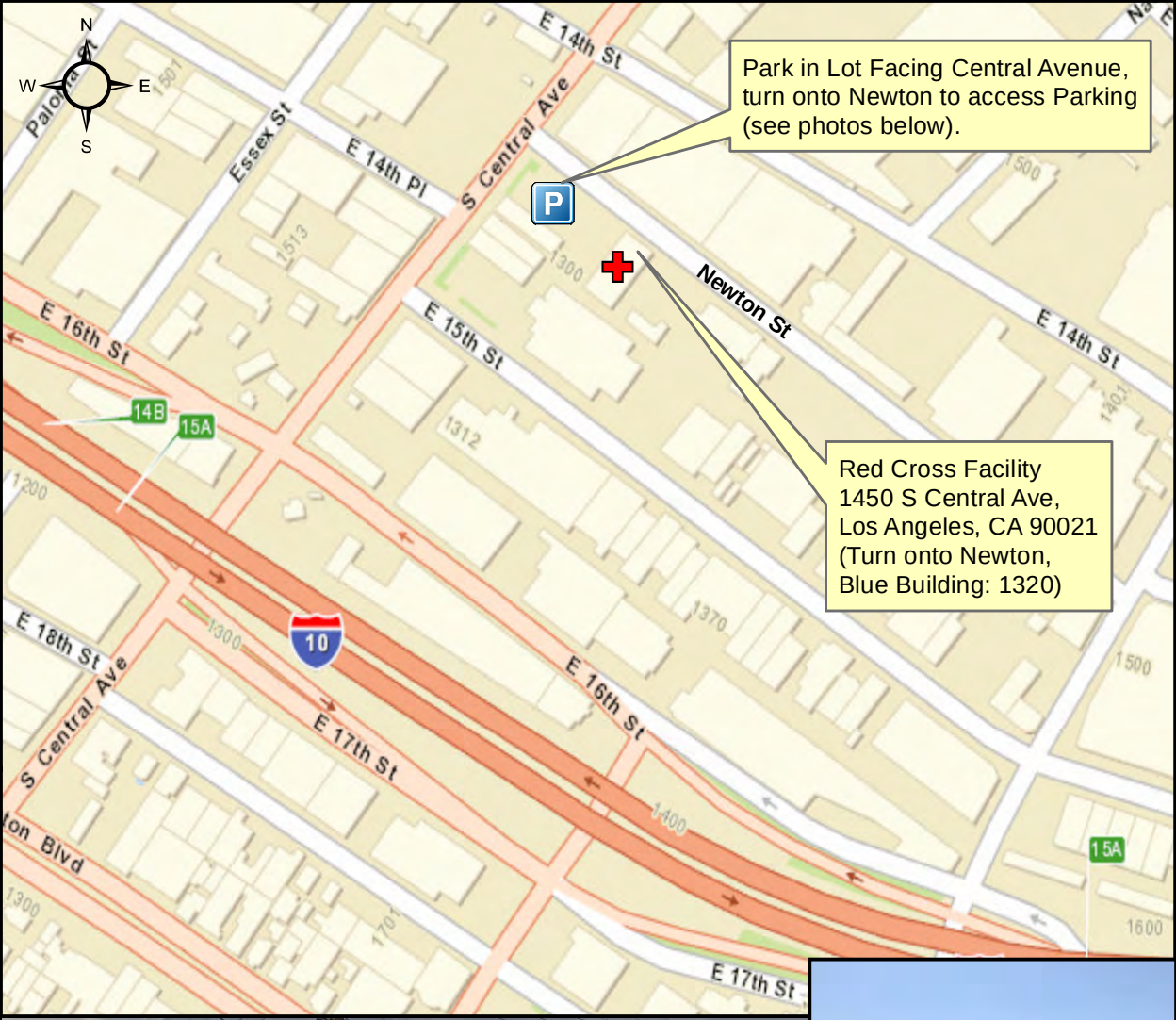
- ***Public Outreach Strategy***
    - Phase 1 outreach
        - Survey combined with County
    - Phase 2 outreach (During Public Comment/Review)
        - Atwater Village
        - Earth Day event

- ***Plan Update***
    - Draft FMP Report
    - Action Item Suggestions

- ***Action Items and Next Steps***

- ***Adjourn***

    - Next Meeting: This is likely the last SC meeting.



ENGINEERING
CITY OF LOS ANGELES

Data Source: Red Cross 2019
Map Source: ESRI 2019

Feet
0 200 400

City of Los Angeles Bureau of Engineering

2020 Floodplain Management Plan Revision

Steering Committee Meeting #8

Thursday, March 12, 2020, 9:30 a.m. to 11:30 a.m. PST

Meeting Participants

All Steering Committee members are listed but are faded-out if not in attendance; voting representatives in attendance are numbered		
1. Government	Affeldt, Michael (P)	Mayor's Office - LA River Works
Government (NV)	Bulkacz, Vanessa (P)	Public Affairs, Department of Public Works
Government	Burton, Anna (P)	Port of Los Angeles
2. Government	Campos, John	*Alternate*, Los Angeles Police Department
Government	Galassi, Romano	*Alternate*-Bureau of Engineering
3. Government	Gross, Aaron Chair	Chief Resiliency Officer-Mayor's Ofc.
Government	Hammett, Mike	Los Angeles Police Department
Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
Government	Hu, JianPing (P)	*Alternate*- Department of Water and Power
4. Government	Ignatczyk, John (P)	City of Los Angeles Fire Department
Government	Kharaghani, Shahram	City of Los Angeles Sanitation
Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Lam, Raymond	*Alternate*- Bureau of Engineering
Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
Government	Maesami, Ida	Los Angeles Sanitation & Environment
Government	McDowell, Jennifer (P)	*Alternate*- Mayor's Office- LA RiverWorks
Government	Mik, Lena	*Alternate*-Department of City Planning
Government	Munongo, Patrick	*Alternate*- Emergency Management Department
Government	Natoli, Gina	LA County Regional Planning
Government	Nemick, Mary	City of Los Angeles Bureau of Engineering
Government	Nepomuceno-Juacalla, Carolynn	*Alternate*-Department of Building and Safety
5. Government	Nguyen, Celeste (P)	*Alternate*-Department of Building and Safety
6. Government	Pallini-Tipton, Conni Vice-Chair (P)	Department of City Planning
Government	Perez, Michael	*Alternate*- Department of Building and Safety
Government	Phinouwong, Nina	*Alternate*-Department of City Planning
Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
Government	Plumb, Cliff (P)	*Alternate*-Department of Water and Power
Government	Reed, Lynette (P)	Alternate-Port of Los Angeles
Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
Government	Scaduto, Michael	*Alternate*- City of Los Angeles Sanitation
7. Government	Shu, Susan	City of Los Angeles Bureau of Engineering
8. Government	Tan, Emmanuel (P)	Department of Water and Power
Government	Wall, Brian	City of Los Angeles Fire Department
Government	Wubishet, Yidmekachew (P)	Department of Water and Power
Non-Government	Alexander, Desmian	USC Public Policy
Non-Government	Asuncion, Kendal	Los Angeles Chamber of Commerce

	Non-Government	Baldauf, Brian	*Alternate*- Mountain Recreation & Conservation Authority
	Non-Government	Demesa, Ed	U.S. Army Corps of Engineers
1.	Non-Government	Ellis, Andre (P)	CSULA Geosciences & Environment
2.	Non-Government	Garcia-Ruiz, Joselito	Red Cross of Greater Los Angeles
	Non-Government	Greenspan, Mike (P)	Resident
	Non-Government	Griego, Liliana	Friends of the Los Angeles River
	Non-Government	McOmber, Britta	UCLA Luskin School of Public Affairs
3.	Non-Government	Miranda, Solomon (P)	CA Department of Water Resources
4.	Non-Government	Oliver, Susan	*Alternate*-Friends of the Los Angeles River
	Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
5.	Non-Government	Robinson, Alex (P)	USC Landscape Architecture
	Non-Government	Tran, Larry (P)	Alternate- Los Angeles County Flood Control District
	Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
6.	Non-Government	Wood, Patricia (P)	Los Angeles County Flood Control District
1.	Team Support	Artz, Ira	Tetra Tech, Inc.
2.	Team Support	Flaner, Rob	Tetra Tech, Inc.
	Team Support	Hernandez, Lorena	KPA
	Team Support	Herrera, Thelma	KPA
3.	Team Support	Padilla, Katherine (P)	KPA
4.	Team Support	Parker, Steve	Tetra Tech, Inc.
5.	Team Support	Schloss, Melissa (P)	Tetra Tech, Inc.
	Team Support	Subbio, Tony	Tetra Tech, Inc.
	Team Support	Suh, Cindy	KPA

(NV) = non-voting member
Members with duplicate organizational attendance are not counted as voting representatives
(P) = attendance by phone

Planning Process

Welcome and Introductions
Conni Pallini-Tipton 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.

Old Business

Approve SC Meeting #7 Summary
Rob Flaner asked the SC if they had any edits to the February 13, 2020 meeting summary. No edits were requested.

MOTION by Aaron Gross to approve the February 13, 2020 meeting summary and second by Romano Galassi. Motion carried 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 comments were expressed.

New Business
Risk Assessment Update

HAZUS Risk Analysis
Rob Flaner reviewed the loss matrix handout and explained that the risk assessment table has been updated and includes the 10-, 50-, 100- and 500-year flood results. Rob explained the difference between the values exposed v. the value of the planning area and noted we are using data from the 2018 American Community Survey for population data.

Rob noted the data has 39,000 data attributes. Not all of this will be used in the plan but the City will be given all of the data and can decide what they'd like to do with it. Rob recommended potential uses for the data that could count as an action for risk communication.

Critical Facilities Analysis
Rob explained to the steering committee that since FEMA still uses the old definition of Critical Facilities, requiring our GIS to have to be cross-walked with our new definition, occupancy class, lifeline construct. Rob noted the results should be ready within the next 2 weeks or so.

Public Outreach Strategy
Rob reminded the steering committee of the survey data sharing plan with Los Angeles County. He noted that the County has no new surveys since the February meeting, but the City is now up to 200 surveys. He noted that adding the Spanish survey version has helped increase the completed survey numbers.

Rob announced that the April 8, 2020 Atwater Village public meeting is cancelled due to COVID-19 virus CDC social distancing recommendations.

Vanessa Bulkacz and Lorena Hernandez announced that the Earth Day event has also been cancelled due to the COVID-19 virus. Lorena informed the steering committee that they are exploring other web-based and interactive public meeting options.

Rob noted that he spoke with the new ISO, Jonathan Smith about holding a virtual meeting due to the current pandemic circumstances but has not yet received the OK. Rob will follow up with him next week.

Plan Update
Rob Flaner reminded the SC members that the last thing they need to do as a committee is review the FMP draft and advise the City of any constructive edits.

Prior Action Review-Progress Report

Rob reminded the SC members of their previous meeting's homework to review the 2018 Annual report action items and provide comments/revisions on the actions, the responsible lead agency, and secondary agency updates. The SC members verbally provided their edits to Chang-Shien Lin and Romano Galassi and will send others via email to them as well. Once the updates are made, Chang and Romano will send the updated document to Rob for plan incorporation.

The SC decided to convene again virtually April 9, 2020 and conduct a virtual meeting test run the week before. Lorena Hernandez will coordinate the virtual meeting platform.

Action Items and Next Steps

- SC to provide action item updates from the 2018 Progress Report to Chang-Shien Lin and Romano Galassi by Friday, March 20.
- Lorena Hernandez to coordinate the April 9, 2020 virtual meeting platform.
- Rob Flaner to follow up with ISO regarding holding a virtual public meeting.
- Tetra Tech will provide a draft FMP to City staff for review on April 17, 2020.
- Public review period for the draft FMP will start on April 20, 2020 with 3 weeks of public review period. Public comments to be finalized by May 11, 2020.

Adjourn

Rob notified attendees that the next meeting will likely be our last.

MOTION by Romano Galassi and second by Chang-Shien Lin to adjourn. Motion carried unanimously.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #9
Thursday, April 9, 2020
9:30 a.m. – 11:30 a.m. PT
Location: Via Zoom Webinar

Zoom Link: https://zoom.us/j/301626612?pwd=T1EvTEJpR1haeGZHc3ZsVWFBRkNuZz09
Meeting ID: 301 626 612
Password: 916281
Instructions: See next page

Steering Committee Chair: Aaron Gross, Chief Resiliency Officer of the City of Los Angeles
Steering Committee Vice-Chair: Conni Pallini of The Department of City Planning
City Project Manager: Chang Lin, Bureau of Engineering, Department of Public Works
Consultant Technical Lead: Rob Flaner, Tetra Tech Inc.

Planning Process

- Welcome and Introductions
- Review Previous Meeting Summary
- Receive Public Comment

Remaining FMP Schedule:

- 4/30/20-5/15/20: SC comment Period
- 5/18/20-6/8/20: Public Comment Period
- 5/18/20: Narrated PPT Posted
- 6/2/20: Virtual Public Meeting

Old Business

- Approve SC meeting #8 summary

New Business

- ***Risk Assessment Update***
  - Repetitive Loss Area Analysis (RLAA)
  - Critical Facilities Analysis
- ***Confirm Plan Maintenance Strategy***
  - What is required?
  - What is the SC Role?
  - What was in the plan last time?
- ***Public Outreach Strategy***
  - Phase 1 outreach
    - Survey combined with County
  - Phase 2 outreach (During Public Comment/Review)
    - Virtual Meeting
      - Platform
      - Date and Time
- ***Plan Update***
  - Draft FMP Report- Timeline for review
  - Review proposed Action Plan
  - Action Item Suggestions
- ***Action Items and Next Steps***
- ***Adjourn***
  - Next Meeting: This is likely the last SC meeting.

City of Los Angeles
Floodplain Management Plan Revision
Steering Committee (SC) Meeting #9
Thursday, April 9, 2020
9:30 a.m. – 11:30 a.m. PT
Location: Via Zoom Webinar

Zoom Meeting Instructions

Meeting ID: 301 626 612
Password: 916281

Join Zoom Meeting:
https://zoom.us/j/301626612?pwd=T1EvTEJpR1haeGZHc3ZsVWFBRkNuZz09

Dial by your location (if you choose not to use computer audio):
+1 669 900 9128 US (San Jose)
+1 346 248 7799 US (Houston)

MEETING PROTOCOLS

PRESENTERS:
1) Have the documents you want to present already open on your computer to avoid time lag when sharing your screen with the viewers

CALLERS:

1. Click on the link provided above to enter the meeting. The link will connect you to the Zoom virtual meeting. You can also use the Zoom app, simply enter the Meeting ID and Password to join.
2. If you are joining via phone you will have to enter the Meeting ID and Password. Please state your name when joining the call.
3. Please mute your line as you enter to eliminate background noise. Keep it mute when you are not speaking. You may ask questions in chat or 'raise hand' if you don't need to speak immediately.
4. Before you speak please state your name.
5. The meeting will be recorded.

PHONE vs. PC

1. Using a phone may be taxing on its CPU, a PC/Mac is a more powerful device. Video is not needed for the call and you can select voice only. Having said that, video makes it easier to see who is speaking, eliminating some of the confusion that occurs in audio-only conferences.
2. The phone screen size is small. If you are trying to view the handouts or look at material on the screen, it will be limited. A PC/Mac would be better in this case.
3. To change the view of all the meeting attendees, click on the gallery view on the top, right corner.
4. Using a phone may use more data, but could be useful if your computer is slow or has limited internet connection bandwidth.
5. Zoom works best in a Chrome, Firefox and Safari browser.

City of Los Angeles Bureau of Engineering

2020 Floodplain Management Plan Revision

Steering Committee Meeting #9

Thursday, April 9, 2020, 9:30 a.m. to 11:30 a.m. PST

Meeting Participants – NOTE all participants were attending remotely for this meeting

All Steering Committee members are listed but are faded-out if not in attendance; voting representatives in attendance are numbered		
1. Government	Affeldt, Michael	Mayor's Office - LA River Works
Government (NV)	Bulkacz, Vanessa	Public Affairs, Department of Public Works
Government	Burton, Anna	Port of Los Angeles
Government	Campos, John	*Alternate*, Los Angeles Police Department
Government	Galassi, Romano	*Alternate*-Bureau of Engineering
2. Government	Gross, Aaron Chair	Chief Resiliency Officer-Mayor's Ofc.
Government	Hammett, Mike	Los Angeles Police Department
3. Government	Hernandez-Marcial, Orval	*Alternate*-City of LA Sanitation
Government	Hom, Japhet	*Alternate*- Los Angeles Police Department
Government	Hu, JianPing	*Alternate*- Department of Water and Power
4. Government	Ignatczyk, John	City of Los Angeles Fire Department
Government	Kharaghani, Shahram	City of Los Angeles Sanitation
Government	Le, Tuyen	*Alternate*-Bureau of Engineering
Government	Lam, Raymond	*Alternate*- Bureau of Engineering
Government	Lin, Chang-Shien	*Alternate*- Bureau of Engineering
Government	Maesami, Ida	Los Angeles Sanitation & Environment
Government	McDowell, Jennifer	*Alternate*- Mayor's Office- LA RiverWorks
Government	Mik, Lena	*Alternate*-Department of City Planning
Government	Munongo, Patrick	*Alternate*- Emergency Management Department
Government	Natoli, Gina	LA County Regional Planning
Government	Nemick, Mary	City of Los Angeles Bureau of Engineering
Government	Nepomuceno-Juacalla, Carolynn	*Alternate*-Department of Building and Safety
5. Government	Nguyen, Celeste	*Alternate*-Department of Building and Safety
6. Government	Pallini-Tipton, Conni Vice-Chair	Department of City Planning
Government	Perez, Michael	*Alternate*- Department of Building and Safety
Government	Phinouwong, Nina	*Alternate*-Department of City Planning
Government	Pijuan, Alen	City of Los Angeles Emergency Management Dept.
7. Government	Plumb, Cliff	*Alternate*-Department of Water and Power
8. Government	Reed, Lynette	Alternate-Port of Los Angeles
Government (NV)	Santo-Domingo, Cathie	Los Angeles Recreation and Parks
Government	Scaduto, Michael	*Alternate*- City of Los Angeles Sanitation
9. Government	Shu, Susan	City of Los Angeles Bureau of Engineering
Government	Tan, Emmanuel	Department of Water and Power
Government	Wall, Brian	City of Los Angeles Fire Department
Government	Wubishet, Yidmekachew	Department of Water and Power
Non-Government	Alexander, Desmian	USC Public Policy
1. Non-Government	Asuncion, Kendal	Los Angeles Chamber of Commerce

Non-Government	Baldauf, Brian	*Alternate*- Mountain Recreation & Conservation Authority
Non-Government	Demesa, Ed	U.S. Army Corps of Engineers
Non-Government	Ellis, Andre	CSULA Geosciences & Environment
Non-Government	Garcia-Ruiz, Joselito	Red Cross of Greater Los Angeles
2. Non-Government	Greenspan, Mike	Resident
Non-Government	Griego, Liliana	Friends of the Los Angeles River
3. Non-Government	McOmber, Britta	UCLA Luskin School of Public Affairs
4. Non-Government	Miranda, Solomon	CA Department of Water Resources
5. Non-Government	Oliver, Susan	*Alternate*-Friends of the Los Angeles River
6. Non-Government	Rascon, Sarah	Mountains Recreation & Conservation Authority
7. Non-Government	Robinson, Alex	USC Landscape Architecture
Non-Government	Tran, Larry	Alternate- Los Angeles County Flood Control District
Non-Government	Vivanti, John	*Alternate*- U.S. Army Corps of Engineers
8. Non-Government	Wood, Patricia	Los Angeles County Flood Control District
1. Team Support	Artz, Ira	Tetra Tech, Inc.
2. Team Support	Flaner, Rob	Tetra Tech, Inc.
3. Team Support	Hernandez, Lorena	KPA
4. Team Support	Herrera, Thelma	KPA
5. Team Support	Padilla, Katherine	KPA
6. Team Support	Parker, Steve	Tetra Tech, Inc.
7. Team Support	Schloss, Melissa	Tetra Tech, Inc.
Team Support	Subbio, Tony	Tetra Tech, Inc.
Team Support	Suh, Cindy	KPA

(NV) = non-voting member
Members with duplicate organizational attendance are not counted as voting representatives

Planning Process

Welcome and Introductions

Aaron Gross welcomed attendees, and everyone introduced themselves. Aaron thanked everyone for joining the FMP Steering Committee and for the work they're doing in response to the Corona Virus. Rob noted that this is the City's last SC meeting.

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.

Old Business

Approve SC Meeting #8 Summary

Rob Flaner asked the SC if they had any edits to the March 12, 2020 meeting summary. No edits were requested.

MOTION by Aaron Gross to approve the March 12, 2020 meeting summary and second by Conni Pallini-Tipton. Motion carried 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 comments were expressed.

New Business
Risk Assessment Update

Repetitive Loss Area Analysis
Rob noted that the RLAA data has been provided to the City and they are reviewing it. Rob explained there are approximately 600 properties, and all have addresses, parcel numbers and were provided in shape file format. Next step is to make a list and send out a standard letter that lets them know there is a RLAA component to the FMP.

Critical Facilities Analysis
Rob explained that the critical facilities analysis is the last component to the Risk Assessment section. Rob explained how it incorporates the lifelines construct and contains sensitive information so the results will be summarized in the Plan text.

Confirm Plan Maintenance Strategy

What is Required?
Rob reviewed the draft Plan Maintenance section provided to the SC and explained that it is the last section the SC needs to approve. Rob explained that it is obligated by what CRS requires, including an annual progress report. Rob noted there is an option to increase annual reporting to four times per year, but the CRS point increase may not be worth the extra work that is required.

What is the SC Role?
Rob explained that the SC members' role in the annual reporting requirement is to meet once annually to review and approve the annual report. He asked the committee members if anyone is not able to commit to that. Rob explained that this meeting can also be held virtually. Pat Wood noted she will participate in the annual reporting process as well as the next FMP update, but her alternate may change. Rob explained that if there is still a County representative it will still qualify.

Public Outreach Strategy
Rob reminded the SC members that the City and County surveys were combined for blended results totaling 250+ survey responses to date.

Rob said he received approval from ISO to hold virtual SC meetings due to the CDC recommendations of the ongoing Corona Virus. Due to the potential security issues involved with Zoom, we will be moving to WebX in the future as it is more secure. Lorena of KPA will post a virtual narrative 1-2 weeks before the meeting date so the public can provide comments prior to and during the meeting. All of this information will also be provided in the public notices, social media and website posts. Once the virtual meeting is held, the narrative will be replaced with a recording of the virtual meeting until the end of the public comment period. The public comment period will be held May 18 through June 8. The SC will be able to

provide comments on the FMP from April 30 to May 15th, followed by additional comment time during the public comment period. Tetra Tech will then have one week to incorporate the comments and submit the FMP to the ISO in early June.

Plan Update
Rob reviewed each proposed action within the Action Plan and asked the SC for their comments/suggestions.

Aaron Gross thanked all the SC members for participating in the FMP update process and thanked Red Cross for hosting the meetings. Rob thanked Aaron for his leadership and participating in the update process as well.

Action Items and Next Steps
- The FMP will be provided to the SC to provide comments April 30 through May 15.
- SC should provide edits is in Word format using track changes and save document with your initials.

Adjourn
Rob notified attendees that this is the last meeting for the 2020 update.

> *MOTION by Aaron Gross and second by Conni Pallini-Tipton to adjourn. Motion carried unanimously.*

P-22 Event Public Workshop
MEETING SUMMARY

PUBLIC WORKSHOP SUMMARY
City of Los Angeles FMP 2020 Update
Public Meeting #1 – P-22 Event at Griffith Park

Date/Time of Meeting: October 19, 2019 11:00 a.m. – 4:00 p.m.

Team Attendance Romano Galissi, Steve Parker, Ira Artz, Carol Bauman, Nahara Zazueta

1. The first public meeting of the Floodplain Management Plan 2020 Update began by setting up the booth that City Parks and Recreation provided for BOE at 9:00 a.m.
    a. An easel focusing on the Los Angeles River floodplain adjacent to Griffith Park was set up, and floodplain maps for all of the City were on hand and available for residents.
    b. HAZUS workstations were functioning and prepared to take queries.
    c. A spinning wheel for residents to win swag was set up.
    d. BOE and LASAN provided a range of give-aways to hand out.
    e. Snacks were set out as well.
    f. FEMA and flood risk flyers were made ready.
    g. The Survey monkey QR code and website was provided, and printed versions were on hand.
2. Our team recorded the number of adults that stopped by the booth. We had a turn out of 131 people, not including their children.
3. Staff took turns entertaining children while others spoke with the adults to garner feedback and to educate the public. They were all encouraged to fill out the survey.
4. Perhaps a 1/3 of the residents who came by were Spanish speaking and Nahara provided interpretation services for them.
5. The team hosted approximately a dozen individuals at the HAZUS workstations to locate their homes as questions were asked of homeowner's properties in relation to locations of flood hazards and their experiences. Other residents looked on and listened as these questions were discussed.
    a. As a printer was not available (no power at the booth), those who had in interest in more information provided contact information on a sign in sheet, or Romano provided his contact information to the residents.

Exhibit #	Organization Name
53	Greater Los Angeles Zoo Association
21	Heal the Bay
12	Herp Connection
50	In Defense of Animals
66	LADWP
20	Meztli Projects
20 x 30 Pavillion	Mountain Lion Foundation
14	mynativestories.com
22	Naional Park Conservation Association
46	Narrated Objects
64	National Park Service - SAMO
Pavillion	National Park Service Pavillion
Pavillion	National Wildlife Federation Pavillion
Bus	Natural History Museum of Los Angeles County
32	Nature For All
Pavillion	NHMLA / La Brea Tar Pits / Urban Nature Research Center
62	Orangutan Conservancy
8	P22 Cycling
54	Poison Free Agoura
55	Poison Free Malibu
35	Rachel Ignotofsky
45	San Fernando Valley Audubon Society
49	San Pascual STEAM Magnet Elementary School
NPS Paillion	Santa Monica Mountains Fund
10	Santa Susana Mountain Park Association (SSMPA)
11	Sky Valley Volunteers
63	SOUTHWESTERN HERPETOLOGISTS SOCIETY
28	Teranga Ranch
9	The Boeing Company
18	The Humane Society of the United States
52	The Raccoon Alliance
33	The Wildwoods Foundation
30	Theodore Payne Foundation for Wild Flowers and Native Plants
1	TreePeople
61	US House of Representatives
56	Whittier Narrows Nature Center
34	Wild Yards Project

Exhibit #	Organization Name
57	3rd Rock Hip Hop
44	Adam Matano Sculpture
38	Amgios de los Rios
25	Animazonia Wildlife Foundation
17	Antelope Valley Conservancy
27	Arroyos & Foothills Conservancy
16	Audubon Center at Debs Park
23	Autry Museum of the American West
51	Ballona Wetlands Institute
41	Bantu Arts Atelier For Kids
29	Betina's Butterfly Garden
7	Calahan Street Elementary
65	California Mountain Lions (UC Davis SoCal Puma Project)
39	California Native Plant Society, Los Angele/Santa Monica Mntns Chapter
43	California State Dominguez
37	California Wildlife Center
15	Caltrans
31	Center for Biological Diversity
36	Christine Echeverri Art Studio
6	CicLAvia
40	Citizens for Los Angeles Wildlife (CLAW)
4	City of Los Angeles - Department of City Planning
3	City of Los Angeles - Department of Public Works
19	Community Nature Connection
26	Cougarmagic
59	Defenders of Wildlife
5	Di Angelo Publications
58	Discovery Cube Los Angeles
2	EFBC's Feline Conservation Center
24	Escondido Creek Conservancy
13	Foundation for the Preservation of the Santa Susana Mountains
42	Friends of California Condors Wild and Free
47	Friends of Griffith Park
48	Friends of Griffith Park
River Rover	Friends of the Los Angeles River
60	Ghost Cat Publications

Attendance to booth

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ENGINEERING
CITY OF LOS ANGELES

CITY OF LOS ANGELES FLOOD PLAIN MANAGEMENT PLAN UPDATE

Please Keep Me Informed/Por favor manténgame informado

NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO
RON HAYNES	RONALD.HAYNES@GMAIL.COM 310 850-4649	310 850 4649
NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO
Aurora Morales	morales552@yahoo.com (323) 522-8943	1929 w 23rd st Los Angeles CA 90018
NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO
FRANCHESCA WATSON	KOKIEMB33@GMail. 818 933 5341	8800 DeSoto CANOGA PK 91304
NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO
NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO
NAME/NOMBRE	EMAIL/CORREO ELECTRÓNICO CELL PHONE NO./TELÉFONO CELULAR	ADDRESS/DOMICILIO

DATE: _____

DEPARTMENT OF RECREATION AND PARKS
3
LA FLOOD PLAIN MANAGEMENT PLAN UPDATE
Find out about flooding risks
ENGINEERING
CITY OF LOS ANGELES

LA FLOOD PLAIN MANAGEMENT PLAN UPDATE
Find out about flooding risks
ENGINEERING
CITY OF LOS ANGELES

CITY OF LOS ANGELES
DEPARTMENT OF RECREATION AND PARKS
CITY OF LOS ANGELES
RECREATION AND PARKS

CITY OF LOS ANGELES
RECREATION AND PARKS

CITY OF LOS ANGELES
DEPARTMENT OF RECREATION AND PARKS

City of Los Angeles 2020 Floodplain Management Plan

Appendix D. Core Capabilities Exercise Summary

City of Los Angeles 2020 FMP Update
Core Capability Exercise Results
1/9/2020

		Average Green	Average Red
1	Flood Emergency management is provided by a unified authority or program within the City.	60%	40%
2	Current land uses within identified flood hazard areas are appropriate for the risk posed by each hazard.	32%	68%
3	There is a good understanding of the flood risk posed by all flood hazards in the City of LA.	17%	83%
4	Flood Emergency response functions for the City are clearly defined and are effective.	41%	59%
5	Members of the public know where to find information about flood hazards and risk.	9%	91%
6	Areas that provide natural resource protection are identified and protected within the City by a uniform policy.	28%	72%
7	Existing flood control systems are effective and well maintained.	26%	74%
8	Roles and responsibilities for emergency management within the City of LA are clearly defined.	63%	37%
9	The City of LA staff are knowledgeable about flood hazards and their impacts and are willing to share that knowledge with the public.	88%	13%
10	The core capability to assess and mitigate flood risk within the planning area is high.	50%	50%
11	City personnel with emergency management functions are adequately trained and exercised.	70%	30%
12	The City of LA citizens have a good understanding of flood hazard exposure and risk.	5%	95%
13	The funding to support flood hazard risk reduction within the City of LA is adequate.	15%	85%
14	Strong collaboration and coordination exists between the City, neighboring jurisdictions, the County and state and federal agency partners.	55%	45%
15	Appropriate and timely flood warning systems are in place.	30%	70%
16	The City currently has an adequate variety of both, regulatory and non-regulatory strategies to reduce risk.	68%	32%
17	The City currently has adequate, adopted policies that encourage development to be located outside of high risk areas.	25%	75%
18	Risk from flood hazards within the City of LA is adequately managed and regulated.	24%	76%
19	There is strong public support for flood risk reduction within the City of LA.	43%	57%
20	The City is adequately prepared for the probable impacts on flood hazards due to the impacts from a changing climate.	14%	86%
21	Coordinated public outreach regarding risk from flood hazards convey clear, consistent messaging to the public.	34%	66%
22	The Planning Partnership's flood risk management programs are fair and equitable.	50%	50%
23	Information on flood insurance is readily available within the City.	50%	50%
24	There is political support for flood risk management within the City	65%	35%

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		Average Green	Average Red
25	All relevant stakeholders are engaged in the City's flood risk management efforts.	33%	67%
26	The City's development regulations for new development within identified flood hazard zones are clear and adequate to address flood risk.	63%	37%
27	There is a coordinated program to maintain drainage systems free of debris.	64%	36%
28	The enforcement of current codes and standards within the planning area is strong.	63%	37%
29	The Citizens of the City of LA have the access to information necessary for them to be prepared to respond, recover and mitigation the impacts for flood hazards within the City.	50%	50%
30	Real Estate professionals adequately disclose risk exposure from natural hazards at the time of sale of real property.	23%	77%

City of Los Angeles 2020 Floodplain Management Plan

Appendix E. Summary of Federal and State Agencies, Programs and Regulations

E. Summary of Federal and State Agencies, Programs and Regulations

Existing laws, ordinances, plans and programs at the federal and state level can support or impact floodplain management actions identified in this plan. Floodplain management plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). 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 mitigation actions or has a nexus with a mitigation action in this plan. Information presented in this section can be used to review local capabilities to implement the actions found in the jurisdictional annexes of Volume 2. Each planning partner has individually reviewed existing local plans, studies, reports, and technical information in its jurisdictional annex, presented in Volume 2.

FEDERAL

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. 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 all 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 other visual alerts. Two technical documents for shelter operators address physical accessibility needs of people with disabilities, as well as medical needs and service animals.

The ADA 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.

FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Civil Rights Act of 1964

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to floodplain management in that it

prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

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, and 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. Numerous 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.

Section 404 of the Clean Water Act regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Responsibility for administering and enforcing Section 404 is shared by the U.S. Army Corps of Engineers and the EPA. The Corps administers the day-to-day program, including individual permit decisions and jurisdictional determinations, develops policy and guidance, and enforces Section 404 provisions. The EPA develops and interprets environmental criteria used in evaluating permit applications, identifies activities that are exempt from permitting, reviews/comments on individual permit applications, enforces Section 404 provisions, and has authority to veto Corps permit decisions. With EPA approval and oversight, states and tribes can assume administration of the Section 404 permit program for certain non-navigable waters, but only two states—Michigan and New Jersey—have done so.

The CWA is important to floodplain management in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for implementing floodplain management projects. Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in floodplain management by addressing urban drainage or localized flooding issues within jurisdictions.

FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Community Development Block Grant Disaster Resilience Program

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of FEMA, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that

considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential alternative source of funding for actions identified in this plan.

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 meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The discount partially depends on location of the property. Properties outside the special flood hazard area receive smaller discounts: a 10-percent discount if the community is at Class 1 to 6 and a 5-percent discount if the community is at Class 7 to 9. 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 river flood risks.

Emergency Watershed Program

The USDA Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. EWP is an emergency recovery program. Financial and technical assistance are available for the following activities (Natural Resources Conservation Service, 2016):

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded banks

- Correct damaged drainage facilities
- Establish cover on critically eroding lands
- Repair levees and structures
- Repair conservation practices.

This federal program could be a possible funding source for actions identified in this plan.

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.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- Endangered means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- Threatened means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- Critical habitat means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- Section 9: Prohibition of Take—It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be

prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."
- Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

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. No such rulings currently affect the Los Angeles area, but floodplain managers should nonetheless be aware of any potential activities that could fall under the ESA.

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. The Commission regulates over 1,700 non-federal dams in the U.S. Over 1,500 regulated hydroelectric projects are in the FERC program (FERC, 2020). Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.

FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication Engineering Guidelines for the Evaluation of Hydropower Projects guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. In November 2019, FEMA published the *Emergency Operations Planning: Dam Incident Planning Guide* supporting state, local, tribal and territorial emergency managers in planning for dam incidents and failures

(FEMA, 2019). National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

National Environmental Policy Act

The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. FEMA floodplain management project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act.

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 and the 500-year flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments and stakeholders.

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 floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.

- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

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 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 some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a 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, technological hazards, and human-caused hazards) regardless of size or complexity.

Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this floodplain management plan can support the implementation and update of all NIMS-compliant plans within the planning area.

Presidential Executive Order 11988, Floodplain Management

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities (FEMA, 2015):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

Presidential Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (FEMA, 2020a):

- Acquiring, managing, and disposing of federal lands and facilities
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status (U.S. Army Corps of Engineers, 2017).

U.S. Army Corps of Engineers Flood Risk Management Program

The U.S. Army Corps of Engineers has several civil works authorities and programs related to flood risk and flood hazard management:

- The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site-specific data related to the extent, duration and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.
- For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from $25,000 to $100,000 with the local jurisdiction providing 50 percent of the cost.
- The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:
    - The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a $7 million federal limit and Section 14 for Emergency Streambank Protection with a $1.5 million federal limit. These can be implemented without specific authorization from Congress.
    - Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 percent federal and 35 percent non-federal.
    - Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.
- The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the flowing categories:
    - Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state and federal agencies.
    - Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance

in certain situations and allows for "advance measures" assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.

- Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.

All of these authorities and programs are available to the City to support any intersecting floodplain management actions.

STATE

AB 32: The California Global Warming Solutions Act

This bill identifies the following potential adverse impacts of global warming:

> "… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels), with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.

The Air Resources Board has adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

AB 70: Flood Liability

This bill provides that a city may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city meets specified requirements.

AB 162: Flood Planning

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 state Department of Water Resources (DWR). During the next revision of the housing element on or after January 1, 2009, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purpose of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards, including:

- Flood hazard zones
- Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, and the Governor's Office of Emergency Services
- 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 DWR has concluded that the flood management infrastructure is not adequate to avoid the risk of flooding.

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.

California Coastal Management Program

The California Coastal Management Program under the California Coastal Act requires each city or county lying wholly or partly within the coastal zone to prepare a local coastal plan. The specific contents of such plans are not specified by state law, but they must be certified by the Coastal Commission as consistent with policies of the Coastal Act (Public Resources Code, Division 20). The Coastal Act has provisions relating to geologic hazards, but does not mention tsunamis specifically. Section 30253(1) of the Coastal Act states that new development shall minimize risks to life and property in areas of high geologic, flood, and fire hazard. Development should be prevented or limited in high hazard areas whenever possible. However, where development cannot be prevented or limited, land use density, building value, and occupancy should be kept at a minimum. Any mitigation project identified in this plan that intersects the mapped coastal zone will be consistent with the recommendations of the local coastal plan.

California Department of Water Resources

In California, the DWR is the coordinating agency for floodplain management. The DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management

programs, reviewing local floodplain ordinances, participating in statewide floodplain management planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by the DWR.

California Division of Safety of Dams

California's Division of Safety of Dams (a division of the DWR) monitors the dam safety program at the state level and maintains a working list of dams in the state. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam to ensure that it is performing as intended and is not developing problems. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. Over 1,200 dams are inspected by Division engineers on a yearly schedule to ensure performance and maintenance of dams (California Division of Safety of Dams, 2017).

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government enacted 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. Jurisdictions conduct analysis of the project to determine if there are potentially significant environmental impacts, identify mitigation measures, and possible project alternatives by preparing environmental reports for projects that requires CEQA review. This environmental review is required before an agency takes action on any policy, program, or project. Any project action identified in this plan will seek full CEQA compliance upon implementation.

The City of Los Angeles has determined that the FMP2020 is categorically exempt from the formal CEQA protocol. The City will initiate the formal CEQA protocol on any project recommended in this plan that requires adherence to this protocol at the initiation of the project.

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. City 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 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.

On January 1, 2014, California Building Code Accessibility Standards found in Chapter 11B incorporated the 2010 Americans with Disabilities Act (ADA) Standards as the model accessibility code for California. The purpose was to ensure consistency with federal guidelines. As a result of this incorporation, the California standards will fully implement and include 2010 ADA Standards within the California Building Code while maintaining enhanced levels of accessibility already provided by existing California accessibility regulations. All planning partners that have building code and permit authority have adopted building codes that are in full compliance with the California State Building Code.

Disadvantaged and Low-income Communities Investments

Senate Bill (SB) 535 directs state and local agencies to make investments that benefit California's disadvantaged communities. It also directs the California Environmental Protection Agency to identify disadvantaged communities for the purposes of these investments based on geographic, socio-economic, public health, and environmental hazard criteria. Assembly Bill (AB) 1550 increased the percent of funds for projects located in disadvantaged communities from 10 to 25 percent and added a focus on investments in low-income communities and households. This program is a potential alternative source of funding for actions identified in this 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. 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.

Los Angeles Regional Water Quality Control Board

The Los Angeles Regional Water Quality Control Board protects ground and surface water quality in the Los Angeles region. It is one of nine regional boards statewide under the California Environmental Protection Agency.

The board conducts the following activities to protect ground and surface waters under its jurisdiction (California State Water Resources Control Board, 2019):

- Address region-wide and specific water quality concerns through updates of the Water Quality Control Plan (Basin Plan) for the Los Angeles Region.
- Prepare, monitor compliance with, and enforce waste discharge requirements.
- Implement and enforce local stormwater control efforts.
- Regulate the cleanup of contaminated sites that have polluted groundwater or surface water or have the potential to do so.
- Enforce water quality laws, regulations, and waste discharge requirements.
- Coordinate with other public agencies and groups that are concerned with water quality.
- Inform and involve the public on water quality issues.

Senate Bill 97: Guidelines for Greenhouse Gas Emissions

Senate Bill 97, enacted in 2007, amends CEQA to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directs the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects by July 1, 2009 and directs the California Natural Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

Senate Bill 379: General Plans: Safety Element—Climate Adaptation

Senate Bill 379 builds upon the flood planning inclusions into the safety and housing elements in general plans outlined in AB 162. SB 379 focuses on a new requirement that cities and counties include climate adaptation and resiliency strategies in the safety element of their general plans beginning January 1, 2017. In addition, this bill requires general plans to include a set of goals, policies and objectives, and specified implementation measures based on the conclusions drawn from climate adaptation research and recommendations.

Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements

In 2016, Senate Bill 1000 amended California's Planning and Zoning Law in two ways:

- The original law established requirements for initial revisions of general plan safety elements to address flooding, fire, and climate adaptation and resilience. It also required subsequent review and revision as necessary based on new information. Senate Bill 1000 specifies that the subsequent reviews and revision based on new information are required to address only flooding and fires (not climate adaptation and resilience).
- Senate Bill 1000 adds a requirement that, upon adoption or revision of any two other general plan elements on or after January 1, 2018, an environmental justice element be adopted for the general plan or environmental justice goals, policies and objectives be incorporated into other elements of the plan.

Standardized Emergency Management System

California Code of Regulations Title 19 establishes the Standardized Emergency Management System (SEMS) to standardize the response to emergencies involving multiple jurisdictions. SEMS 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 SEMS by December 1, 1996, to be eligible for state funding of response-related personnel costs under California Code of Regulations Title 19 (Sections 2920, 2925 and 2930). The roles and responsibilities of Individual agencies contained in

existing laws or the state emergency plan are not superseded by these regulations. This floodplain management plan is considered to be a support document for all phases of emergency management, including those associated with SEMS.

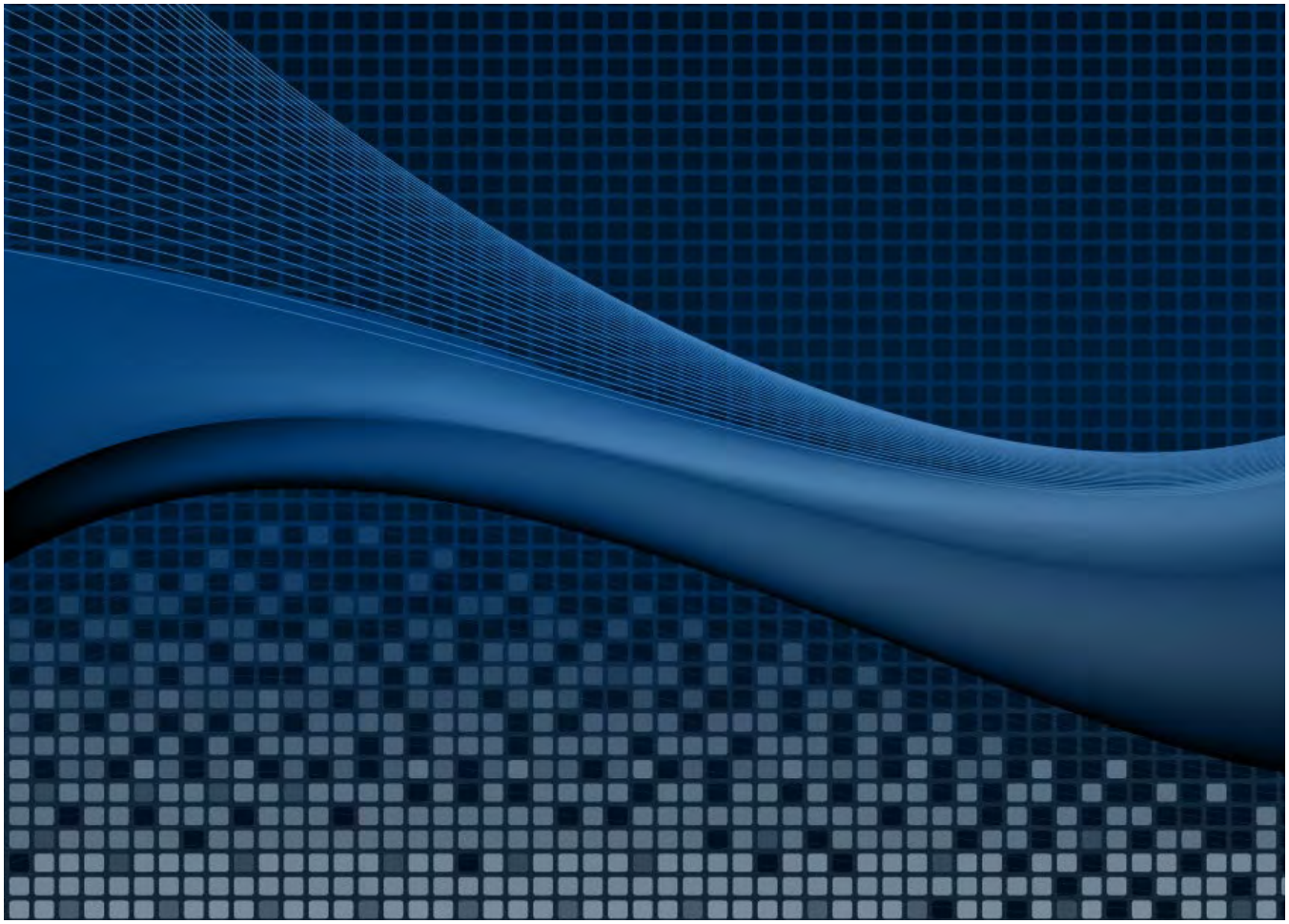
City of Los Angeles 2020 Floodplain Management Plan

Appendix F. Repetitive Loss Area Analysis

City of Los Angeles

2020 Repetitive Loss Area Analysis

Public Release



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August 2020

City of Los Angeles 2020 Repetitive Loss Area Analysis

August 2020

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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).

Federal programs such as the Community Rating System (CRS) encourage 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 for reduced flood insurance premiums in communities that carry out various 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 THE REPETITIVE LOSS AREA ANALYSIS

The City of Los Angeles had 155 FEMA-designated repetitive loss properties as of FEMA's last report on July 31, 2019. These properties have been mapped into 23 regions encompassing 120 repetitive loss areas, and an

analysis has been conducted for each area. 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.
- 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.
- 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 report 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 region and area (Chapters 7 – 29)
- A table of basic information about each building in the area (Chapters 7 – 29)
- A description of alternative approaches considered to address the problem (Chapter 6)
- A set of recommended action items to address the problem (Chapters 7 – 29).

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 the City of Los Angeles for internal use only correlates the property ID numbers presented here with specific address information.

1.3 CITY OF LOS ANGELES REPETITIVE LOSS AREA ANALYSIS

The City of Los Angeles prepared a Floodplain Management Plan in 2001 and updated it in 2010, following NFIP requirements and procedures outlined in the Community Rating System Coordinator's Manual. The plan addressed site-specific problems and identified possible solutions under the authority of individual homeowners or homeowner associations. In 2020, this repetitive loss area analysis was included as an appendix in the City's overall 2020 Floodplain Management Plan.

There are 155 identified repetitive loss properties (RLPs) in the City of Los Angeles, as shown in Figure 1-1. Table 1-1 summarizes the properties and the flood insurance claims filed for each. As indicated by the flood zone information presented in Table 1-1, most RLPs in Los Angeles are not within a mapped floodplain. The causes of flooding for those outside of mapped floodplains are described in Chapter 7 through Chapter 29.

Table 1-1 lists the dates of flooding events that have caused damage (with insurance claims filed) to each repetitive loss property since 1978. All of the RLPs suffered flooding damage at least twice in that period. Flood events occurred in most rainy seasons. Figure 1-2 shows the type of flooding that has been experienced at each repetitive loss property.

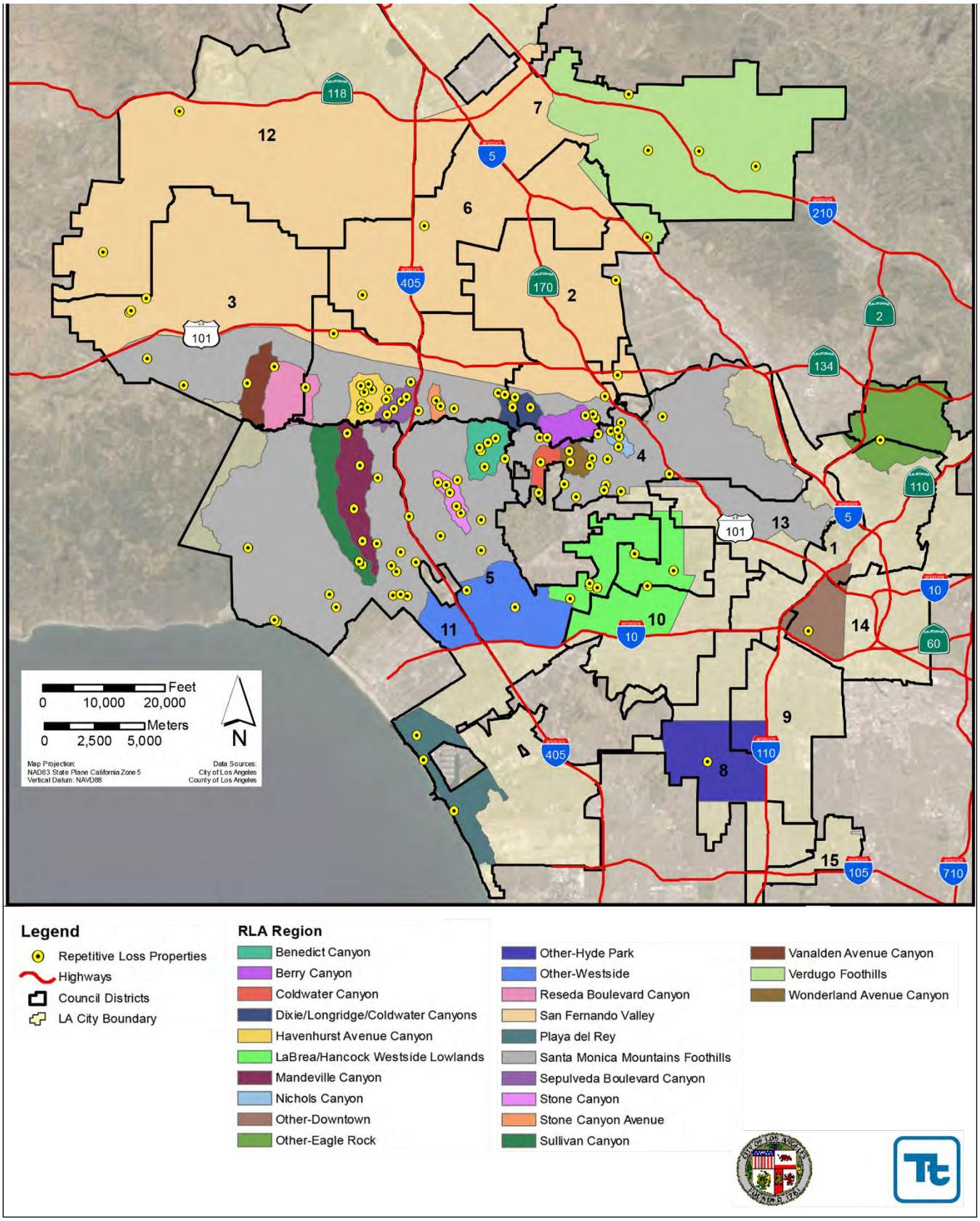

Figure 1-1. Repetitive Loss Regions and Properties in the City of Los Angeles

Table 1-1. Repetitive Loss Properties in the City of Los Angeles

FEMA RLP #[a]	Claim History (Month/Year)	Flood Zone[b]	Total Claim Paid as of May 2018
417	2/92, 2/93	Shaded X	$33,501.00
878	2/92, 1/93, 2/93, 1/95	Shaded X	$41,337.00
1157	12/92, 2/93	X	$12,995.00
2988	2/92, 1/93	X	$17,849.00
6605	2/92, 1/93, 1/95	X	$17,151.00
7232	2/92, 2/93	Shaded X	$56,505.00
10457	1/83, 1/88	X	$19,405.44
11060	2/92, 2/93	X	$5,937.82
12816	2/92, 2/93	Shaded X	$8,910.08
12817	2/92, 2/93	X	$3,835.59
12819	3/92, 2/93	Shaded X	$4,891.98
13679	2/92, 3/92	X	$3,072.16
13694	2/78, 2/92, 2/93	X	$7,445.24
14891	2/80, 3/83	X	$4,828.08
14893	3/78, 2/80	Shaded X	$8,687.00
14894	3/78, 3/79, 1/80, 1/93, 1/95	X	$19,936.55
14895	3/78, 2/80, 3/83	X	$22,874.05
14897	3/78, 2/80, 3/83	X	$30,909.74
14899	1/78, 2/80	X	$67,773.98
14906	3/78, 2/80	X	$67,389.46
14911	2/80, 3/83	X	$8,776.30
17936	3/78, 2/80	X	$15,343.61
17937	3/78, 2/86	X	$15,220.26
17939	1/78, 2/80	X	$49,445.22
28306	2/78, 2/80	X	$74,200.00
28307	1/78, 2/78, 3/79	X	$6,184.50
28336	2/78, 2/80	X	$14,621.22
28390	1/79, 2/80	X	$14,721.80
28400	2/78, 2/80	X	$2,407.18
28413	3/80, 1/83	AH	$3,468.72
28454	2/78, 2/80	X	$13,243.78
28471	2/80, 3/83	X	$10,527.91
33983	3/78, 2/80, 1/83	X	$18,703.16
34203	3/78, 1/80, 2/80	Shaded X	$16,069.44
34379	2/80, 3/81	X	$10,784.56
34521	2/80, 3/83	X	$2,387.10
34711	2/80, 1/83, 3/83, 2/93	X	$52,806.90
34954	1/80, 2/80	X	$4,619.74
35004	2/80, 3/83, 2/01, 1/05	X	$31,070.10
35040	3/79, 2/80	X	$61,419.06
35091	2/80, 1/83	X	$6,931.86
35738	2/80, 3/83	X	$15,986.64
36864	1/80, 11/82, 1/83	X	$13,091.34

FEMA RLP #[a]	Claim History (Month/Year)	Flood Zone[b]	Total Claim Paid as of May 2018
36963	3/79, 3/83	X	$11,792.26
37246	2/80, 3/83	X	$25,315.26
37406	2/80, 1/81	X	$43,162.85
38943	2/80, 1/83	X	$9,226.04
39001	1/83, 3/83	X	$5,727.48
39055	3/79, 2/80, 3/83, 1/05	X	$38,187.63
39174	2/79, 3/83	X	$15,310.25
39188	2/80, 1/83, 3/83	X	$87,712.37
39738	2/80, 3/83	X	$4,050.00
39782	3/83, 2/93	X	$11,537.79
39933	1/79, 2/80	X	$23,427.62
40092	1/80, 2/80, 1/83	X	$29,015.00
40145	1/79, 2/80	X	$3,832.48
40261	2/80, 1/83	X	$6,556.44
40388	3/79, 2/83	Shaded X	$8,546.03
40571	3/79, 2/80, 3/83	X	$12,455.67
40572	1/79, 2/80	X	$56,480.18
40832	2/80, 3/83	X	$7,494.39
41643	2/80, 2/93, 1/95	X	$49,141.26
41841	2/80, 3/83	X	$2,623.60
41904	2/80, 3/83	X	$25,416.46
42283	2/80, 3/83	X	$3,793.50
45672	2/80, 3/83	X	$27,269.64
45890	2/80, 3/83	X	$5,685.50
46546	2/80, 3/83	X	$34,097.36
46600	2/80, 3/83	X	$98,400.00
46649	2/80, 1/83	X	$4,929.47
46812	2/80, 1/83, 3/83, 1/88, 3/11	X	$294,678.66
47162	3/83, 10/87, 2/92, 2/93, 3/95, 2/98	X	$98,965.97
47221	12/80, 11/82, 2/86	X	$11,642.05
47284	3/83, 1/86	X	$11,384.27
47423	1/83, 3/83, 2/92, 1/93	X	$8,312.35
48057	3/83, 2/92, 2/98	X	$9,701.30
49416	1/81, 3/83	X	$3,802.20
49539	3/83, 2/92	X	$87,616.23
51293	1/83, 2/86	X	$12,709.18
51775	4/82, 3/83, 2/93	X	$24,959.27
56938	2/92, 2/93	Shaded X	$39,430.72
57891	11/85, 2/93	X	$63,482.46
57931	3/80, 3/83	X	$6,614.78
58017	11/82, 2/92, 1/95, 2/98	X	$42,898.21
58021	2/80, 2/91, 2/98	X	$23,828.26
58032	1/83, 2/93, 3/95	X	$16,565.77
58033	3/83, 2/93, 3/98, 3/98	X	$32,266.65

FEMA RLP #[a]	Claim History (Month/Year)	Flood Zone[b]	Total Claim Paid as of May 2018
58034	2/80, 1/83	X	$11,843.80
58038	3/83, 2/93	X	$17,965.88
58040	2/80, 2/92, 4/98	X	$13,434.89
70874	3/94, 12/94, 11/97	AE	$23,589.62
71419	2/92, 1/95, 2/01, 2/04, 1/05, 3/11	X	$81,761.12
72134	1/93, 1/95	X	$10,480.10
72245	1/93, 1/95, 3/98	X	$35,286.22
72654	3/93, 3/95	X	$3,856.22
73630	1/95, 3/95, 2/98	X	$12,243.80
76800	2/93, 3/95	X	$7,203.78
77246	2/80, 3/95, 2/98	X	$30,542.76
84045	1/95, 2/96	X	$15,355.75
84552	2/93, 3/95	X	$106,109.53
92317	2/98, 2/98	X	$7,655.31
93876	1/95, 2/98	X	$2,843.71
94073	12/92, 2/98	X	$6,267.38
94323	2/98, 3/98	X	$19,216.40
94805	1/95, 2/98	X	$20,883.44
94922	2/98, 3/98	X	$13,494.69
95202	2/92, 2/98	X	$9,442.46
95748	1/93, 2/98	X	$18,994.27
95776	1/95, 12/97	X	$8,421.73
108392	2/98, 3/00	X	$14,082.66
111643	3/98, 1/01	X	$64,119.41
111736	2/98, 2/01, 12/04	X	$88,244.40
111789	2/98, 2/01	X	$38,189.96
113344	2/98, 4/01, 1/08	X	$44,428.75
116479	2/98, 1/01, 3/11	X	$66,926.31
121962	2/98, 12/02	X	$5,022.24
122550	2/00, 12/02, 3/03	X	$59,949.58
122853	3/01, 2/03	X	$60,800.33
122949	2/00, 2/03	X	$14,886.93
135368	2/98, 10/04	X	$19,615.43
136151	2/98, 12/04	X	$23,808.32
136616	1/01, 1/05	X	$10,708.94
136852	2/98, 12/04	X	$10,807.49
136862	2/98, 1/05	X	$13,802.94
136863	2/98, 1/05	X	$20,741.73
137203	1/98, 1/05	X	$5,245.17
137531	2/98, 1/05	X	$11,396.60
137532	2/98, 1/05	X	$45,085.76
137533	1/05, 2/05	X	$28,591.82
137534	1/01, 2/05	X	$31,214.98
137692	1/95, 1/05	X	$110,854.74

FEMA RLP #[a]	Claim History (Month/Year)	Flood Zone[b]	Total Claim Paid as of May 2018
137797	2/98, 1/05	X	$5,648.84
137798	2/98, 1/05, 2/05	X	$10,115.83
137802	2/98, 2/05	Shaded X	$9,397.96
138175	1/05, 2/05	X	$27,768.53
138199	12/04, 2/05	X	$28,488.68
138217	1/05, 2/05	X	$3,008.40
138264	8/98, 1/05	X	$26,489.93
138318	2/98, 1/05	X	$52,725.60
138325	2/98, 1/05	X	$9,862.73
138450	2/98, 1/05, 3/11	X	$23,515.53
138780	2/98, 1/05	X	$10,394.03
138958	2/98, 10/04	X	$26,784.54
139491	2/00, 2/05, 3/11	X	$121,616.44
139586	2/98, 1/05	X	$3,075.11
139702	3/98, 2/05	X	$33,508.92
144893	3/98, 1/05	Shaded X	$28,038.63
174323	2/98, 1/08	X	$17,466.78
174594	2/01, 1/08	X	$7,947.03
192020	2/05, 2/10	X	$19,672.91
192705	1/08, 2/10	X	$84,448.17
192747	12/02, 3/10	X	$47,604.95
212545	1/10, 11/11	X	$6,116.95
245944	2/05, 3/11	X	$141,584.79
270833	2/14, 8/17	Shaded X	$15,937.23

a. Addresses not shown, for privacy; this information is available from the City of Los Angeles Bureau of Engineering.
b. Flood zones are defined as follows:
AE—Special hazard area inundated by the 1% annual chance flood with base flood elevation determined.
AH—Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones..
Shaded X—The area between the special hazard areas and the limits of the 0.2% annual chance floodplain.
X—The area determined to be outside the 0.2% annual chance floodplain.

Source: City of Los Angeles, 2019

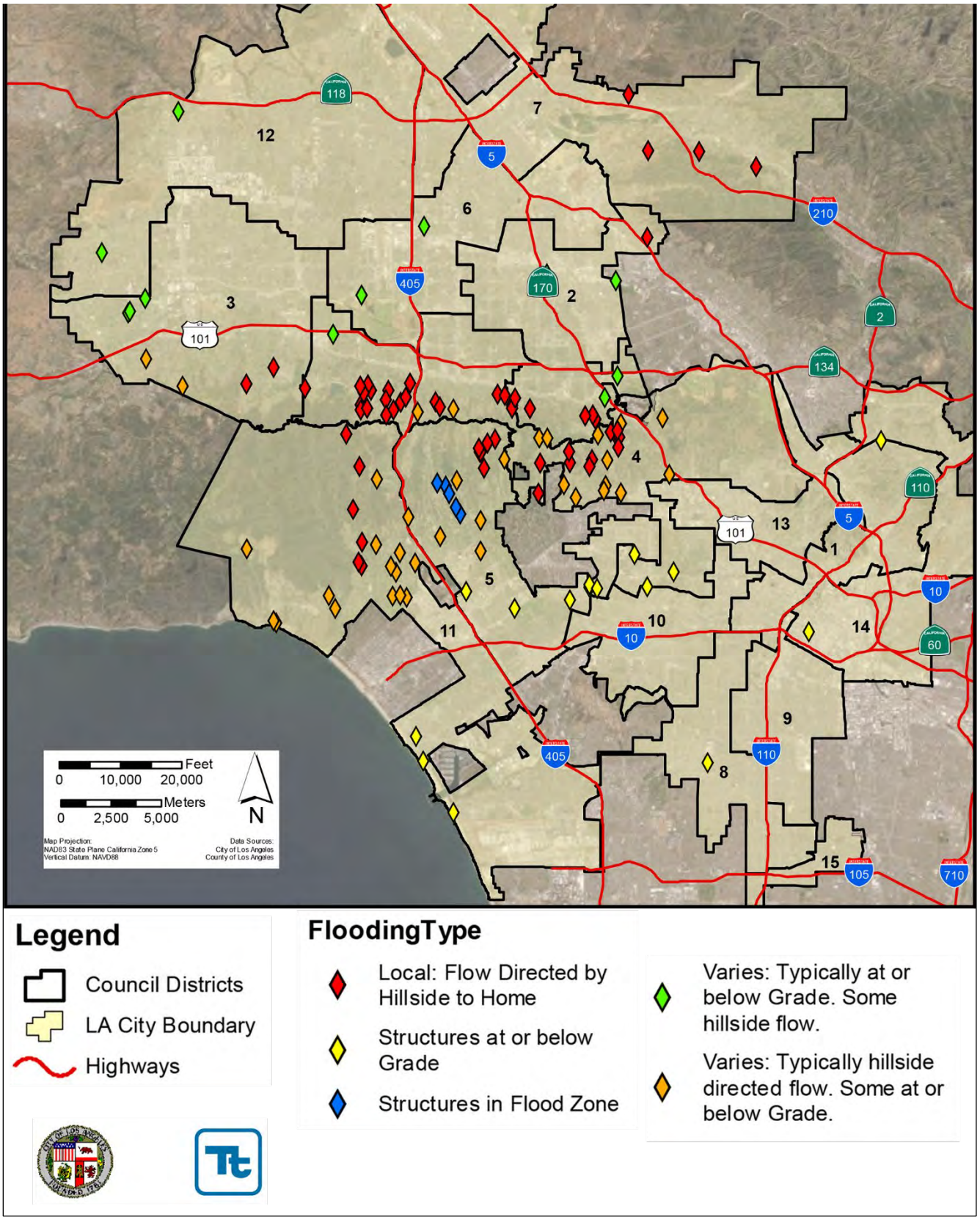

Figure 1-2. Repetitive Loss Properties by Flooding Type

1.4 NUMBERING AND NOMENCLATURE

In designating federally recognized repetitive loss properties, FEMA assigns a repetitive loss number (RL #) to each property, using a nationally defined numbering system. Based on geographic distribution, repetitive loss areas were defined that include one or more repetitive loss properties. Areas were numbered sequentially (1 through 120) and grouped by regions, which are designated by place names indicating the general location of the areas included. Table 1-2 summarizes the numbering and naming used in this analysis. It also includes the number of buildings in each repetitive loss area and a brief description of possible flooding causes in each region.

Table 1-2. Naming and Numbering of City of Los Angeles Repetitive Loss Properties, Areas, and Regions

Repetitive Loss Area Region	Possible Flooding Causes	Repetitive Loss Area	FEMA RL #	# of Buildings	Repetitive Loss Area	FEMA RL #	# of Buildings
Benedict Canyon	Stormwater runoff coming down the steep terrain of the canyon	1	6605	1	4	57891	4
		2	14893, 144893	2	5	138199	1
		3	39174	1			
Berry Canyon	Stormwater runoff coming down the steep terrain of the canyon	6	17936	2	8	137534	1
		7	138958	1			
Coldwater Canyon	Stormwater runoff coming down the steep terrain of the canyon and urbanized stormwater drainage issues	9	41643	3	10	174323	6
Dixie/Longridge/ Coldwater Canyons	Stormwater runoff coming down the steep terrain of the canyon and urbanized stormwater drainage issues	11	14894	1	14	47423	1
		12	14899	3	15	51775	4
		13	41904	5	16	108392	1
Havenhurst Avenue Canyon	Stormwater runoff coming down the steep terrain of the canyon	17	28471	1	22	93876	1
		18	35004	1	23	95202	1
		19	36864	1	24	137797	2
		20	46546	3	25	137798	1
		21	73630	2			
La Brea/Hancock Westside Lowlands	Stormwater runoff coming down the steep terrain of the canyon into the urbanized environment	26	7232	1	30	77246	4
		27	417	1	31	111789	14
		28	12817	2	32	138325	2
		29	39001	1			
Mandeville Canyon	Stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues	33	40571	2	35	42283	5
		34	39055	2	36	46600	7
Nichols Canyon	Stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues	37	13694	2	40	137692	1
		38	58034	3	41	136863	4
		39	192020	2			
Other – Downtown	Urbanized stormwater drainage issues	42	70874	7			
Other – Eagle Rock	Urbanized stormwater drainage issues	43	139586	1			
Other – Hyde Park	Urbanized stormwater drainage issues	44	137203	1			

Repetitive Loss Area Region	Possible Flooding Causes	Repetitive Loss Area	FEMA RL #	# of Buildings	Repetitive Loss Area	FEMA RL #	# of Buildings
Other - Westside	Urbanized stormwater drainage issues	45	34379	5	46	35091	1
Reseda Boulevard Canyon	Stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues	47	18341	1			
San Fernando Valley	Stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues	48	11060	1	54	92317	2
		49	34203	2	55	113344	5
		50	34954	11	56	245944	2
		51	36936	2	57	138450	5
		52	49539	2	58	136852	2
		53	57931	1	59	121962	2
Playa del Rey	Urbanized stormwater drainage issues	60	10457	48	62	137802	1
		61	270833	1			
Santa Monica Mountains Foothills	Stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues	63	1157	1	81	76800	1
		64	2988	1	82	94073	2
		65	13679	1	83	94922	3
		66	14895	1	84	11964	2
		67	17937	2	85	111736	3
		68	28307	20	86	139491	2
		69	28400	4	87	192747	1
		70	34711	1	88	192705	2
		71	38943	1	89	174594	2
		72	40572	1	90	139702	4
		73	45890	3	91	138318	6
		74	46649	2	92	138217	1
		75	46812	3	93	136616	1
		76	51293	1	94	136151	2
		77	58032	2	95	135368	1
		78	58033	3	96	122949	1
		79	58038	24	97	138264	2
		80	72134	2	98	28413	2
Sepulveda Boulevard Canyon	Stormwater runoff coming down the steep terrain of the canyon	99	14906	1	102	71419	1
		100	28306	7	103	122853	7
		101	35040	2			
Stone Canyon	Urbanized stormwater drainage issues	104	40261, 72245, 95748, 122550	146	105	212545	1
Stone Canyon Avenue	Stormwater runoff coming down the steep terrain of the canyon	106	14897	8	107	39782	2
Sullivan Canyon	Stormwater runoff coming down the steep terrain of the canyon	108	37246	3	109	58040	9
Vanalden Avenue Canyon	Stormwater runoff coming down the steep terrain of the canyon	110	4266	1	111	116479	4

Repetitive Loss Area Region	Possible Flooding Causes	Repetitive Loss Area	FEMA RL #	# of Buildings	Repetitive Loss Area	FEMA RL #	# of Buildings
Verdugo Foothills	Stormwater runoff coming down the steep terrain of the canyon	112	37406	3	115	138175	2
		113	48057	4	116	137532	8
		114	138780	1			
Wonderland Avenue Canyon	Stormwater runoff coming down the steep terrain of the canyon	117	878	2	119	41841	3
		118	28454	3	120	137531	1

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 City of Los Angeles 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:

- The City of Los Angeles received a formal update of its repetitive loss data from the Insurance Services Office (ISO) in July 2019. This was the last official dataset available for this RLAA.
- A Level 2, user-defined flood model using Hazus-MH, version 4.2 was constructed in 2019 to support the development of the *City of Los Angeles 2020 Floodplain Management Plan*. The model was possible due to the quality of the City's assessment data available to the planning team. The County Assessor's 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 City 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-MH 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 2019 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 *City of Los Angeles 2020 Floodplain Management Plan*. This digital elevation model has a 3-foot resolution.
- The average loss for each repetitive-loss (RL) 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 RL 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 are the same damage functions contained in FEMA's Hazus-MH and BCAR platforms. They 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 determined using Google Street View and assuming crawl space foundations for any structures not visible in that application, 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 RL properties were shown to have basements, according the analysis.
- 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 RL 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 list for the City.
- Property condition assessments were included in existing Los Angeles County assessor's data, which were used for this RLAA.

Utilizing this methodology, 120 repetitive loss areas in 23 regions were delineated. Maps and descriptions of the causes of flooding for each area can be found in Chapters 7 to 29.

The final step was to determine the cause of flooding, giving consideration to the following findings from the initial identification:

- 2 of 155 properties (1 percent) are located in a FEMA-designated 100-year flood zone.
- 12 of 155 properties (8 percent) are located in a FEMA-designated 500-year flood zone.
- The average number of claims per property was 2.
- The average claim paid, adjusted to 2019 dollars, was $62,878. The highest average claim per property was $144,916 and the lowest was $1,964.
- The average replacement cost for the RL properties was $1,080,957. Two of the properties have replacement cost values of over $10,000,000. The average replacement cost for the RL properties excluding the two properties was $640,604.
- The average percent-damage (the average claim divided by the replacement cost) was 1.7 percent. Excluding the two properties with replacement cost values of over $10,000,000, the average percent-damage was 2.8 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/hillside 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 FMP.

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 City 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 587 properties in repetitive loss areas, with 761 insurable structures. This became the final repetitive loss area mailing list for the City of Los Angeles.

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 datum 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 upon 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 structures.
  - 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 the City of Los Angeles, 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.

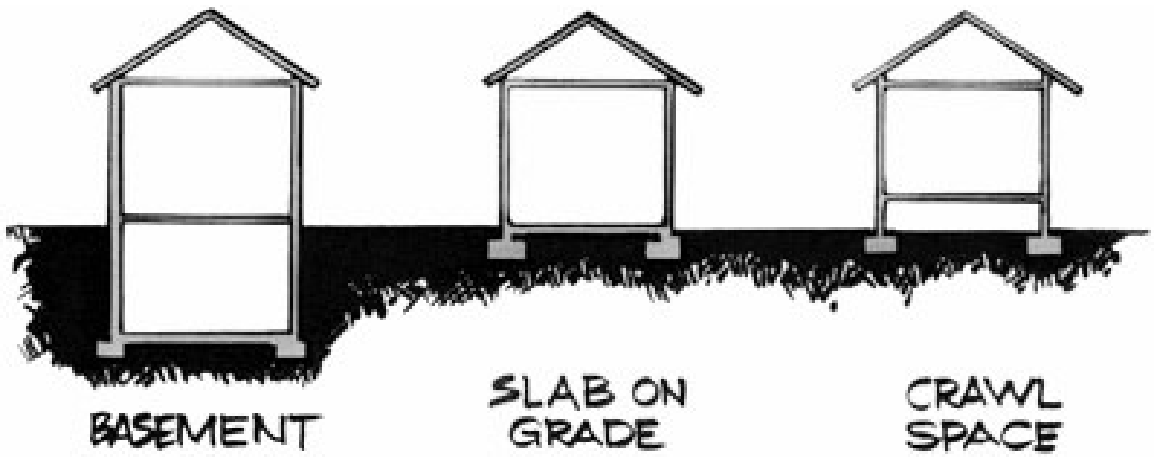

Figure 2-1. Foundation Types—Basement (left), Slab (center), and Crawlspace (right)

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. Planning staff 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 CITYWIDE FLOODPLAIN MANAGEMENT PLANNING EFFORT

This Repetitive Loss Area Analysis is considered by the City of Los Angeles Department of Public Works to be the companion document to the *City of Los Angeles 2020 Floodplain Management Plan.* 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 floodplain management plan. The outreach effort used to develop the floodplain management plan 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 floodplain management plan.

3.2.1 Contact with Agencies and Organizations

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
- Los Angeles County Flood Control District
- U.S. Army Corps of Engineers, Los Angeles District
- Friends of the Los Angeles River
- Mountain Recreation & Conservation Authority
- Red Cross of Greater Los Angeles

- Los Angeles County Public Works
- Floodplain Management Association
- City of Los Angeles Chamber of Commerce
- California State University Los Angeles, Geosciences & Environment
- University of Southern California, Public Policy
- University of California Los Angeles, Luskin School of Public Affairs

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 Steering Committee (see Section 3.2.1, above).
- Attempt to reach as many citizens as possible using multiple media.
- Leverage the vast social media resources that are available to the City.
- Distribute press releases through the Department of Public Works Public Affairs Office.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders

Stakeholders and the Steering Committee

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

- Citizens
- Community Emergency Response Team representatives
- Environmental advocacy groups
- State and federal agencies with floodplain management responsibilities
- Owners/operators of businesses within the floodplain
- Academia
- Community representatives.

Website

The City maintains a floodplain management plan website with information on the 2001, 2010 and 2015 floodplain management plans, as well as annual progress reports and resources related to floodplain management. At the beginning of the development process for the FMP and RLAA, the website was updated to keep the public posted on planning activities and to solicit input (see Figure 3-1). The site's address (https://eng.lacity.org/fmp-updates) was publicized in all press releases, mailings and public meetings. The site provided the public with information on the planning process, the Steering Committee, a project survey, and drafts of the FMP and RLAA. The City will keep the website active to keep the public informed about successful mitigation projects and future plan updates.

The Flood Preparedness Survey

The planning team developed a 27-question survey with guidance from the Steering Committee (see Figure 3-2). The survey assessed household preparedness for flooding, residents' level of knowledge about ways to reduce risk and loss from flooding, and areas vulnerable to floods. Responses helped guide selection of mitigation actions for the FMP.

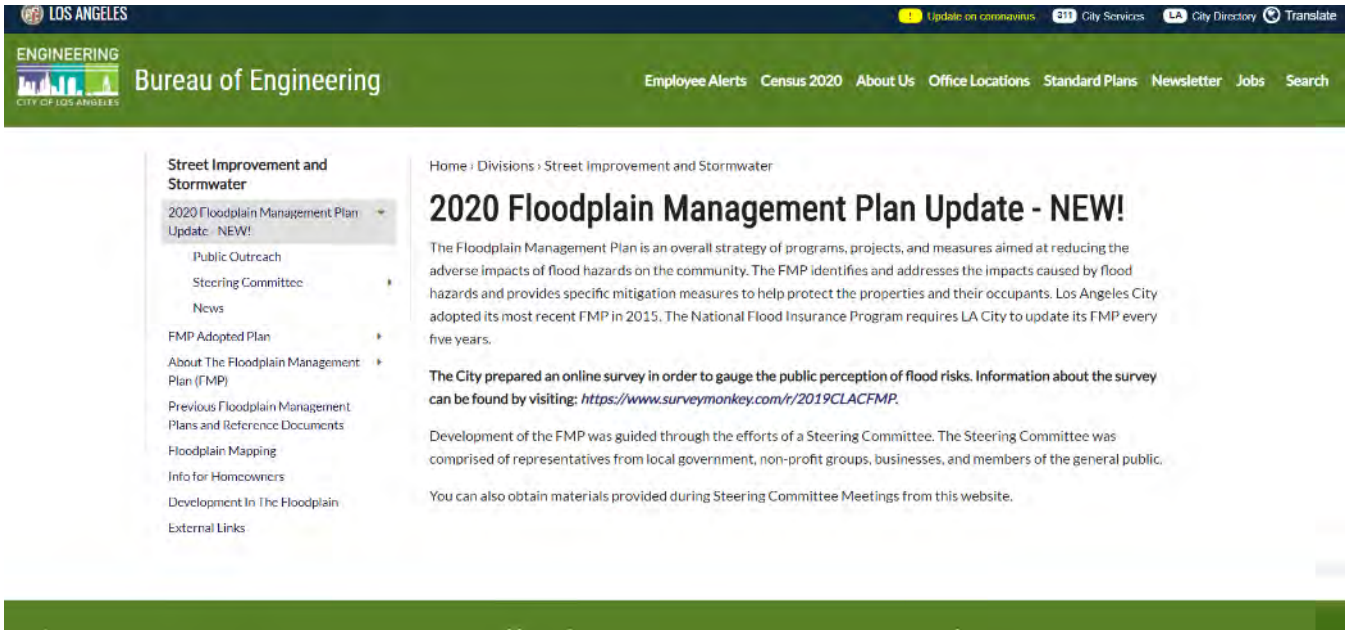

Figure 3-1. Sample Page from Floodplain Management Plan Web Site

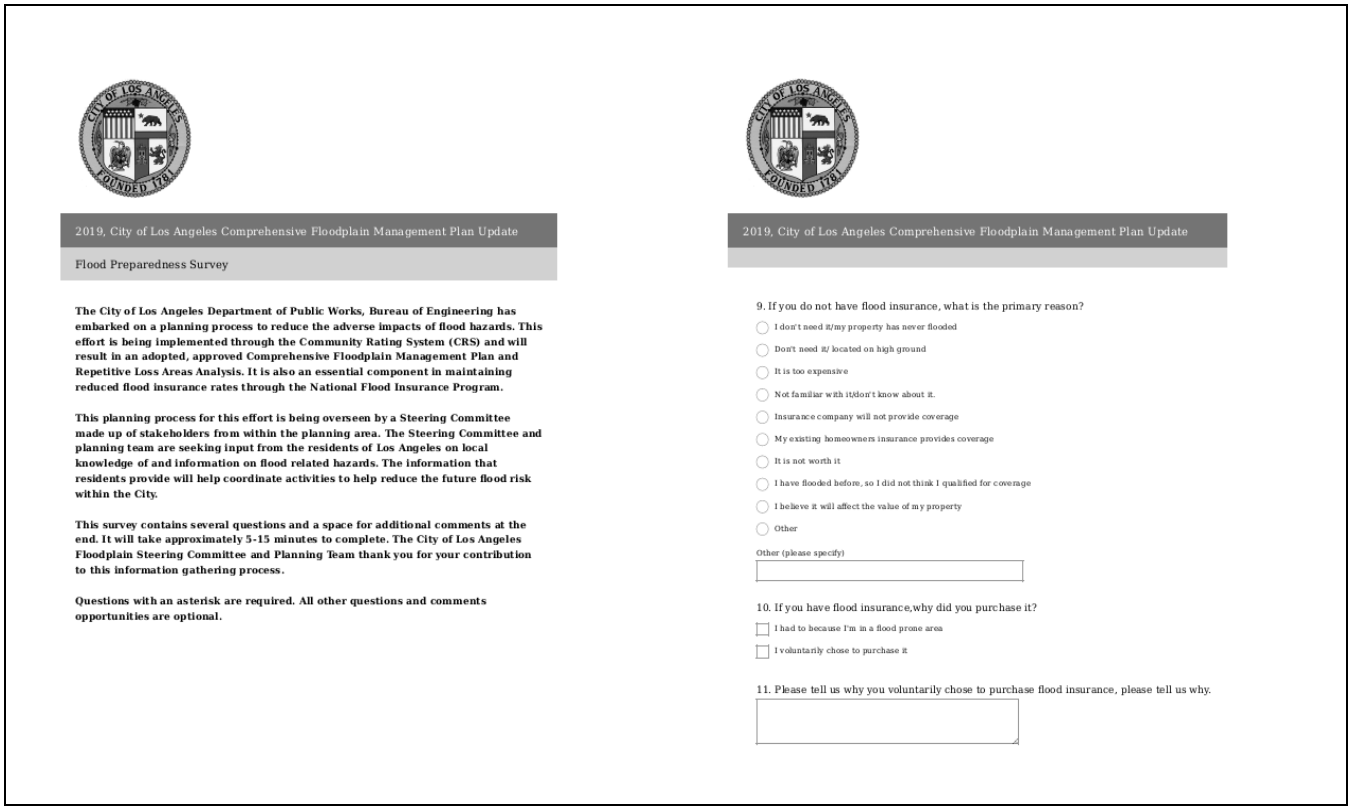

Figure 3-2. Sample Pages from Survey Distributed to the Public

Questions addressed the following topics:

- Level of awareness of flood risks
- Steps respondents have taken to prepare for floods
- Preferred communication methods for distributing information about flood risk
- Knowledge about the level and sources of flood risks
- Awareness of City floodplain management policies
- Flood insurance.

Multiple methods were used to solicit survey responses:

- The survey was prepared in both English and Spanish
- Web-based versions of both languages were made available on the FMP website.
- All attendees at the public open houses were asked to complete a survey, using the web site or hard copies of the survey form available at the open houses.
- Extensive outreach was implemented using the City's extensive social media resources (see Figure 3-3)
- The survey and the plan information website were advertised in the "flood bulletin" that is sent annually to all floodplain and repetitive loss area residents (see Figure 3-4).
- Individual Steering Committee members contacted organizations to request that they publicize the link to the online survey; the following organizations were contacted in this way:
    - City of Los Angeles Neighborhood Councils
    - City of Los Angeles City Council.

Public Meetings

Phase 1 Public Meetings

The objective of Phase 1 of the public outreach strategy was to engage the public early in the planning process and to gauge public perception of flood risk. A public meeting was held near the Los Angeles River, an area that will be impacted by future FEMA flood map updates. The meeting was held as part of the "P-22" event, in Griffith Park, on October 19, 2019, about three months after the planning process began with the first Steering Committee meeting. The P-22 Day Festival is part of P-22 Day & Urban Wildlife Week, a series of events across the Santa Monica Mountains and the Los Angeles area that celebrates wildlife, with an emphasis on the Santa Monica Mountains Cougars. P-22 is a specific Cougar who has been tagged and monitored by several wildlife agencies. Over 7,000 people attended the P-22 Day Festival in 2019, and thousands more at the events throughout Urban Wildlife Week (see https://savelacougars.org/p-22-day/ for more information on this event).

This event provided an opportunity to educate a large audience on flood risk and the drivers for the FMP2020. The Bureau of Engineering had a booth providing the following information (see Figure 3-5 and Figure 3-6):

- An easel focusing on the Los Angeles River floodplain adjacent to Griffith Park was set up, and floodplain maps for all of the City were on hand and available for residents.
- Hazard modeling computer workstations provided property-specific flood risk information to inquirers
- A spinning wheel offered chances to win prizes, provided BOE and LASAN.
- Snacks were set out.
- FEMA and flood risk flyers were available.
- The online survey QR code and website were provided, and printed versions were on hand.

Members of the planning team on hand to engage participants recorded the number of adults who stopped at the booth. They counted 131 people, not including children.

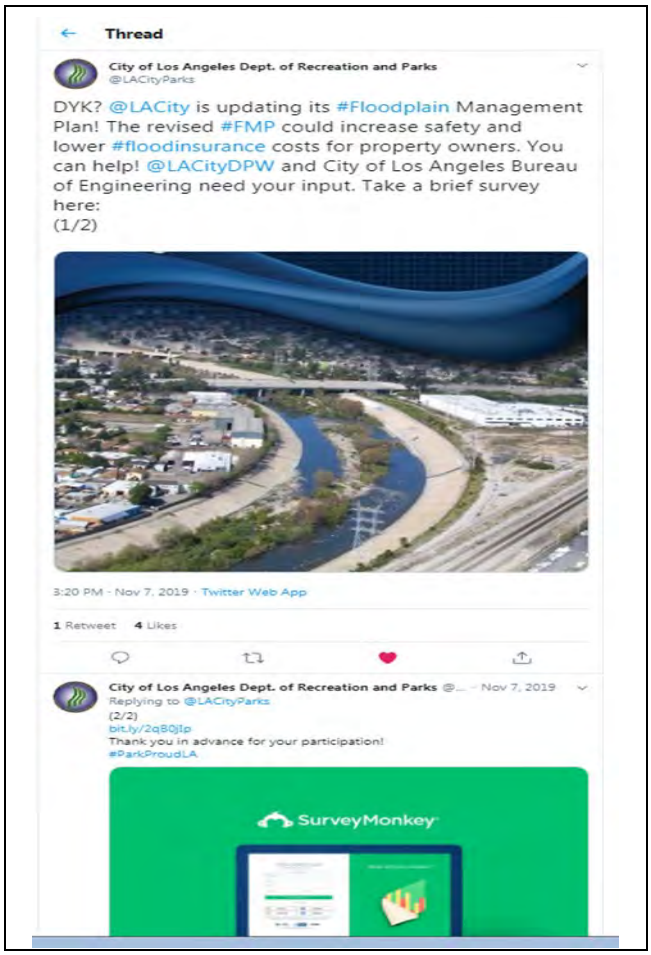

Figure 3-3. Social Media posts advertising the survey

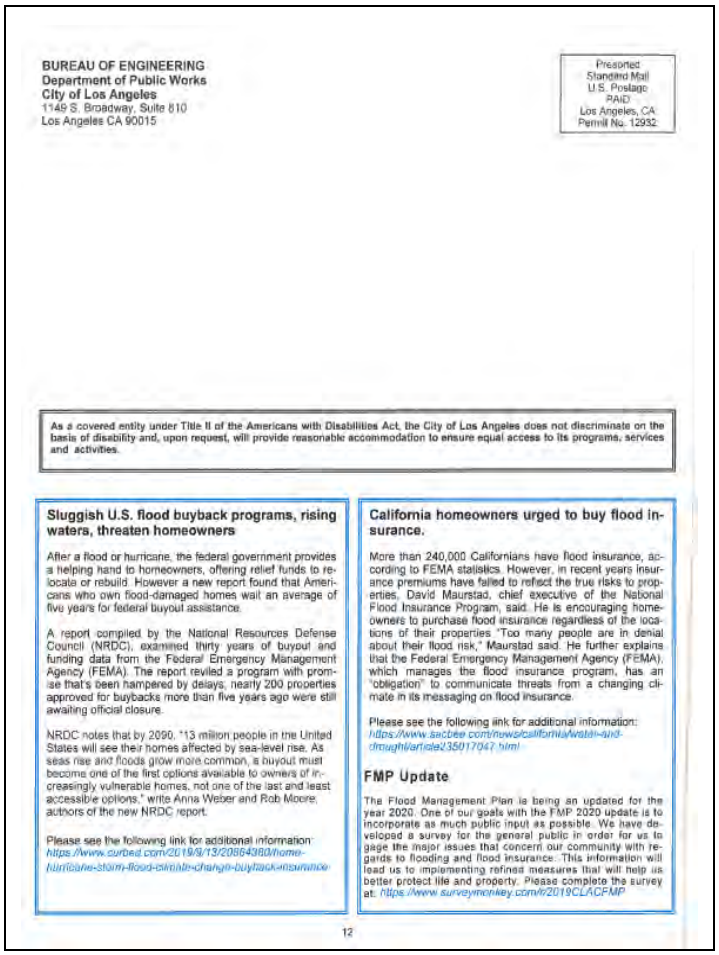

Figure 3-4. Back Page of Floodplain Resident and Repetitive Loss Area Mailing

Figure 3-5. BOE FMP Booth at P-22 Festival

Figure 3-6. Planning Team Engaging the Public at the P-22 Festival

A second Phase 1 public meeting was held on Thursday, January 9, 2020, from 6 to 8 p.m. at the Studio City Branch Library (12512 Moorpark Street). This was an open house meeting that began with a short presentation on the planning process, flood risk, and preliminary findings from the flood risk assessment. The open house allowed attendees to examine maps and handouts and to talk with members of the planning team . Computer mapping workstations allowed property owners to see information about their property—including exposure and damage estimates for flood hazard events (see Figure 3-7)—that could be printed out for them at the meeting or sent to them by email. Planning team members were present to answer questions. Each attendee was asked to complete a survey form, and each was given an opportunity to provide written comments describing personal experiences with flood related hazards in their community.

Figure 3-7. Sample Property-Specific Output from Open-House Computer Modeling Work Station

The meeting was lightly attended, with 10 members of the public as well as several members of the Steering Committee and executive officers from the City of Los Angeles (see Figure 3-8). The session was covered by Channel 35 for a spot on "LA This Week" (see Figure 3-9) that was presented via multiple media outlets (https://www.facebook.com/LAThisWeek/videos/654350835103481/).

Phase 2 Public Meetings

The objective for the Phase 2 public outreach strategy was to provide the public an opportunity to provide comment on the proposed draft plan during an advertised public comment period. The planning team, directed by the Steering Committee, announced a three-week public comment period to begin on May 19, 2020 and end at the close of business on June 9, 2020. Notice about the public comment period was sent to multiple media outlets and posted on the FMP2020 website and the social media networks available to the City.

This phase 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 prohibited the City from holding open-air public meetings for this phase.

Figure 3-8. 1/9/2020 Open House, Studio City

Figure 3-9. LA This Week Coverage of the 1/9/2020 Public Meeting

Following direction provided by the Insurance Services Office, FEMA's CRS program management contractor, the City mitigated these impacts as follows:

- Provide notice as usual of a 3-week public comment period—through press release, website and social media—with information on how the public can comment on the draft plan during the comment period.
- Post a narrated PowerPoint presentation about the draft plan on the FMP2020 website.
- Conduct a minimum of two virtual public meetings (webinars) by the planning team through a web-based media platform that can provide a digital signature by those participating and that allows for polling so that those in attendance can ask questions and those questions can be recorded by the planning team.

The planning team scheduled a virtual webinar to present the draft plan. The webinar was conducted during the public comment period, on June 2, 2020 from 5 to 6:30 p.m. The narrated PowerPoint posted to the FMP2020 website was presented at the webinar. All questions asked and the answers provided, as recorded by the medium used, informed the final draft of the FMP2020 and RLAA.

3.2.3 Public Involvement Results

Survey Outreach

Los Angeles County Public Works was facilitating an update to its Comprehensive Flood Hazard Management Plan concurrent with the City's FMP2020 update. The City and County were active stakeholder participants in each other's plan update efforts. Both efforts used surveys, and the two surveys were very similar in the number and types of 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 of the FMP. 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)

Public Meetings

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. Meeting attendance and comments received are summarized in Table 3-1.

Table 3-1. Summary of Public Meetings

Date	Location	Number of Residents in Attendance	Number of Survey Forms Completed	Comments Received
10/19/2019	P-22 Festival, Griffith Park	131	6	3
1/9/2020	Studio City Library Public Workshop	10	0	6
5/19 to 6/2	3-Week Public Comment Period	—	—	152
6/2/2020	Virtual Public Meeting	317	0	31
Total		458	0	40

3.3 REPETITIVE LOSS AREA SPECIFIC OUTREACH

Upon the completion of a draft of this report, the City of Los Angeles Department of Public Works disseminated a 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 3-10.

BOARD OF PUBLIC WORKS MEMBERS

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BUREAU OF ENGINEERING

GARY LEE MOORE, PE, ENV SP
CITY ENGINEER

1149 S. BROADWAY, SUITE 700
LOS ANGELES, CA 90015-2213

http://eng.lacity.org

07/10/2020

(RECIPIENT)
(ADDRESS)
(CITY), (STATE) (ZIP CODE)

Re: City of Los Angeles Community Flood Vulnerability

Dear City of Los Angeles Resident:

Greetings! You have received this letter because your property may be in an area subject to repetitive flooding that has been identified as a Repetitive Loss Area. The City of Los Angeles is conducting a Repetitive Loss Area Analysis (RLAA) to identify causes of flood loss in our community and to specify actions that can reduce those losses. You may recall receiving a letter about the RLAA in March 2020.

The draft of the RLAA report is now complete and available for public review and comment until July 31, 2020. You can review the draft RLAA report at: https://eng.lacity.org/fmp-updates

Please review the draft RLAA report and send your comments to the City's consultant via email at Rob.Flaner@tetratech.com

Thank you for your time and interest in this project. We look forward to your continued participation as we work to reduce the impact of flooding on our homes and neighborhoods. If you have any questions on this project or would like more information, please contact City's National Flood Insurance Program specialist, Romano Galassi, at (213) 847-0405 or romano.galassi@lacity.org

AN EQUAL EMPLOYMENT OPPORTUNITY EMPLOYER

Recyclable and made from recycled waste.

Figure 3-10. Repetitive Loss Area Target Mailing

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 the City of Los Angeles. 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. The Los Angeles County Department of Public Works and the Los Angeles County Flood Control District work to reduce flood risk throughout Los Angeles County, including in the City of Los Angeles. 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.

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

Agency, Program or Regulation	Local Relevance and Response
Americans with Disabilities Act	In the event of a flood, persons with disabilities may require additional assistance in evacuation (e.g., vehicles with wheelchair lifts or paratransit buses). Local governments may consider implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance. FEMA floodplain management project grant applications require full compliance with applicable federal acts.
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.
Civil Rights Act of 1964	FEMA floodplain management project grant applications require full compliance with applicable federal acts.
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. FEMA floodplain management project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	This is a potential alternative source of funding for actions identified in this plan.
Community Rating System	This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements. The City of Los Angeles has participated in the CRS program since 1991. To maintain or improve its rating, the City goes through an annual recertification and a re-verification every five years. This plan has been developed to help the City maintain or enhance its CRS classification in the future.

Agency, Program or Regulation	Local Relevance and Response
Emergency Watershed Program	This is a possible funding source for actions identified in this plan.
Endangered Species Act	FEMA floodplain management project grant applications require full compliance with applicable federal acts. Floodplain managers should be aware of any potential floodplain management measures that could fall under the Endangered Species Act.
Federal Energy Regulatory Commission Dam Safety Program	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
Floodplain Management and Protection of Wetlands (44 CFR Part 9)	This federal code requires federal agencies to avoid long and short-term adverse impacts associated with occupancy and modification of floodplains.
National Dam Safety Act	This act requires a periodic engineering analysis of most dams in the country
National Environmental Policy Act	FEMA floodplain management project grant applications require full compliance with applicable federal acts.
National Flood Insurance Program	This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations. The City of Los Angeles participates in the NFIP and has adopted regulations that meet the NFIP requirements. The City is currently in good standing with the provisions of the NFIP as monitored by FEMA Region IX and the California Department of Water Resources.
National Incident Management System	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards
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.
U.S. Army Corps of Engineers Dam Safety Program	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	The Corps of Engineers offers multiple funding and technical assistance programs available for floodplain management actions

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

Agency, Program or Regulation	Local Relevance and Response
AB 70: Flood Liability	A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a state flood control project
AB 162: Flood Planning, Chapter 369, Statutes of 2007	Cities and counties must address flood-related matters in the land use, conservation, and safety and housing elements of their general 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 2140: General Plans—Safety Element	This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans.
AB 2800: Climate Change—Infrastructure Planning	This act requires state agencies to take into account the impacts of climate change when developing state infrastructure.
California Civil Code 1102	The flood hazard disclosure requirements established under this code apply to all real estate transactions in the City of Los Angeles.

Agency, Program or Regulation	Local Relevance and Response
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.
California Department of Water Resources	This state department is the state coordinating agency for floodplain management.
California Division of Safety of Dams	This division monitors the dam safety program at the state level and maintains a working list of dams in the state.
California General Planning Law	This law requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of floodplain management plans with general plans.
California Environmental Quality Act	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
California State Building Code	Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events.
First Validating Act of 2019	This act requires cities and counties to include climate adaptation and resiliency strategies in the safety element of their general plans.
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.
Los Angeles Regional Water Quality Control Board	The Los Angeles Regional Water Quality Control Board protects ground and surface water quality in the Los Angeles region.
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.
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	The City's compliance with SB 379 is described in Section 4.2.
Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements	Under this bill, review and revision of general plan safety elements are required to address only flooding and fires (not climate adaptation and resilience), and environmental justice is required to be included in general plans.
Standardized Emergency Management System	Local governments must use this system to be eligible for state funding of response-related personnel costs.

4.2 LOCAL

4.2.1 City of Los Angeles

General Plan

The Los Angeles General Plan is a comprehensive set of purposes, policies and programs to guide the future form and development of the City. The plan is approved by the City Council and the Mayor and adopted by the Planning Commission. The General Plan is both a strategic and long-term document, broad in scope and specific in nature. It is implemented by decisions that direct the allocation of public resources and that shape private development, which affects the lives of the residents and business community. The General Plan is prepared and maintained by the Department of City Planning. The City is currently updating the General Plan. The update (OurLA2040) is anticipated to be completed in 2020. The current plan consists of the following elements:

- Plan for a Healthy LA: A Health and Wellness Element of the General Plan, March 2015
- Air Quality Element: An Element of the City of Los Angeles General Plan, November 1992
- Conservation Element of the City of Los Angeles General Plan, September 2001
- The Housing Element 2013 – 2021 of the City of Los Angeles General Plan, December 2013
- Noise Element of the City of Los Angeles General Plan, February 1999
- The Open Space Element of the City of Los Angeles General Plan, June 1973
- Infrastructure Systems Element of the City of Los Angeles General Plan, October 1971
- Safety Element of the City of Los Angeles General Plan, November 1996
- Mobility Plan 2035, An Element of the General Plan, September 2016 (previously the Transportation Plan)
- The Land Use Element of the General Plan, 2001 – 2017 (consisting of 35 community plans)

The Safety Element addresses protection from unreasonable risks associated with natural disasters, including stormwater and inundation. The Safety Element includes the Emergency Operations Organization and other interagency coordination, the California State safety element requirements, and emergency response, disaster recovery and hazard mitigation.

The Department of City Planning is reviewing all of the General Plan elements, establishing a schedule for updating plans that are still pending, and developing a sequence for updating other existing elements. The following new laws, requirements, resources, and research will affect general planning:

- SB 375 (Sustainable Communities Strategies)
- SB 379 (Land Use, General Plan, Safety Element)
- SB 5 (Affordable Housing and Community Development Investment Program)
- SB 743 (Environmental Quality)
- SB 244 (Island or Fringe Communities)
- SB 1000 (Safety Element and Environmental Justice)
- AB 52 (Tribal Consultation)
- AB 2140 (General Plan Safety Element)
- Home-Sharing Ordinance adopted November 2019
- Accessory Dwelling Unit Ordinance adopted August 2019
- Historic Preservation Overlay Zone code amendment
- Proposed Vacation Rental Ordinance drafted November 2019.

The General Plan must comply with the California General Planning Law and with the additional flood planning provisions of AB 162. The General Plan, the FMP2020, and this RLAA are considered to be linked as the General Plan represents the City's adopted policies and the FMP2020 and RLAA are part of the implementation programs established to carry out policies.

Comprehensive Zoning Plan

The Zoning Code regulates all land, building, structures, and uses within the City of Los Angeles. Since 2013, the City has been in the process of creating a new zoning code for the 21st century. The original zoning regulations were developed in 1946 and had not been revised comprehensively since then. An ongoing initiative called, "Plan re:code LA" is the City's latest effort to update the zoning code with an engaged community vision, policies and implementation strategies, alignment with various adopted plans, land use and zoning maps, and address the issues of unique neighborhoods with needs that differ by neighborhood. The code update team released a draft of an ordinance September 2017, held five public hearings and a dozen stakeholder group meetings. A City Planning Commission meeting was held October 2018 and is currently making its way through the legislative process.

Los Angeles Municipal Code Chapter 1, Article 2, also known as the Comprehensive Zoning Plan of the City of Los Angeles, coordinates all City zoning regulations and provisions in order to regulate the location and use of

buildings, structures and land. The goals of the Comprehensive Zoning Plan are to encourage the most appropriate use of land; to stabilize the value of property; to provide adequate open spaces; to prevent and fight fires; to prevent undue concentration of population; to lessen street congestion; to facilitate adequate provisions for transportation, water, sewerage, schools, parks and other public requirements; and to promote health, safety and the general welfare in accordance with the General Plan. It includes designation of zones that allow for floodplains and flood control facilities and presents design standards including those that deal with flood prevention and control.

Los Angeles River Revitalization Master Plan

The Los Angeles River has a long history of modifications that were made to control flooding as the City of Los Angeles grew. More recently, community leaders, elected officials, concerned citizens, environmental groups and recreational groups began to look for ways to return the natural benefits of the river to the people of Los Angeles while maintaining flood protection and safety. In 2007, the City adopted the Los Angeles River Revitalization Master Plan, establishing a blueprint for future revitalization of the Los Angeles River.

The master plan's long-term vision is to restore a continuous, functioning ecosystem along the river corridor. This would involve restoring vegetation and developing fish passages, fish ladders, and riffle pools. It also would involve expanding channel capacity and reducing flow velocity through a combination of flood storage outside the channel, underground flow diversions, and land acquisition to allow for channel widening. In the short-term, channel walls can be modified to provide landscaped terraces for wildlife habitat, water quality treatment, and increased public enjoyment. Pathways and overlooks can provide safe public access (City of Los Angeles, 2007).

Programs to Preserve or Enhance Natural Beneficial Functions

The City of Los Angeles has implemented numerous programs to preserve or enhance the natural beneficial functions that floodplains provide. This includes projects to improve local water quality, as well as development review requirements for mapped significant ecological areas. These programs are described in detail in the natural beneficial functions plan that is presented in Chapter 12 of the FMP2020.

Flood-Related Activities of City Departments

Several City departments perform activities and collect data related to flooding issues. The following is a summary of key City activities related to floodplain management (City of Los Angeles, 2010):

- Department of Public Works, Bureau of Engineering
    - Maintain FEMA Flood Insurance Rate Map data.
    - Maintain a map of hillside areas.
    - Maintain records of drainage complaints. Complaints are investigated by staff engineers or maintenance crews. Complaints have been entered into a database and geo-coded for display on the GIS.
    - Maintain a list of known deficiencies. A project is identified to address each deficiency, so the deficiency list serves as a list of proposed projects. The projects can also be displayed on the GIS.
    - Assess infrastructure damage through field investigations after major storms.
    - Prepare geotechnical reports related to geologically unstable areas.
    - Maintain a database of FEMA Repetitive Loss Properties.
    - Maintain participation in the One Water LA initiative
- Department of Public Works, Bureau of Sanitation
    - Assess infrastructure damage through field investigations after major storms.

- Identify areas in need of frequent maintenance of the flood control system.
- Maintain participation in the One Water LA initiative
- Maintain participation in the Enhanced Watershed Management Program

- Department of Building and Safety
  - Inspect buildings after major storms.
  - Issue building permits
  - Identify mud-prone and landslide areas throughout the City.
  - Track the number of building permits issued in flood risk areas.
  - Maintain participation in the One Water LA initiative
- Planning Department
  - Maintain demographic, building, land use and zoning data.
  - Determine flood protection provided by the General Plan and each Community Plan.
  - Maintain tsunami maps, dam failure inundation maps and landslide hazard identification maps from the Safety Element of the General Plan (input from the State Division of Mines and Geology and the State Office of Emergency Services).
  - Assess City policy in maintaining open space and the effectiveness of regulatory and preventive standards in preventing flood damage.
  - Maintain list of natural and beneficial areas within the City (wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species).
  - Maintain participation in the One Water LA initiative
- Department of Emergency Management
  - Assess ability of emergency plan to respond to flooding events.
  - Maintain the City's Hazard Mitigation Plan and its flood-related hazards
  - Maintain hazard preparedness guides for the public
- Port of Los Angeles/Los Angeles Harbor Department
  - Maintain tsunami signage program
  - Maintain participation in the One Water LA initiative
- Department of Water and Power
  - Implement necessary planning in the design, construction, reconstruction and maintenance of water and power systems to carry out floodplain management principles.
  - Maintain participation in the One Water LA initiative

City of Los Angeles Resilience Program

The City of Los Angeles is committed to addressing resilience by strengthening the city's physical, social, and economic foundations. The Mayor's Office has adopted far-reaching strategies to develop the tools the City needs to rebound from major crises if and when they come. By creating a pathway that recognizes roles across various scales of governance, planning, and action, we ensure our collective work is connected—providing opportunities for information sharing and collaboration.

The context of Los Angeles presents unique risks and vulnerabilities that impact the city's ability to sustain and strengthen its resilience. In resilience terms, "shocks" are sudden or acute events that threaten or impact Los

Angeles' immediate well-being. These can include earthquakes, extreme weather events, infrastructure failures, or civil unrest. "Stresses" are daily or chronic challenges that weaken our natural, built, or human resources. Examples include climate change, aging infrastructure, inequity, and homelessness. Stresses can amplify the effects of shocks when they occur, particularly for vulnerable populations.

One focus of Resilient Los Angeles is climate adaptation, which highlights taking action to reduce the impact of future climate change, while also preparing for and adapting to the already changing environment. Over the past few years, Los Angeles has experienced a new normal, with record-breaking drought, heat, and storms; climate projections indicate future challenges associated with urban heat island effects, unpredictable snowpack, and sea level rise. Among the expected challenges are severe weather and flooding—whether from storms or sea level rise or a combination of both.

With that in mind, the City takes very seriously all planning efforts intended to better prepare our City, its residents and its businesses to deal with and recover from any type of flooding that might occur. The Floodplain Management Plan serves as one of the City's primary tools to plan for, educate about, and inform the public regarding flooding, flood preparation, and flood recovery. ***100 Resilient Cities***

In 2013, the City of Los Angeles was selected as an inaugural member of 100 Resilient Cities network pioneered by the Rockefeller Foundation, an organization that helps cities confront 21st century challenges. The network gives cities tools to develop a road map to resilience:

- Financial and logistical guidance for establishing an innovative new position in city government—a Chief Resilience Officer—to lead the city's resilience efforts
- Expert support for development of a robust resilience strategy
- Connection with service providers and others who can help implement resilience strategies
- Membership in a global network of member cities that share best practices and support pioneering resilience.

Through these actions, the 100 Resilient Cities network aims to build urban resilience and establish guidelines for resilience among governments, non-governmental organizations, the private sector, and individual residents.

The Sustainable City pLAn

The Sustainable City pLAn is a road map for a Los Angeles that is environmentally healthy, economically prosperous, and equitable in opportunity for all—now and over the next 20 years. The pLAn focuses on both short-term results and long-term goals to transform the City. The pLAn provides the following:

- A vision for Los Angeles' future—Presents a clear vision and details specific long-term outcomes to be achieved over the next two decades in 14 key aspects of the environment, the economy and measures of social equity.
- A pathway to short-term results that lay the foundation for long-term outcomes—Creates a set of near-term, back-to-basics outcomes by 2017 that create a foundation to achieve transformational change by 2025 and 2035.
- A framework to build out policies—Lays out strategies and priority initiatives that will be developed and detailed to deliver the tangible outcomes in the pLAn.
- A platform for collaboration—Creates a platform for collaboration to identify, create, and strengthen programs, policies, and partnerships that cut across bureaucratic boundaries to improve the city and neighborhoods.
- A set of tools to help manage Los Angeles—Provides the Mayor with a set of tools to ensure implementation and empower the men and women who work for the City.

- A dashboard of sustainability metrics to transparently measure progress—Identifies and tracks clear metrics to measure progress and share how everyone—in city operations, and as Angelenos—is doing along the way.
- A pathway for engaging residents—Builds on leadership throughout Los Angeles, while providing Angelenos ways and opportunities to participate in creating tangible improvements to their lives, their neighborhoods, and the entire city.

Los Angeles "Green New Deal" is the first 4-year progress report on the accomplishments of the Sustainable City pLAn. It augments, expands, and elaborates in detail the city's vision for a sustainable future and it tackles the climate emergency with accelerated targets and new aggressive goals. The Green New Deal is an expanded vision for the pLAn—securing clean air and water and a stable climate, improving community resilience, expanding access to healthy food and open space, and promoting justice. The Green New Deal includes four key principles:

- A commitment to the Paris Climate Agreement and to act urgently with a scientifically driven strategy for achieving a zero carbon grid, zero carbon transportation, zero carbon buildings, zero waste, and zero wasted water
- A responsibility to deliver environmental justice and equity through an inclusive economy, producing results at the community level, guided by communities themselves
- A duty to ensure that every Angeleno has the ability to join the green economy, creating pipelines to good paying, green jobs and a just transition in a changing work environment
- A resolve to demonstrate the art of the possible and lead the way, walking the walk and using the City's resources—its people and its budget—to drive change

Venice Local Coastal Program

The California Coastal Act requires coastal communities to prepare a local coastal program, which must address potential hazards associated with coastal areas and establish policies and implementation measures to avoid or reduce coastal hazards. Sea level rise is a coastal hazard that scientific research has linked to climate change. Because the State of California and City of Los Angeles have made it a priority to prepare for climate change, the Venice Local Coastal Program must include a section on coastal hazards related to sea level rise, along with policies and implementation measures to avoid or reduce risks based on a Venice-specific sea level rise vulnerability assessment.

Sea level rise and climate change present challenges of a new magnitude. Sea level rise has the potential to significantly threaten many coastal resources, including shoreline development, coastal beach access and recreation, natural habitats, and cultural and scenic resources, all of which are subject to specific protections and regulations in the California Coastal Act. Sea level rise in Venice also has the potential to threaten critical infrastructure, transportation systems, canal and oceanfront communities, and public facilities, which could affect safety, health, and economic and environmental sustainability.

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program is designed to help identify flood risk and promote informed planning and development practices on a nationwide level. FEMA maps community-wide flood risks on maps called Flood Insurance Rate Maps (FIRMs), which provide detail about different flood hazard zones but do not incorporate or address anticipated sea level rise. The local coastal program sea level rise planning is developed at the local government level and is a comprehensive local plan to adapt to sea level rise unique to the Venice coastal zone.

4.2.2 Los Angeles County and Regional Agencies

Enhanced Watershed Management Plans

In order to improve water quality, comply with water quality mandates and address water supply issues, Municipalities and community stakeholders throughout Los Angeles County watersheds are working to develop Enhanced Watershed Management Plans for each of the five watersheds—Ballona Creek, Dominguez Channel, Marina del Rey, Santa Monica Bay and Upper Los Angeles River. The efforts are being led by the City of Los Angeles with the exception of Marina Del Rey watersheds led by the Los Angeles County Public Works.

Each plan identifies projects to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve local aesthetics, and support public education. Each outlines water quality priorities, watershed control measures, reasonable assurance analysis, the scheduling of projects and the monitoring, assessment and adaptive management of projects. The plans were submitted to the Los Angeles Regional Water Quality Control Board in 2017 and 2018 (LASAN, 2019).

Greater Los Angeles County Region Integrated Regional Water Management Plan

Municipalities and groups across the Greater Los Angeles County Region collaborated to develop an Integrated Regional Water Management Plan in 2006 that focuses on water resource management. The plan identifies solutions over the next 20 years to reduce dependence on imported water, clean up local groundwater and stormwater, enhance in-stream water quality, improve habitat, and expand parks and open space. The plan can support development of local funding sources and help local jurisdictions comply with regulatory mandates. It provides a tool for achieving planning targets for the region and improving the sustainability of water resources and ecological health of local watersheds. More sustainable water resources will improve the quality of life for all communities. (Los Angeles County Department of Public Works, 2020)

Los Angeles County Flood Control District

The State Legislature adopted the Los Angeles County Flood Control Act in 1915 after a disastrous regional flood. The Act established the Los Angeles County Flood Control District and empowered it to provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries. The Flood Control District is governed, as a separate entity, by the County of Los Angeles Board of Supervisors. In 1984, the Flood Control District entered into an operational agreement with the Los Angeles County Department of Public Works transferring planning and operational activities to the Department of Public Works. Watershed Management Division is the planning and policy arm of the Flood Control District. Public Works Flood Maintenance and Water Resources Divisions, respectively, oversee its maintenance and operational efforts.

The Flood Control District encompasses more than 2,700 square miles, 86 cities and 2.1 million land parcels. It includes the vast majority of drainage infrastructure within incorporated and unincorporated areas in every watershed, including 483 miles of open channel, 3,330 miles of underground storm drain, and an estimated 82,000 catch basins. The District includes all of the City of Los Angeles.

U.S. Army Corps of Engineers Los Angeles River Ecosystem Restoration Feasibility Study

The Los Angeles River Ecosystem Restoration Integrated Feasibility Report documents a study that was initiated in 2003 to determine whether there is a federal interest in ecosystem restoration along the Los Angeles River within the City of Los Angeles. The primary purpose of the project is to restore approximately 11 miles of the Los Angeles River from Griffith Park to Downtown Los Angeles by reestablishing riparian strand, freshwater marsh and aquatic habitat communities and reconnecting the river to major tributaries, its historic floodplain, and nearby regional habitat zones, all while maintaining existing levels of flood risk management. A secondary planning objective is to provide recreational opportunities consistent with the restored ecosystem.

The City of Los Angeles adopted the Los Angeles River Ecosystem Restoration Study on June 20, 2016. The study includes a hydraulic analysis along the proposed project's 11-mile extent that produced a set of floodplain maps. The purpose of this hydraulic analysis is to produce baseline and "with-project" snapshots of potential impacts that an ecosystem restoration plan might have on the flood conveyance capacity of the river. The resulting floodplain from this study is different from that on the currently effective FEMA FIRM for the City of Los Angeles.

These maps are not used in the risk assessment for this plan because the study was preliminary as of the time of this planning process. Since there are distinct differences between two studies by two different federal agencies (FEMA and the Corps of Engineers), the City wanted to make sure that this data was fully vetted before acknowledging the Corps study as "best available data."

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 the City of Los Angeles. Table 4-4 summarizes the administrative and technical capability. Table 4-5 summarizes fiscal capability. Table 4-6 summarizes the City's standing in various risk-related national programs. Table 4-7 summarizes the City's participation in flood-related national programs. These programs rank and evaluate the City's capabilities to implement flood hazard reduction programs such as building code enforcement and flood warning and response activities.

Table 4-3. Legal and Regulatory Capability

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated
CODES, ORDINANCES & REQUIREMENTS				
Building Code	Yes	No	No	Yes
Comment: City of Los Angeles Municipal Code, Chapter IX, Article I, Amended by Ordinance No. 185,198, effective 11/22/17				
Zoning Code	Yes	No	No	Yes
Comment: City of Los Angeles Municipal Code, Chapter I, Article 2 and Article 3, Amended by Ordinance No. 184,766, effective 3/27/17				
Subdivisions	Yes	No	No	No
Comment: City of Los Angeles Municipal Code, Chapter I, Article 7, Added by Ordinance No. 122,064, effective 6/14/62				
Post-Disaster Recovery	Yes	No	No	No
Comment: City of Los Angeles, Administrative Code, Division 8, Chapter 3, Section 8.61 Amended by Ordinance No. 179,421, effective 1/19/08				
Real Estate Disclosure	No	No	No	Yes
Comment: State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1002.6c)				
Growth Management	No	No	Yes	Yes
Comment: City of Los Angeles Municipal Code, Article 1.5, Section 11.5.6 General Plan, Amended by Ordinance 173,268, effective 7/1/00, Operational 7/1/00. Other jurisdictional authority is with the Southern California Association of Governments				
Site Plan Review	Yes	No	No	No
Comment: City of Los Angeles, Municipal Code, Chapter I, Article 6.1, Section 16.05, Renumbered and amended by ordinance No. 166,127, effective 9/23/90. Operational 10/13/90				
Stormwater Management	Yes	No	Yes, Los Angeles County	Yes
Comment: City of Los Angeles Municipal Code, Chapter VI, Article 4.4, Section 64.70, Article and Section added by Ord. No. 181,701, EFF. 6/12/11				

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated
PLANNING DOCUMENTS				
General Plan	Yes	No	No	Yes
Comment: Consists of a framework, 10 citywide elements, and land use elements for 35 planning areas, effective through 2040. This plan is currently being updated by the City Planning Department.				
Capital Improvement Plan	Yes	No	No	No
What types of capital facilities does the plan address? City buildings and projects (fire facilities/fire stations, animal shelters, police facilities, seismic retrofit program of bridges, construction projects such as neighborhood city halls, Police SID Tech Lab, El Pueblo Capital Program, youth recreational and cultural facilities, street and transportation projects, clean stormwater, recharge groundwater and provide cleaner beaches projects, zoo exhibits). Public housing, community investments.				
Comment: City of Los Angeles Capital Improvement Program, 2008-2009 – 2012-13 (last version available online)				
Economic Development Plan	Yes	No	No	No
Comment: City of Los Angeles Citywide Economic Development Strategy, August 28, 2018				
Floodplain Plan	Yes	No	No	No
Comment: City of Los Angeles Floodplain Management Plan, adopted 2015				
Stormwater Plans	Yes	No	Yes	Yes
Comment: Standard Urban Stormwater Mitigation Plan, adopted by the State Regional Water Quality Control Board in 2000, Enhanced Watershed Management Plan 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				
Habitat Conservation Plan	No	No	No	No
Comment: Conservation Element within the City of Los Angeles General Plan. Also see City of Los Angeles Master Plan 2035				
Shoreline Management Plan	Yes	No	Yes	Yes
Comment: Local Coastal Program Land Use Plan, Venice, California Coastal Commission				
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	No	No	Yes
Comment: Emergency Operation Master Plan and Procedures, November 2017				
Continuity of Operations Plan	Yes	No	No	Yes
Comment: The City Council has provided for the preservation of the City government in the event of an emergency (City of Los Angeles Administrative Code, Section 8.25), The alternates to key positions in the regular departments and agencies of government, or of business and industry, are shown in the City's Continuity of Operations/Continuity of Government Plan, department emergency plans, and executive or administrative orders or the equivalent issued by department or agency authorities.				
Post Disaster Recovery Plan	Yes	No	No	No
Comment: Annex to the Emergency Operations Master Plan, Recovery and Reconstruction Plan, June 2018				
Threat & Hazard Identification & Risk Assessment	Yes	No	No	Yes
Comment: Los Angeles / Long Beach Urban Area Security Initiative				
Resilience/Sustainability Plans				
Resilient Los Angeles (100RC Resilience Plan)	Yes	No	No	No
Comment: A plan that includes strategies to help the City fortify its infrastructure, protect its economy, and make the city safer. Plan developed pursuant to the 100RC program				
The Sustainable City pLAn 2019	Yes	No	No	No
Comment: The City's commitment to the Paris Climate Agreement and to act urgently with a scientifically driven strategy for achieving a zero carbon grid, zero carbon transportation, zero carbon buildings, zero waste, and zero wasted water.				

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	Department of City Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Department of Building and Safety
Planners or engineers with an understanding of flooding hazards	Yes	Department of Public Works, Bureau of Engineering and Bureau of Sanitation Department of City Planning
Staff with training in benefit/cost analysis	Yes	Can contract out for service
Floodplain manager	Yes	Department of Public Works, City Engineer
Surveyors	Yes	City of Los Angeles Survey Division
Personnel skilled or trained in GIS applications	Yes	Various, including Bureau of Engineering and City Planning
Scientist familiar with flooding hazards in local area	Yes	Department of Public Works
Emergency manager	Yes	Emergency Management Department, General Manager
Grant writers	Yes	Department of City Planning can assign planners to complete grant applications

Table 4-5. Fiscal Capability

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	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	08/19/2014
Building Code Effectiveness Grading Schedule	Yes	2/2	2014
StormReady	Yes	N/A	January 27, 2012
TsunamiReady	Yes	N/A	January 27, 2012

Table 4-7. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Department of Public Works, Bureau of Engineering
Who is your floodplain administrator? (department/position)	City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	No
What is the date of adoption of your flood damage prevention ordinance?	Ordinance No. 172081, Effective July 3, 1998
What is the date of your current Effective FIRM?	December 21, 2018
When was the most recent Community Assistance Visit or Community Assistance Contact?	December 4, 2019 by California DWR
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, please state what they are	Findings from December 2019 Community Assistance Visit were still pending as of this planning effort.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, please state why	No Current flood hazard maps may not have adequately addressed the flood risk within our jurisdiction especially for the area adjacent to the Los Angeles River according to recent studies by the U.S. Army Corps of Engineers. City is working with the Corps in filing a Los Angeles River letter of map revision (LOMR) with FEMA to update the current flood hazard maps in the Upper Los Angeles River near Glendale Narrow area. This LOMR was still being processed through coordination between FEMA Region IX and the City as of this plan update. All data associated with this LOMR is considered to be preliminary and will not be viewed as effective until accepted and approved by FEMA Region IX. Hillsides in the Santa Monica Mountains are also not adequately addressed, with repetitive loss areas not recognized by FEMA.
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?	Yes Annual refresher training courses are needed to help bring the flood management staff up to speed on the latest info and requirements in NFIP. Classes include but are not limited to "Floodplain Management and the Duties of the Local Administrator," "Elevation Certificate Review," "CRS Coordinator Manual Overview," "How to prepare for a Community Assistance Visit as well as a Cycle Verification Visit," etc.
Does your jurisdiction participate in the Community Rating System (CRS)? • If so, is your jurisdiction seeking to improve its CRS Classification?	Yes Yes
How many flood insurance policies are in force in your jurisdiction?[a]	9,801
What is the insurance coverage in force?	3,033,027,000
What is the premium in force?	$6,102,259
What is the average cost of a flood insurance policy?	$637
How many total loss claims have been filed in your jurisdiction?[a]	3,663
What were the total payments for losses?	$20,202,364
What is the average claim paid?	$5,515

a. According to FEMA statistics as of 7/31/2019 (https://www.fema.gov/policy-claim-statistics-flood-insurance)

5. MITIGATED REPETITIVE LOSS PROPERTIES

5.1 REPETITIVE LOSS LIST CORRECTION

CRS-participating communities are required to 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 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

The City of Los Angeles provided AW-501s for the following properties:

12816	17939	34521	39933	40832	58017	94323
12819	28336	35738	40145	45672	58021	94805
14891	28390	39188	40261	47162	72654	95776
14911	33983	39738	40388	49416	84045	136862
				56938	84552	137533

These properties were not used in the analysis and development of repetitive loss areas.

Federal Emergency Management Agency
National Flood Insurance Program
NFIP REPETITIVE LOSS UPDATE WORKSHEET (AW-501)

OMB #1660-0022 EXPIRES Sept 30, 2013

THE INFORMATION ON THE 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: 56-09-29-0-999-000

Current Property Address
12345 MEMORY LANE
FAIRHOPE AL 365325963

Previous Property Address/Community ID#

Last Claimant:

Insured: YES Named Insured: ELMER FLOOD

Dates of Losses: Total Number of Losses for Property: 2

20040916	19980927							

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 your 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. X FLOOD PROTECTION PROVIDED.
Choose this update 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 information below must be provided.

Mitigation Action 1.) P Source of Primary Mitigation Funding 3.) Q Secondary Source of Funding 3.) W

5. NO BUILDING ON PROPERTY.
Choose this update only if the property in question can be positively identified as the site of the previously flooded building and documentation is available to support that an insurable building no longer exists at this site. The Update must be supported by documentation such as a Demolition or Relocation Permit and the Mitigation action and funding information below must be provided.

Mitigation Action 2.) Source of Primary Mitigation Funding 3.) Secondary Source of Funding 3.)

See Appropriate Mitigation Action and Funding Codes

6. DUPLICATE LISTING WITH RL NUMBER: COMBINE AS ONE LISTING.
Choose this update to identify two or more separate listings that are for the same building. List all other RL numbers that are duplicates to this property. Please indicate which address shown is the correct address to use.

7. HISTORIC BUILDING:
Choose this update if you know the building is or would be eligible to be listed on a State or National Historic Registry.

COMMENTS SECTION:
Previously updated - this property is no longer considered a RL property
Updated as - Flood protection provided - on 11/05/2009

A signed RL Transmittal Sheet must accompany this form for approval of the update)

03/31/2011 PAGE 73 OF 448

Figure 5-1. Example AW-501

6. MITIGATION ALTERNATIVES CONSIDERED

Although this report presents separate analyses for each identified repetitive loss area in the City of Los Angeles, 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 City, 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 (FEMA 2017) breaks the primary types of mitigation down as follows:

- **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

The City of Los Angeles regulates residential and commercial development through its building code, planning and zoning requirements, stormwater management regulations and floodplain management ordinances. Any project located in a floodplain, regardless of its size, requires a permit from the City, unless the project can be characterized as routine maintenance.

6.2 PROPERTY PROTECTION

Property protection measures are generally performed by property owners or their agents. FEMA has published numerous manuals to help property owners determine appropriate property protection measures:

- 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 the City are:

- Acquisition
- Home elevation (structure or damage prone components such as furnace or AC unit)
- Dry flood-proofing (so water cannot get in)
- Wet flood-proofing portions of the building (so water will not cause damage)
- Directing drainage away from buildings
- 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 City of Los Angeles 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 the City of Los Angeles 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 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. The City 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 area.

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

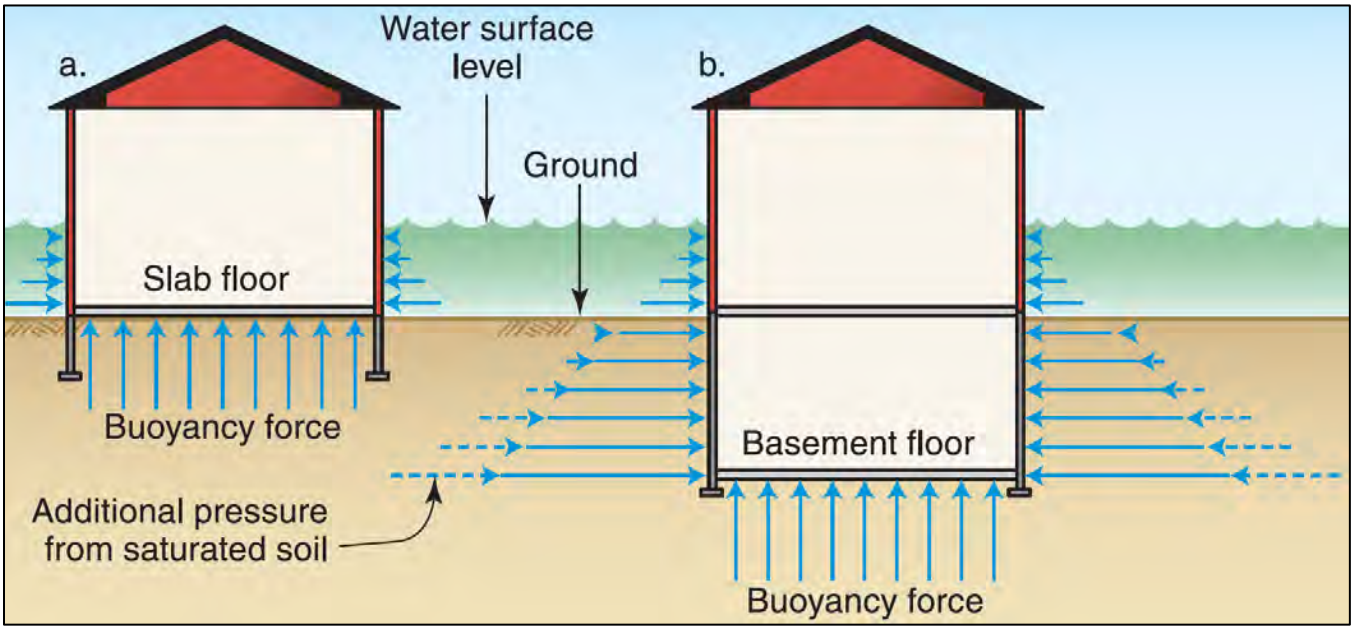

Figure 6-1. Dry Flood-Proofing Example

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. 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.

Source: FEMA P-312, June 30, 2014

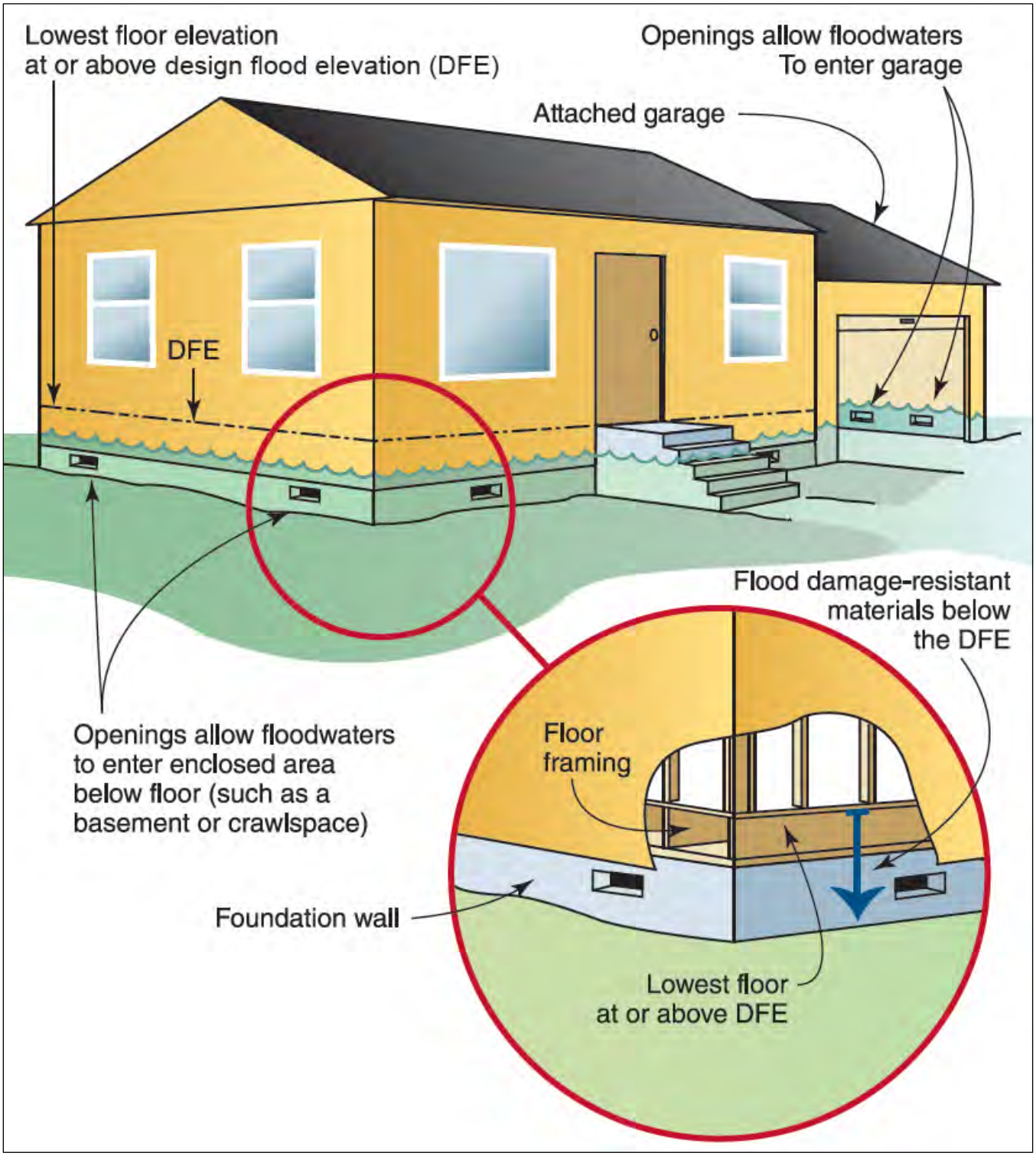

Figure 6-2. Wet Flood-Proofing Example

6.2.5 Directing Drainage Away from Buildings

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 drainageway 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 can be 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, drainage problems may return if the swales along the lot lines or in the back yard get filled in or property owners build fences, garages, sheds, swimming pools, and other obstructions up to the lot line, blocking the drainage from running off the property. These future drainage problems can be fixed by removing the obstructions and restoring the swales so they will again carry water away from the building.

6.2.6 Drainage Maintenance

Dumping into the drainage system is a violation under the City of Los Angeles Municipal Code. 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, contact the City of Los Angeles Department of Public Works at 800-974-9794.

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

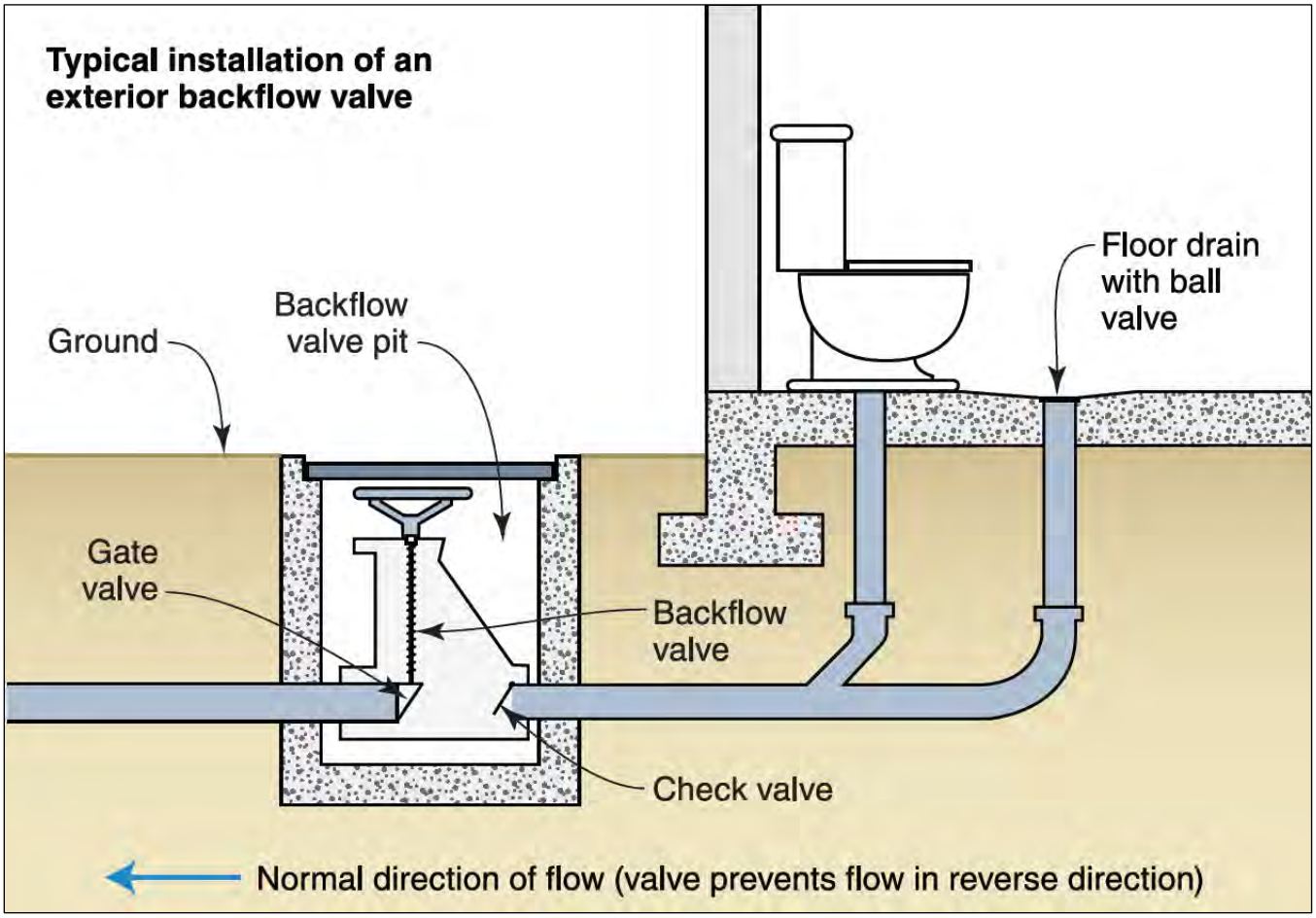

Figure 6-3. Sewer Backflow Valve Installation Example

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 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. The City of Los Angeles Department of Public Works develops and implements capital projects.

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, the City of Los Angeles Department of Public Works sends out an annual outreach letter to every resident in each repetitive loss area.

PART 2—ANALYSIS OF INDIVIDUAL REPETITIVE LOSS AREAS

7. BENEDICT CANYON

7.1 PROBLEM STATEMENT

The Benedict Canyon repetitive loss region is comprised of Repetitive Loss Areas 1-6. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 7.2 through Section 7.6. Maps are not included for single-building repetitive loss areas due to privacy concerns.

7.2 REPETITIVE LOSS AREA NO. 1

7.2.1 Identified Repetitive Loss Properties

Table 7-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 7-1. Repetitive Loss Properties in Repetitive Loss Area 1

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
6605	1	X	2/92, 12/97	$2,783	No

7.2.2 Properties Included in Repetitive Loss Area 1

One property with one structure has been identified in this repetitive loss area. Table 7-2 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 7-2. All Properties in Repetitive Loss Area 1

Property ID	# of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BenCan-1-1	1	Crawlspace	D8A	Elevate, Dry Flood Proof, Directional Drainage

7.3 REPETITIVE LOSS AREA NO. 2

7.3.1 Identified Repetitive Loss Properties

Table 7-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 7-3. Repetitive Loss Properties in Repetitive Loss Area 2

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
144893	2	B	01/05, 03/98	$14,019	No
14893	2	EMG	02/80, 03/78	$4,343	No

7.3.2 Properties Included in Repetitive Loss Area 2

Two properties with a total of two structures have been identified in this repetitive loss area. Table 7-4 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 7-4. All Properties in Repetitive Loss Area 2

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BenCan-2-1	1	D9B	Slab	Elevate, Dry Flood Proof, Directional Drainage
BenCan-2-2	1	D8A	Crawlspace	Elevate, Dry Flood Proof, Directional Drainage

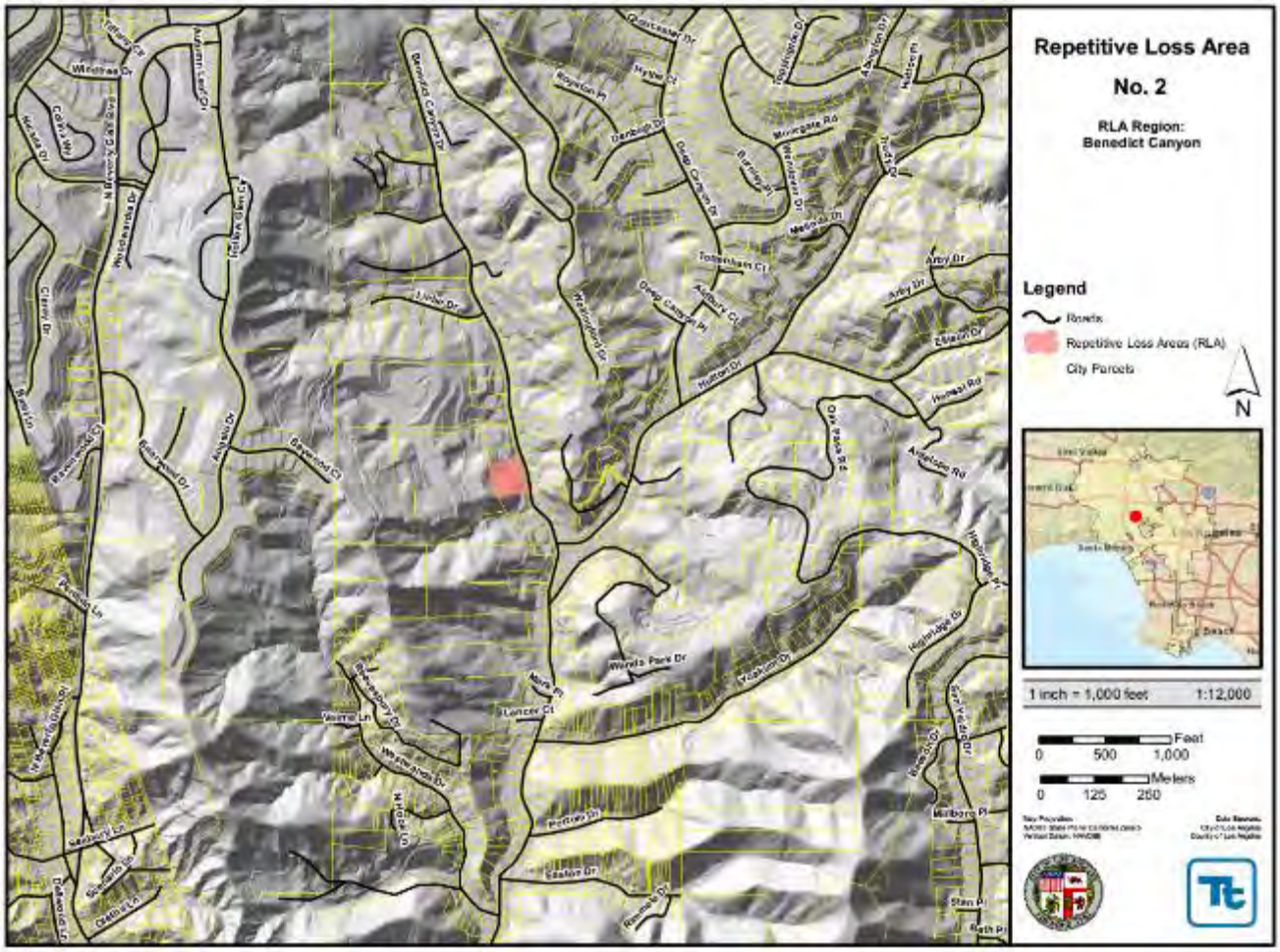

Figure 7-1. Repetitive Loss Area No. 2

7.4 REPETITIVE LOSS AREA NO. 3

7.4.1 Identified Repetitive Loss Properties

Table 7-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 7-5. Repetitive Loss Properties in Repetitive Loss Area 3

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
39174	3	A (SFHA)	03/83, 02/79	$7,655	No

7.4.2 Properties Included in Repetitive Loss Area 3

One property with one structure has been identified in this repetitive loss area. Table 7-6 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 7-6. All Properties in Repetitive Loss Area 3

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BenCan-3-1	1	D8B	Crawlspace	Elevate, Dry Flood Proof, Directional Drainage

7.5 REPETITIVE LOSS AREA NO. 4

7.5.1 Identified Repetitive Loss Properties

Table 7-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 7-7. Repetitive Loss Properties in Repetitive Loss Area 4

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
57891	4	A (SFHA)	02/93, 11/85	$31,741	No

7.5.2 Properties Included in Repetitive Loss Area 4

Two properties with a total of four structures have been identified in this repetitive loss area. Table 7-8 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 7-8. All Properties in Repetitive Loss Area 4

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BenCan-4-1	2	D12A	Crawlspace	Elevate, Dry Flood Proof, Directional Drainage
BenCan-4-2	2	D11B	Crawlspace	Elevate, Dry Flood Proof, Directional Drainage

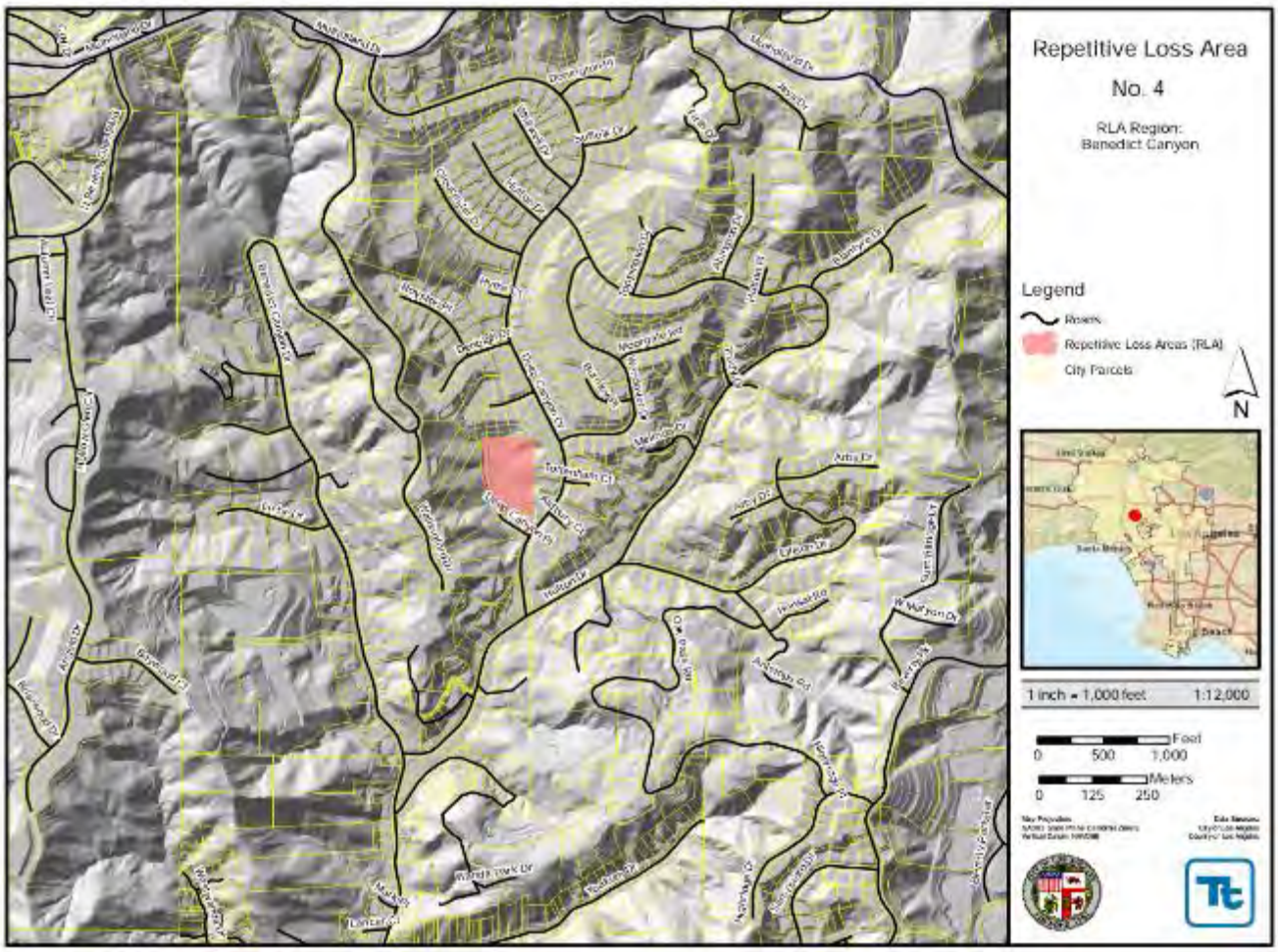

Figure 7-2. Repetitive Loss Area No. 4

7.6 REPETITIVE LOSS AREA NO. 5

7.6.1 Identified Repetitive Loss Properties

Table 7-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 7-9. Repetitive Loss Properties in Repetitive Loss Area 6

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138199	5	B	02/05, 12/04	$14,244	No

7.6.2 Properties Included in Repetitive Loss Area 5

One property with one structure has been identified in this repetitive loss area. Table 7-10 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 7-10. All Properties in Repetitive Loss Area 5

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BenCan-5-1	1	D9D	Crawlspace	Elevate, Dry Flood Proof, Wet Flood Proof

8. Berry Canyon

8.1 PROBLEM STATEMENT

The Benedict Canyon repetitive loss region is comprised of Repetitive Loss Areas 7 - 10. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 8.2 through Section 8.4. Maps are not included for single-building repetitive loss areas due to privacy concerns.

8.2 REPETITIVE LOSS AREA NO. 6

8.2.1 Identified Repetitive Loss Properties

Table 8-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 8-1. Repetitive Loss Properties in Repetitive Loss Area 6

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
17936	6	EMG	02/80, 03/78	$7,672	No

8.2.2 Properties Included in Repetitive Loss Area 6

Two properties with a total of two structures have been identified in this repetitive loss area. 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 Repetitive Loss Area 6

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BerCan-6-1	1	Slab	D85C	Elevate, Dry Flood Proof, Directional Drainage
BerCan-6-2	1	Crawlspace	D8C	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage

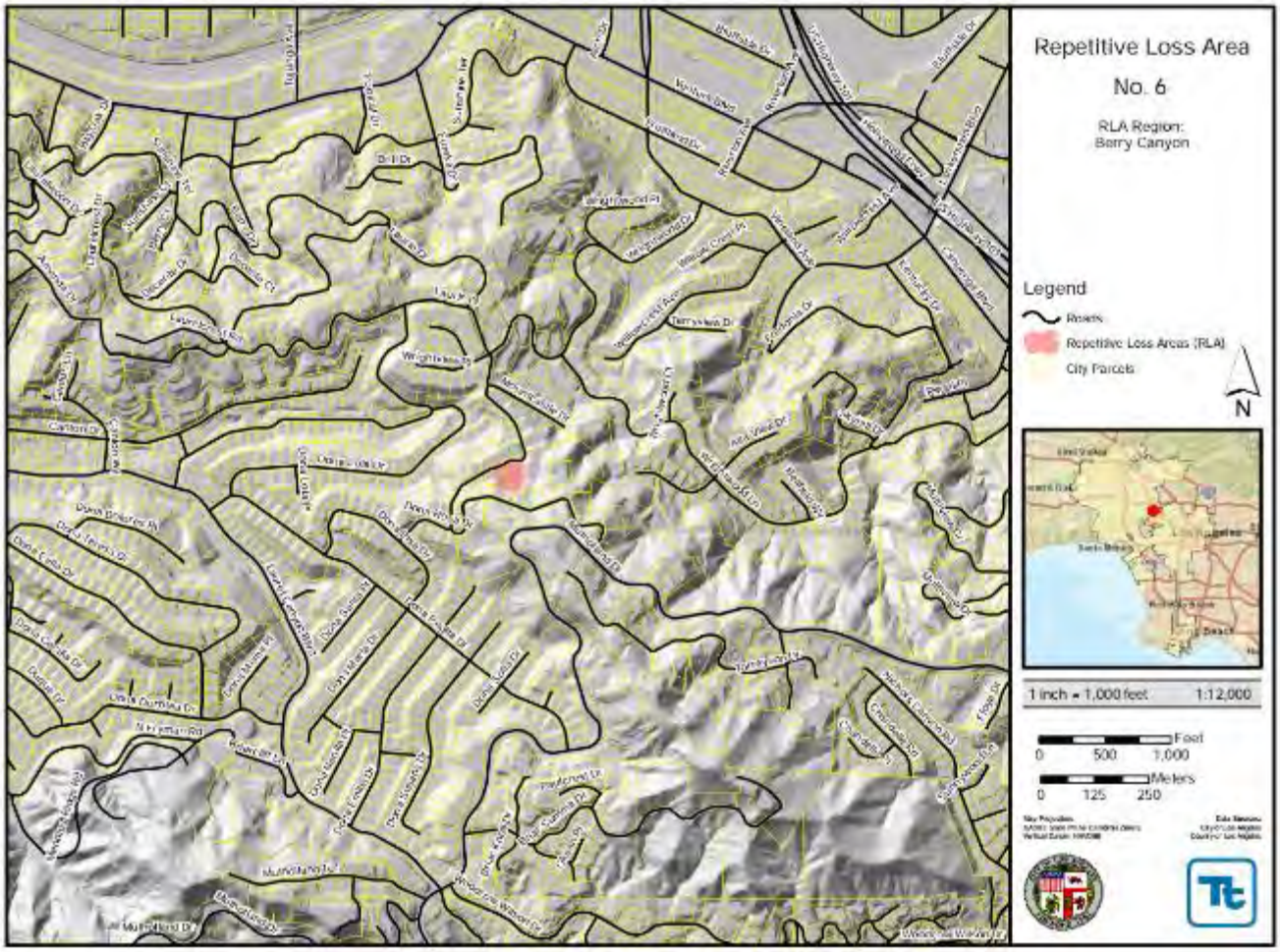

Figure 8-1. Repetitive Loss Area No. 6

8.3 REPETITIVE LOSS AREA NO. 7

8.3.1 Identified Repetitive Loss Properties

Table 8-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 8-3. Repetitive Loss Properties in Repetitive Loss Area 7

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138958	7	X	10/04, 02/98	$13,392	No

8.3.2 Properties Included in Repetitive Loss Area 7

One property with one structure has been identified in this repetitive loss area. Table 8-4 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 8-4. All Properties in Repetitive Loss Area 7

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BerCan-7-1	1	Slab	D85B	Elevate, Dry Flood Proof, Wet Flood Proof

8.4 REPETITIVE LOSS AREA NO. 8

8.4.1 Identified Repetitive Loss Properties

Table 8-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 8-5. Repetitive Loss Properties in Repetitive Loss Area 8

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137534	8	C	02/05, 01/01	$15,607	No

8.4.2 Properties Included in Repetitive Loss Area 8

One property with one structure has been identified in this repetitive loss area. Table 8-6 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 8-6. All Properties in Repetitive Loss Area 8

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
BerCan-8-1	1	Crawlspace	D7B	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage

9. COLDWATER CANYON

9.1 PROBLEM STATEMENT

The Coldwater Canyon repetitive loss region is comprised of Repetitive Loss Areas 11-12. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. In addition, RLA 12 consists of urbanized stormwater drainage issues. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 9.2 through Section 9.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

9.2 REPETITIVE LOSS AREA NO. 9

9.2.1 Identified Repetitive Loss Properties

Table 9-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 9-1. Repetitive Loss Properties in Repetitive Loss Area 9

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
41643	9	C	01/95, 02/93	$16,380	No

9.2.2 Properties Included in Repetitive Loss Area 9

Three properties with a total of three structures have been identified in this repetitive loss area. 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 Repetitive Loss Area 9

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CWC-9-1	1	Crawlspace	D11A	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
CWC-9-2	1	Slab	D85B	Elevate, Dry Flood Proof, Directional Drainage
CWC-9-3	1	Slab	D85D	Elevate, Dry Flood Proof, Directional Drainage

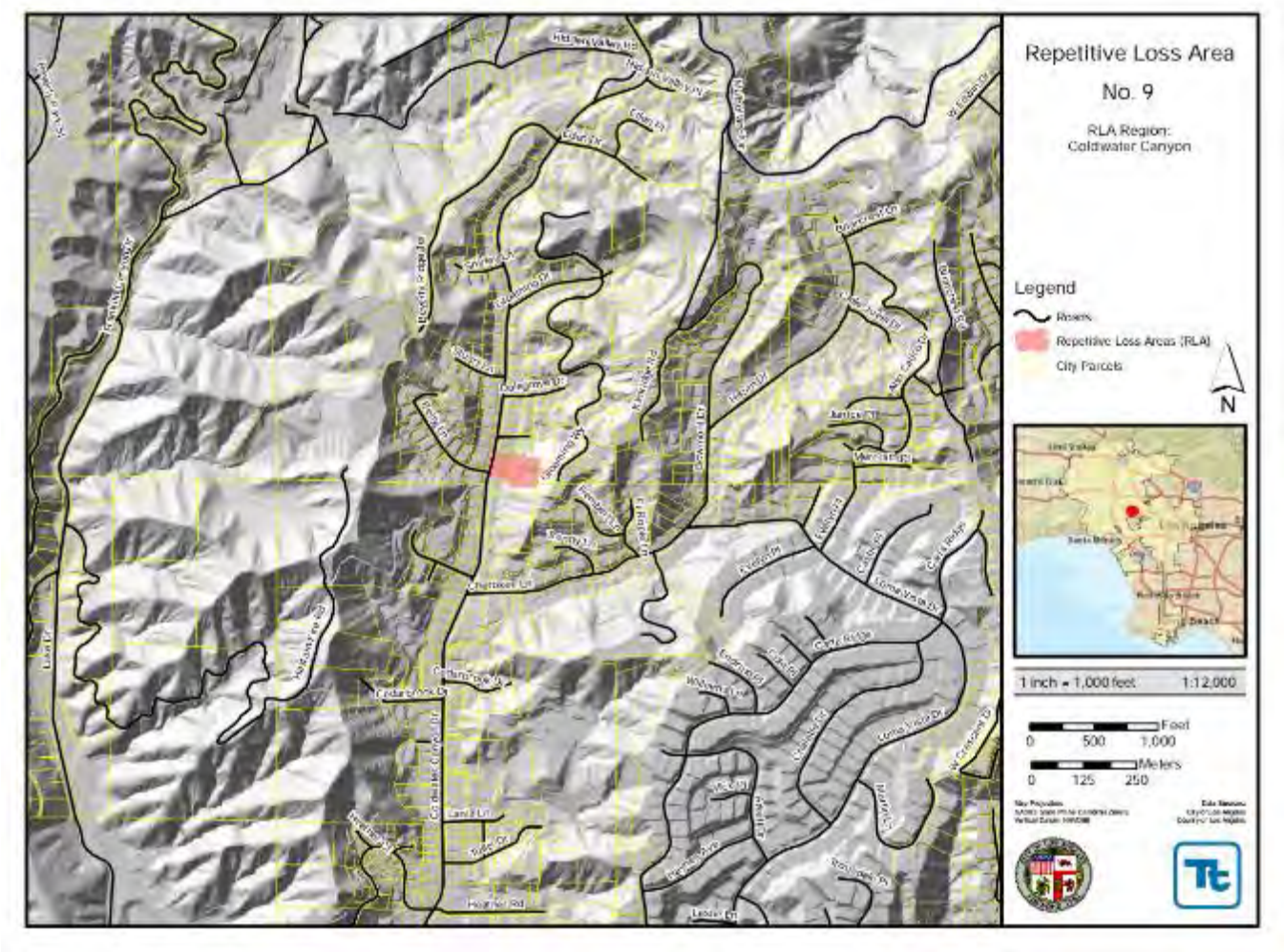

Figure 9-1. Repetitive Loss Area No. 9

9.3 REPETITIVE LOSS AREA NO. 10

9.3.1 Identified Repetitive Loss Properties

Table 9-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 9-3. Repetitive Loss Properties in Repetitive Loss Area 10

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
174323	10	C	01/08, 02/98	$8,733	No

9.3.2 Properties Included in Repetitive Loss Area 10

Three properties with a total of six structures have been identified in this repetitive loss area. Table 9-4 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 9-4. All Properties in Repetitive Loss Area 10

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CWC-10-1	3	Crawlspace	D10C	Elevate, Dry Flood Proof, Wet Flood Proof
CWC-10-2	1	Slab	D95A	Elevate, Dry Flood Proof
CWC-10-3	2	Crawlspace	D95B	Elevate, Dry Flood Proof, Wet Flood Proof

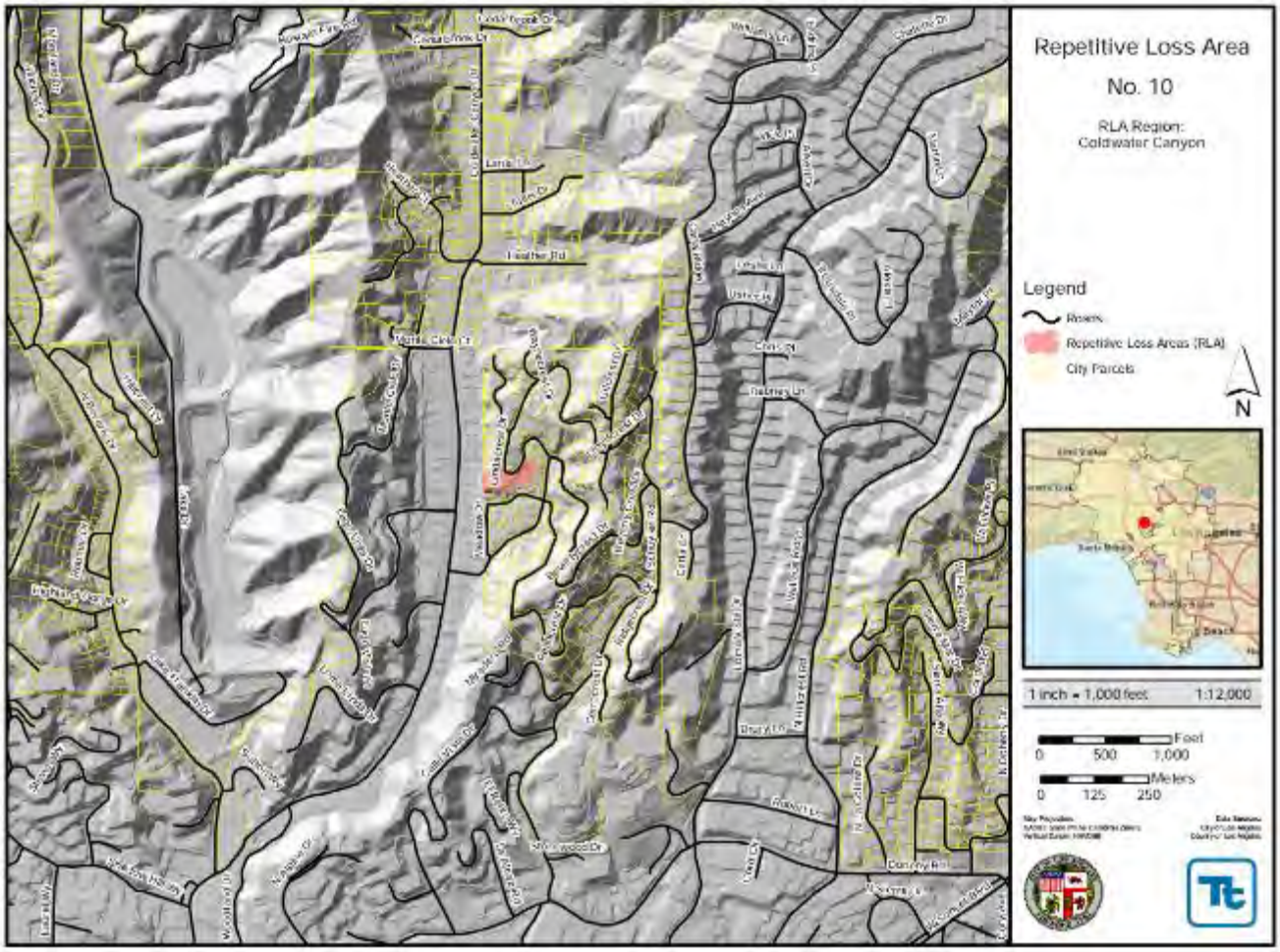

Figure 9-2. Repetitive Loss Area No. 10

10. DIXIE/LONGRIDGE/COLDWATER CANYONS

10.1 PROBLEM STATEMENT

The Coldwater Canyon repetitive loss region is comprised of Repetitive Loss Areas 13-18. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. In additional some regions consist of local urbanized stormwater drainage issues. A few properties in RLA 17 are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners in these regions are required to carry flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 10.2 through Section 10.7. Maps are not included for single-building repetitive loss areas due to privacy concerns.

10.2 REPETITIVE LOSS AREA NO. 11

10.2.1 Identified Repetitive Loss Properties

Table 10-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-1. Repetitive Loss Properties in Repetitive Loss Area 11

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14894	11	X	01/95, 01/93, 01/80, 03/79, 03/78	$3,987	No

10.2.2 Properties Included in Repetitive Loss Area 11

One property with one structure has been identified in this repetitive loss area. 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 Repetitive Loss Area 11

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-11-1	1	Crawlspace	D10A	Elevate, Dry Flood Proof, Wet Flood Proof

10.3 REPETITIVE LOSS AREA NO. 12

10.3.1 Identified Repetitive Loss Properties

Table 10-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-3. Repetitive Loss Properties in Repetitive Loss Area 12

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14899	12	EMG	02/80, 01/78	$33,887	No

10.3.2 Properties Included in Repetitive Loss Area 12

Three properties with a total of three structures total has been identified in this repetitive loss area. Table 10-4 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 10-4. All Properties in Repetitive Loss Area 12

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-12-1	1	Crawlspace	D6B	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
DLC-12-2	1	Crawlspace	D6B	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
DLC-12-3	1	Slab	D65B	Elevate, Dry Flood Proof, Directional Drainage

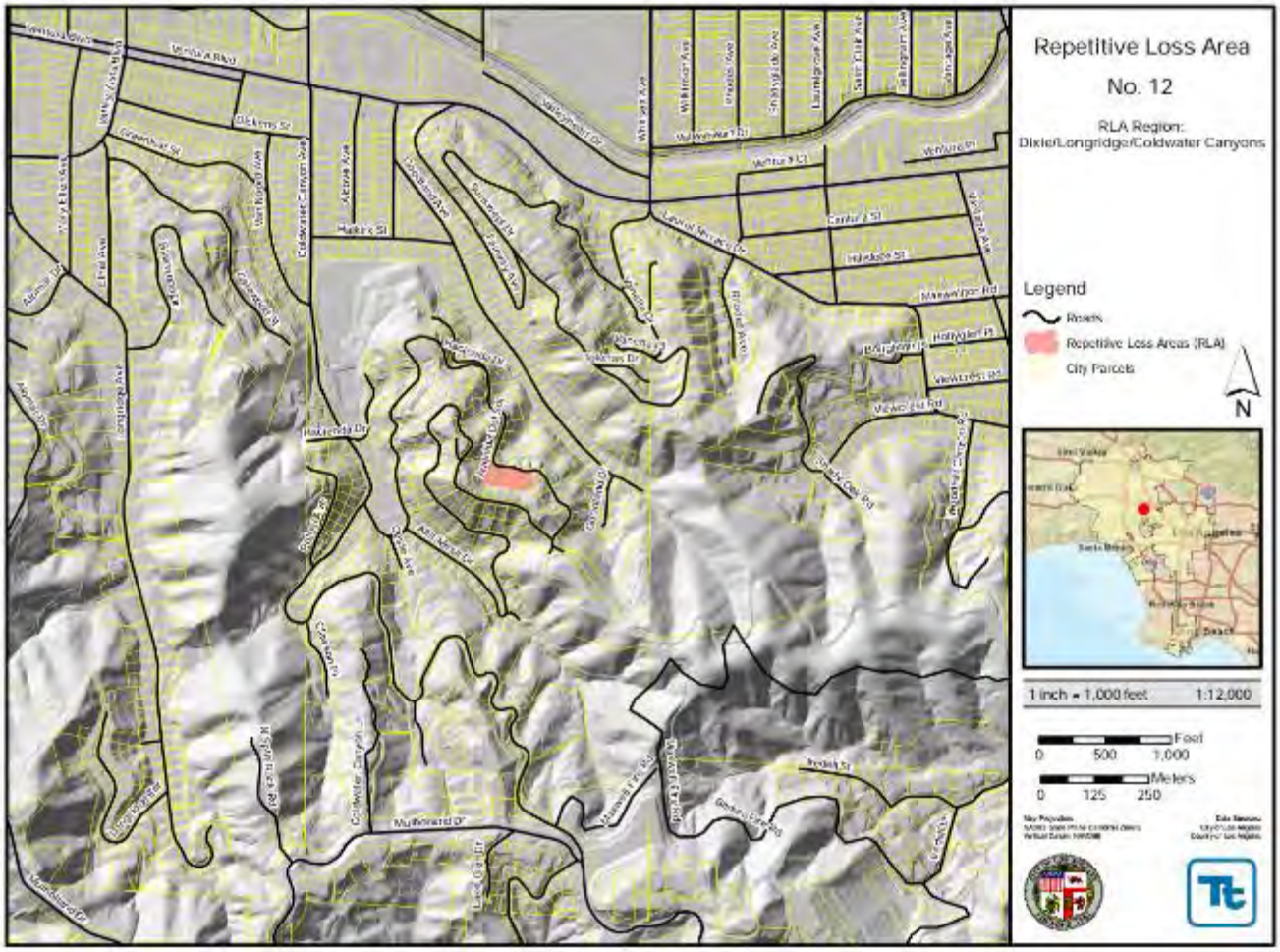

Figure 10-1. Repetitive Loss Area No. 12

10.4 REPETITIVE LOSS AREA NO. 13

10.4.1 Identified Repetitive Loss Properties

Table 10-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-5. Repetitive Loss Properties in Repetitive Loss Area 13

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
41904	13	C	03/83, 02/80	$12,708	No

10.4.2 Properties Included in Repetitive Loss Area 13

Three properties with a total of five structures has been identified in this repetitive loss area. Table 10-6 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 10-6. All Properties in Repetitive Loss Area 13

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-13-1	2	Crawlspace	D9A	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
DLC-13-2	1	Crawlspace	D125C	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
DLC-13-3	2	Crawlspace	D11C	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage

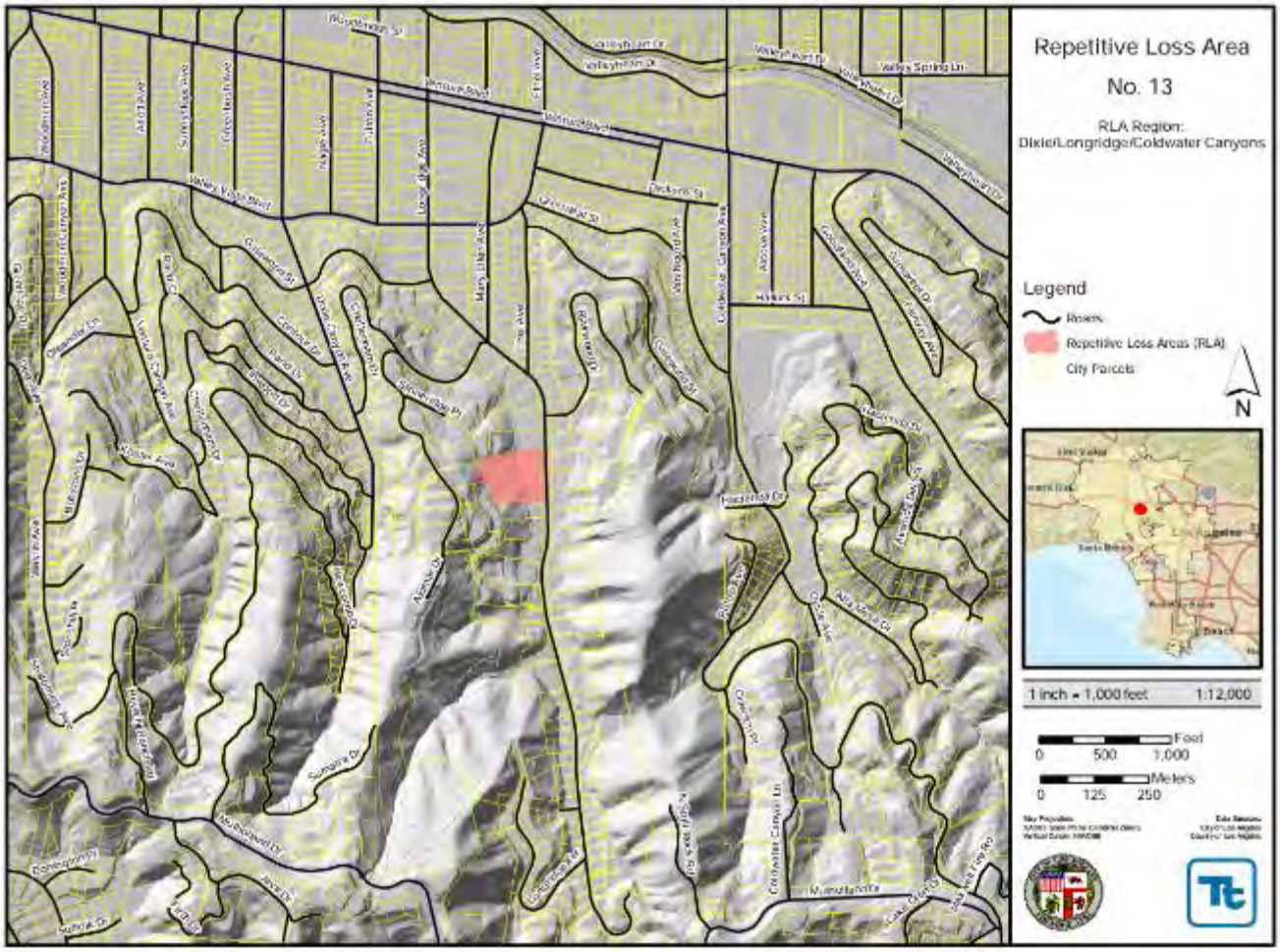

Figure 10-2. Repetitive Loss Area No. 13

10.5 REPETITIVE LOSS AREA NO. 14

10.5.1 Identified Repetitive Loss Properties

Table 10-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-7. Repetitive Loss Properties in Repetitive Loss Area 14

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
47423	14	C	01/93, 02/92, 03/83, 01/27	$2,078	No

10.5.2 Properties Included in Repetitive Loss Area 14

One property with one structure has been identified in this repetitive loss area. Table 10-8 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 10-8. All Properties in Repetitive Loss Area 14

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-14-1	1	Slab	No Information	Elevate, Dry Flood Proof

10.6 REPETITIVE LOSS AREA NO. 15

10.6.1 Identified Repetitive Loss Properties

Table 10-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-9. Repetitive Loss Properties in Repetitive Loss Area 15

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
51775	15	A (SFHA)	02/93, 03/83, 04/82	$8,320	No

10.6.2 Properties Included in Repetitive Loss Area 15

Two properties with a total of four structures have been identified in this repetitive loss area. Table 10-10 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 10-10. All Properties in Repetitive Loss Area 15

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-15-1	2	Crawlspace	No Information	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage
DLC-15-2	2	Crawlspace	D105D	Elevate, Dry Flood Proof, Wet Flood Proof, Directional Drainage

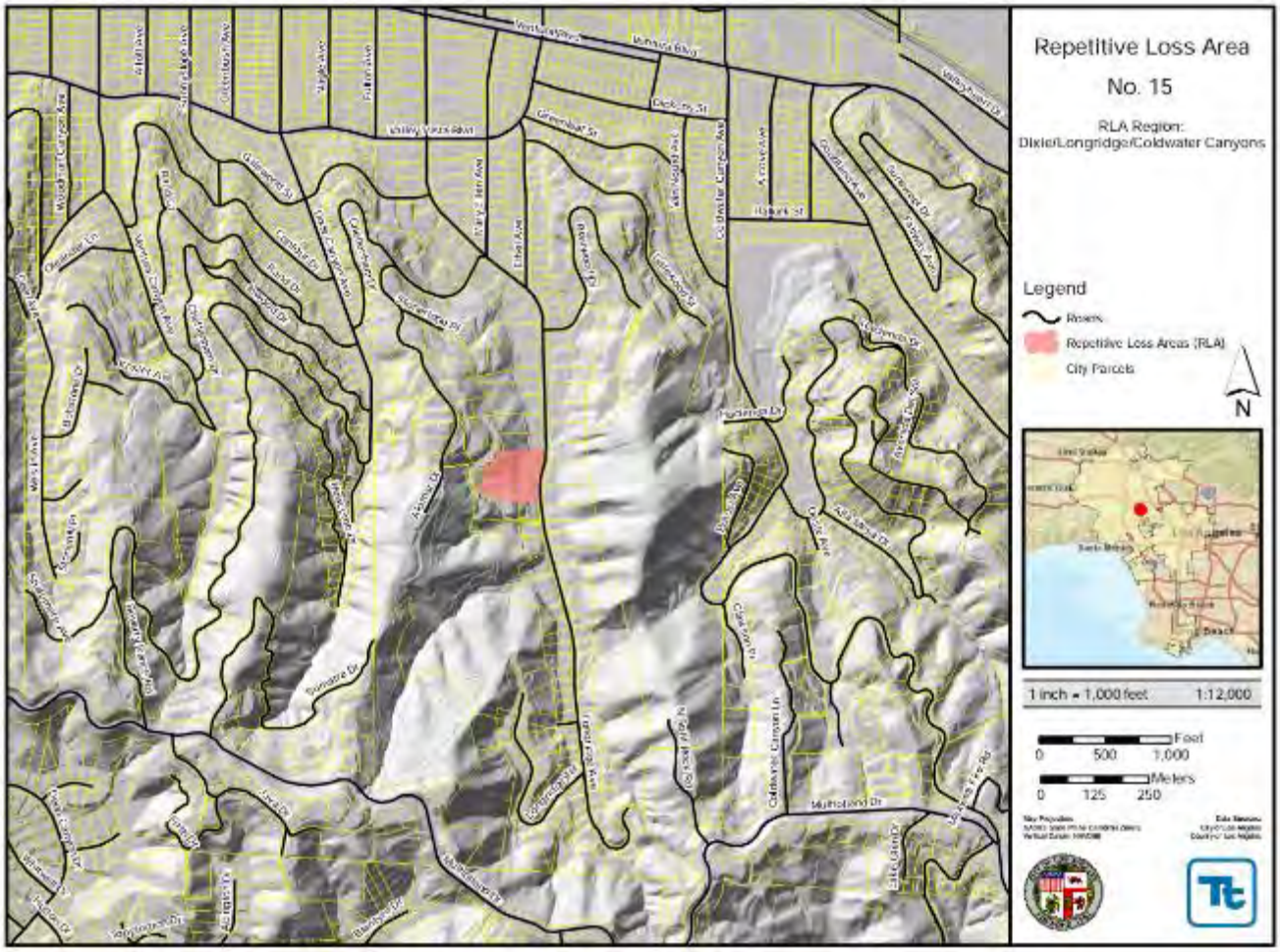

Figure 10-3. Repetitive Loss Area No. 15

10.7 REPETITIVE LOSS AREA NO. 16

10.7.1 Identified Repetitive Loss Properties

Table 10-11 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 10-11. Repetitive Loss Properties in Repetitive Loss Area 16

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
108392	16	C	03/00, 02/98	$7,041	No

10.7.2 Properties Included in Repetitive Loss Area 16

One property with one structure has been identified in this repetitive loss area. Table 10-12 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 10-12. All Properties in Repetitive Loss Area 16

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DLC-16-1	1	Slab	D7C	Elevate, Dry Flood Proof, Directional Drainage

11. Havenhurst Avenue Canyon

11.1 PROBLEM STATEMENT

The Havenhurst Avenue Canyon repetitive loss region is comprised of Repetitive Loss Areas 19-28. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 11.2 through Section 11.10. Maps are not included for single-building repetitive loss areas due to privacy concerns.

11.2 REPETITIVE LOSS AREA NO. 17

11.2.1 Identified Repetitive Loss Properties

Table 11-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-1. Repetitive Loss Properties in Repetitive Loss Area 17

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28471	17	C	03/83, 02/80	$5,264	No

11.2.2 Properties Included in Repetitive Loss Area 17

One property with one structure has been identified in this repetitive loss area. Table 11-2 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 11-2. All Properties in Repetitive Loss Area 17

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-17-1	1	Slab	D85A	Elevate, Dry Flood Proof, Directional Drainage

11.3 REPETITIVE LOSS AREA NO. 18

11.3.1 Identified Repetitive Loss Properties

Table 11-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-3. Repetitive Loss Properties in Repetitive Loss Area 18

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
35004	18	C	01/05, 02/01, 03/83, 02/80	$7,768	No

11.3.2 Properties Included in Repetitive Loss Area 18

One property with one structure has been identified in this repetitive loss area. Table 11-4 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 11-4. All Properties in Repetitive Loss Area 18

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-18-1	1	Slab	D8C	Elevate, Dry Flood Proof, Utility Elevation

11.4 REPETITIVE LOSS AREA NO. 19

11.4.1 Identified Repetitive Loss Properties

Table 11-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-5. Repetitive Loss Properties in Repetitive Loss Area 19

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
36864	19	X	01/83, 11/82, 01/80	$4,364	No

11.4.2 Properties Included in Repetitive Loss Area 19

One property with one structure has been identified in this repetitive loss area. Table 11-6 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 11-6. All Properties in Repetitive Loss Area 19

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-19-1	1	Slab	D8C	Elevate, Dry Flood Proof, Directional Drainage, Utility Elevation

11.5 REPETITIVE LOSS AREA NO. 20

11.5.1 Identified Repetitive Loss Properties

Table 11-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-7. Repetitive Loss Properties in Repetitive Loss Area 20

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
46546	20	C	03/83, 02/80, 02/80	$17,048.68	No

11.5.2 Properties Included in Repetitive Loss Area 20

Two properties with a total of three structures have been identified in this repetitive loss area. Table 11-8 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 11-8. All Properties in Repetitive Loss Area 20

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-20-1	2	Crawlspace	D8D	Elevate, Wet Flood Proof, Dry Flood Proof, Utility Elevation, Acquisition/Demolition
HAC-20-2	1	Slab	D85D	Elevate, Dry Flood Proof, Utility Elevation, Acquisition/Demolition

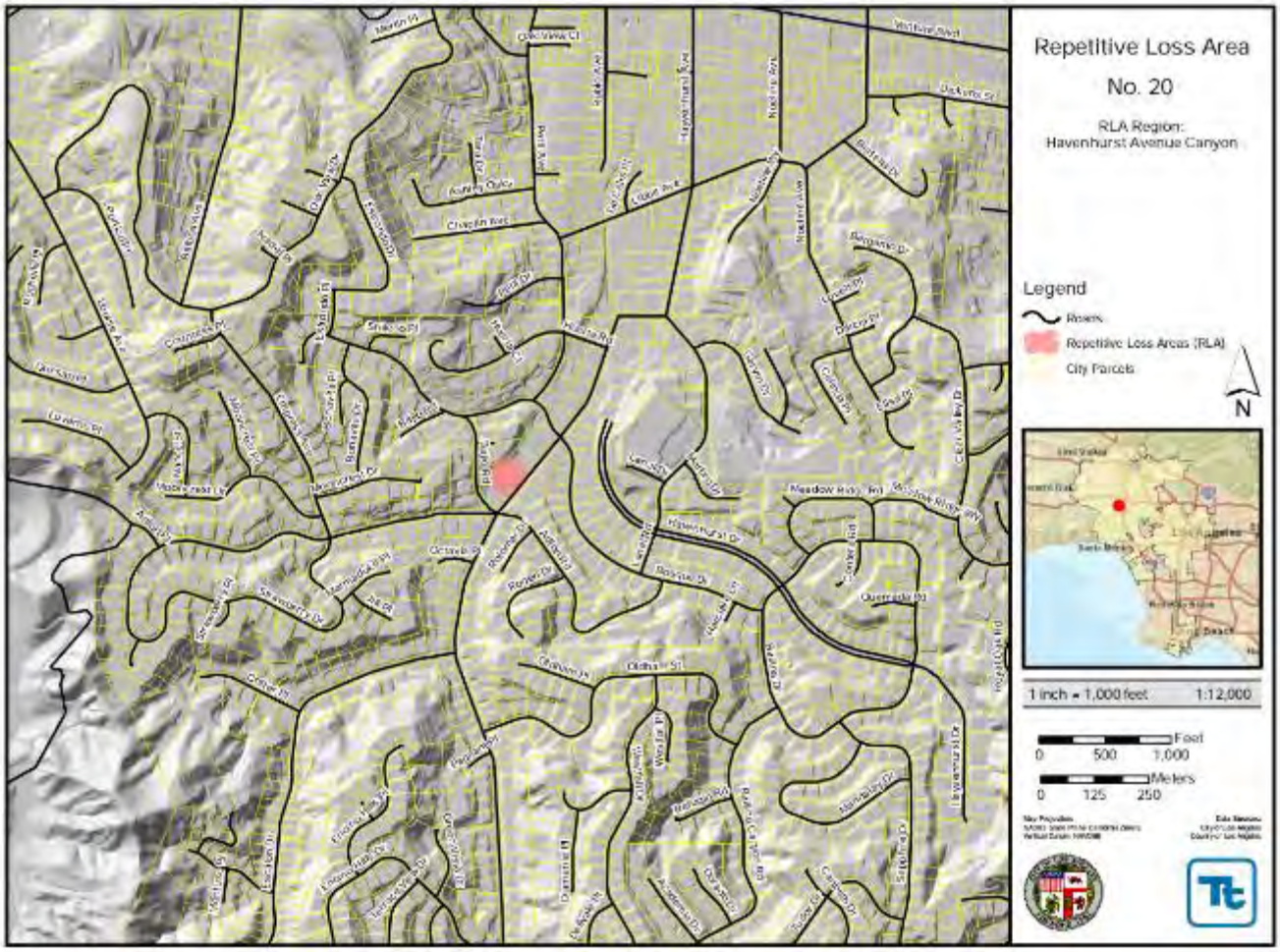

Figure 11-1. Repetitive Loss Area No. 20

11.6 REPETITIVE LOSS AREA NO. 21

11.6.1 Identified Repetitive Loss Properties

Table 11-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-9. Repetitive Loss Properties in Repetitive Loss Area 21

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
73630	21	X	02/98, 03/95, 01/95	$4,081	No

11.6.2 Properties Included in Repetitive Loss Area 21

Two properties with a total of two structures have been identified in this repetitive loss area. Table 11-10 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 11-10. All Properties in Repetitive Loss Area 21

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-21-1	1	Crawlspace	No Information	Elevate, Wet Flood Proof, Dry Flood Proof, Direction Drainage
HAC-21-2	1	Crawlspace	D9B	Elevate, Wet Flood Proof, Dry Flood Proof, Direction Drainage

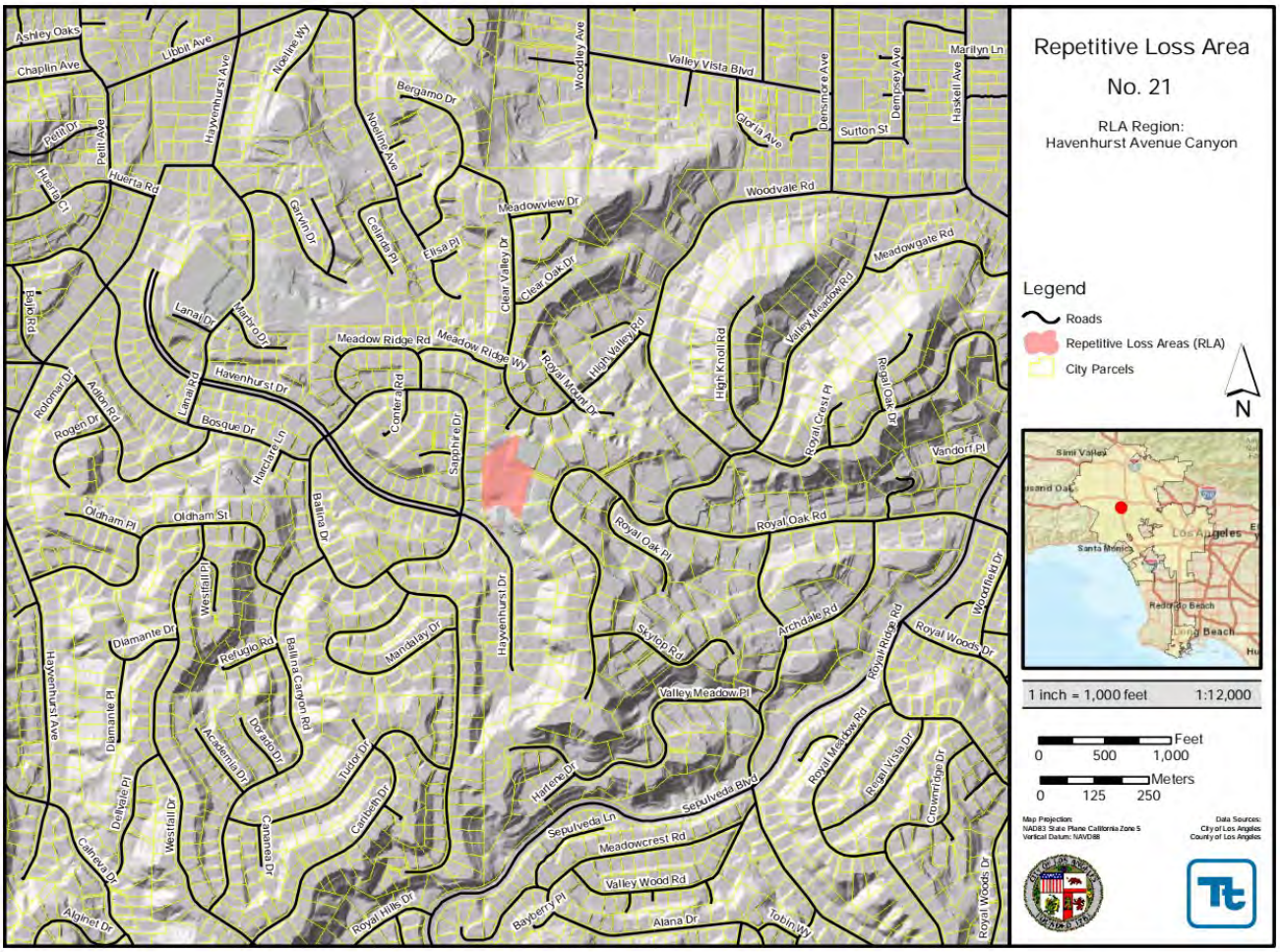

Figure 11-2. Repetitive Loss Area No. 21

11.7 REPETITIVE LOSS AREA NO. 22

11.7.1 Identified Repetitive Loss Properties

Table 11-11 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-11. Repetitive Loss Properties in Repetitive Loss Area 22

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
93876	22	X	02/98, 01/95	$1,422	No

11.7.2 Properties Included in Repetitive Loss Area 22

One property with one structure has been identified in this repetitive loss area. Table 11-12 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 11-12. All Properties in Repetitive Loss Area 22

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-22-1	1	Slab	D8C	Elevate, Wet Flood Proof, Dry Flood Proof, Direction Drainage

11.8 REPETITIVE LOSS AREA NO. 23

11.8.1 Identified Repetitive Loss Properties

Table 11-13 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-13. Repetitive Loss Properties in Repetitive Loss Area 23

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
95202	23	C	02/98, 02/92	$4,721	No

11.8.2 Properties Included in Repetitive Loss Area 23

One property with one structure has been identified in this repetitive loss area. Table 11-14 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 11-14. All Properties in Repetitive Loss Area 23

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-23-1	1	Slab	D9B	Elevate, Dry Flood Proof, Direction Drainage

11.9 REPETITIVE LOSS AREA NO. 24

11.9.1 Identified Repetitive Loss Properties

Table 11-15 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-15. Repetitive Loss Properties in Repetitive Loss Area 24

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137797	24	C	01/05, 02/98	$2,824	No

11.9.2 Properties Included in Repetitive Loss Area 24

Two properties with a total of two structures have been identified in this repetitive loss area. Table 11-16 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 11-16. All Properties in Repetitive Loss Area 24

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-24-1	1	Slab	D8B	Elevate, Dry Flood Proof, Direction Drainage
HAC-24-2	1	Slab	D85A	Elevate, Dry Flood Proof, Direction Drainage

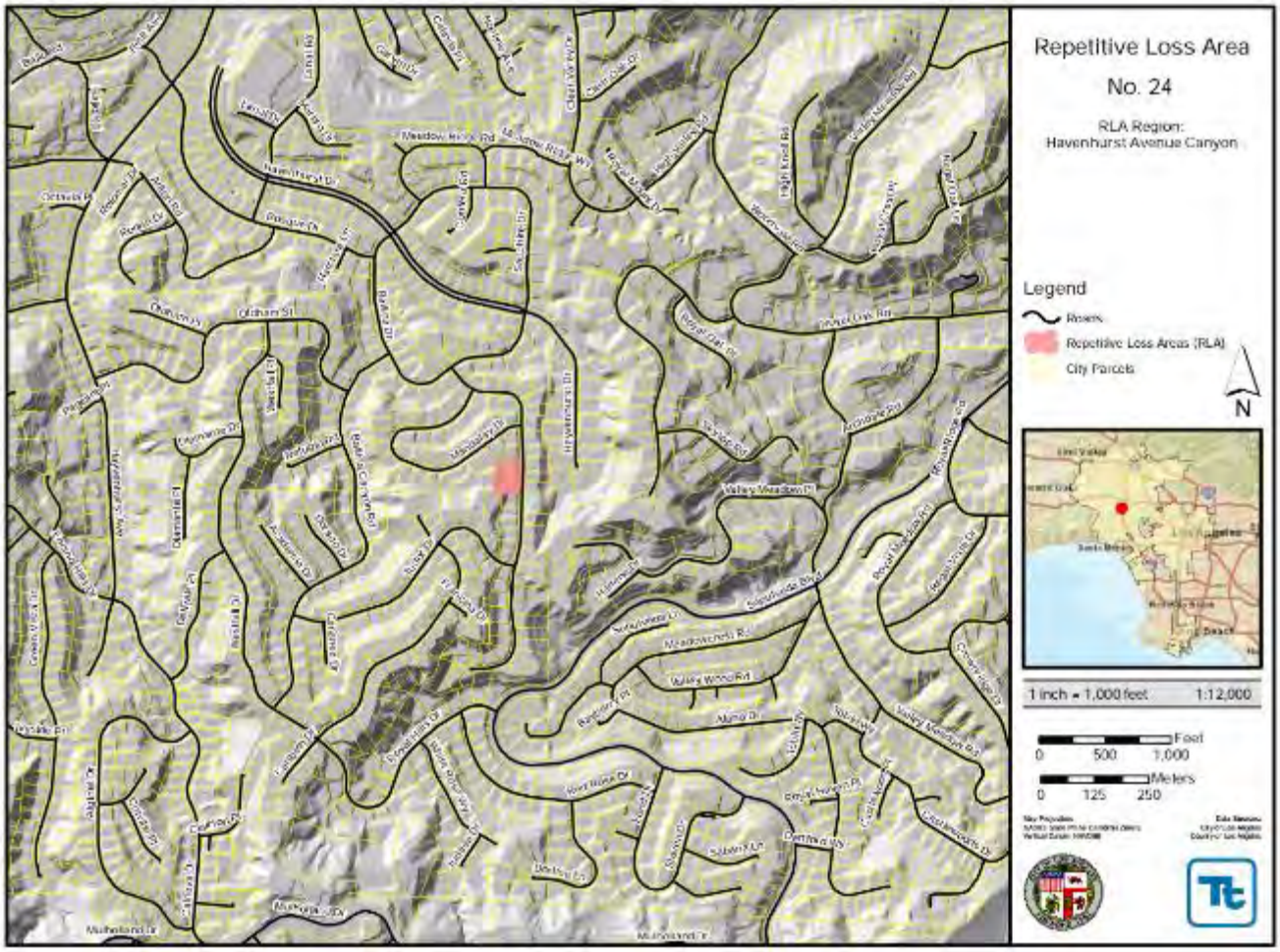

Figure 11-3. Repetitive Loss Area No. 24

11.10 REPETITIVE LOSS AREA NO. 25

11.10.1 Identified Repetitive Loss Properties

Table 11-17 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 11-17. Repetitive Loss Properties in Repetitive Loss Area 25

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137798	25	X	02/05, 01/05, 02/98	$3,372	No

11.10.2 Properties Included in Repetitive Loss Area 25

One property with one structure has been identified in this repetitive loss area. Table 11-18 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 11-18. All Properties in Repetitive Loss Area 25

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
HAC-25-1	1	Slab	D8B	Elevate, Dry Flood Proof, Direction Drainage

12. La Brea/Hancock Westside Lowlands

12.1 PROBLEM STATEMENT

The La Brea/Hancock Westside Lowlands repetitive loss region is comprised of Repetitive Loss Areas 29-38. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon into the urbanized environment. Many of these properties are in None of the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners are required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 12.2 through Section 12.8. Maps are not included for single-building repetitive loss areas due to privacy concerns.

12.2 REPETITIVE LOSS AREA NO. 26

12.2.1 Identified Repetitive Loss Properties

Table 12-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-1. Repetitive Loss Properties in Repetitive Loss Area 26

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
7232	26	X	02/93, 02/92	$28,252	No

12.2.2 Properties Included in Repetitive Loss Area 26

One property with one structure has been identified in this repetitive loss area. Table 12-2 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 12-2. All Properties in Repetitive Loss Area 26

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-26-1	1	Slab	C6B	Elevate, Dry Flood Proof, Direction Drainage

12.3 REPETITIVE LOSS AREA NO. 27

12.3.1 Identified Repetitive Loss Properties

Table 12-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-3. Repetitive Loss Properties in Repetitive Loss Area 27

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
417	27	X	2/92, 2/93	$45,628	No

12.3.2 Properties Included in Repetitive Loss Area 27

One property with one structure has been identified in this repetitive loss area. Table 12-4 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 12-4. All Properties in Repetitive Loss Area 27

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-27-1	1	Slab	No Information	Elevate, Dry Flood Proof, Direction Drainage

12.4 REPETITIVE LOSS AREA NO. 28

12.4.1 Identified Repetitive Loss Properties

Table 12-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-5. Repetitive Loss Properties in Repetitive Loss Area 28

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
12817	28	AO (SFHA)	02/93, 02/92	$1,918	No

12.4.2 Properties Included in Repetitive Loss Area 28

One property with two structures has been identified in this repetitive loss area. Table 12-6 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 12-6. All Properties in Repetitive Loss Area 28

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-28-1	2	Slab	D6D	Elevate Structure, Elevate Utilities

12.5 REPETITIVE LOSS AREA NO. 29

12.5.1 Identified Repetitive Loss Properties

Table 12-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-7. Repetitive Loss Properties in Repetitive Loss Area 29

FEMA RL #	RL Map #		Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
39001	29	A (SFHA)	03/83, 01/83	$2,863.74	No

12.5.2 Properties Included in Repetitive Loss Area 29

One property with one structure has been identified in this repetitive loss area. Table 12-8 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 12-8. All Properties in Repetitive Loss Area 29

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-29-1	1	Slab	D95D	Dry Flood Proof, Rain Garden, Elevate Structure/Utilities

12.6 REPETITIVE LOSS AREA NO. 30

12.6.1 Identified Repetitive Loss Properties

Table 12-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-9. Repetitive Loss Properties in **Repetitive Loss Area No. 30**

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
77246	30	C	02/98, 03/95, 02/80	$10,180.92	No

12.6.2 Properties Included in Repetitive Loss Area 30

Four properties with a total of four structures have been identified in this repetitive loss area. Table 12-10 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 12-10. All Properties in Repetitive Loss Area 30

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-30-1	1	Crawlspace	D6A	Elevate, Wet Flood Proof, Directional Drainage
LHW-30-2	1	Crawlspace	DX	Elevate, Wet Flood Proof, Directional Drainage
LHW-30-3	1	Crawlspace	CX	Elevate, Wet Flood Proof, Directional Drainage
LHW-30-4	1	Slab	DX	Elevate, Dry Flood Proof, Directional Drainage

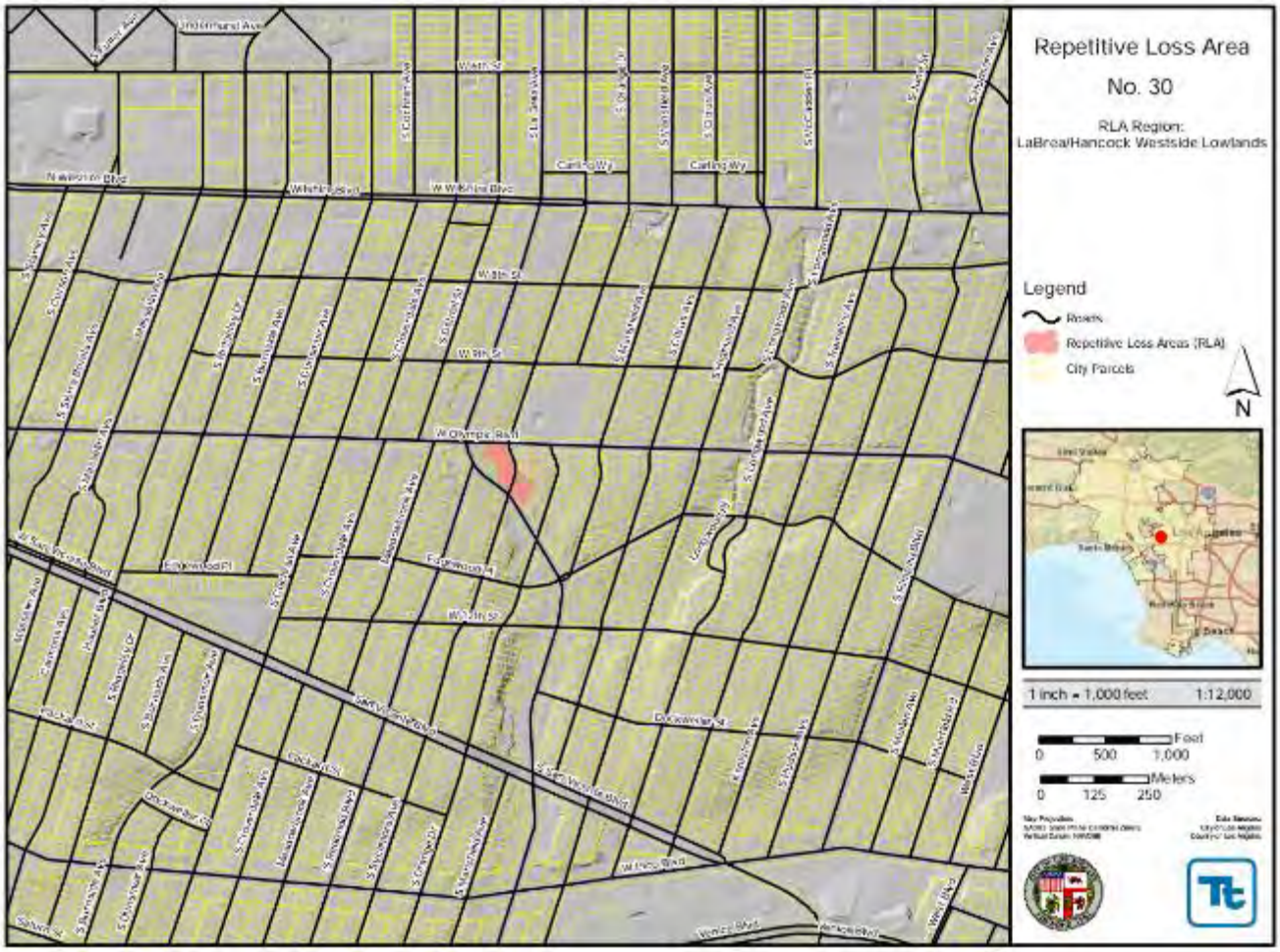

Figure 12-1. Repetitive Loss Area No. 30

12.7 REPETITIVE LOSS AREA NO. 31

12.7.1 Identified Repetitive Loss Properties

Table 12-11 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-11. Repetitive Loss Properties in Repetitive Loss Area 31

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
111789	31	C	02/01, 02/98	$19,095	No

12.7.2 Properties Included in Repetitive Loss Area 31

Seven properties with a total of fourteen structures have been identified in this repetitive loss area. Table 12-12 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 12-12. All Properties in Repetitive Loss Area 31

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-31-1	2	Basement	D8B	Wet Flood Proof, Directional Drainage, Evacuate Basement, Elevate
LHW-31-1	2	Crawlspace	D75C	Wet Flood Proof, Directional Drainage, Elevate
LHW-31-3	2	Crawlspace	D75D	Wet Flood Proof, Directional Drainage, Elevate
LHW-31-4	2	Crawlspace	D8C	Wet Flood Proof, Directional Drainage, Elevate
LHW-31-5	2	Crawlspace	D75B	Wet Flood Proof, Directional Drainage, Elevate
LHW-31-6	2	Crawlspace	D75C	Wet Flood Proof, Directional Drainage, Elevate
LHW-31-7	2	Crawlspace	D75B	Wet Flood Proof, Directional Drainage, Elevate

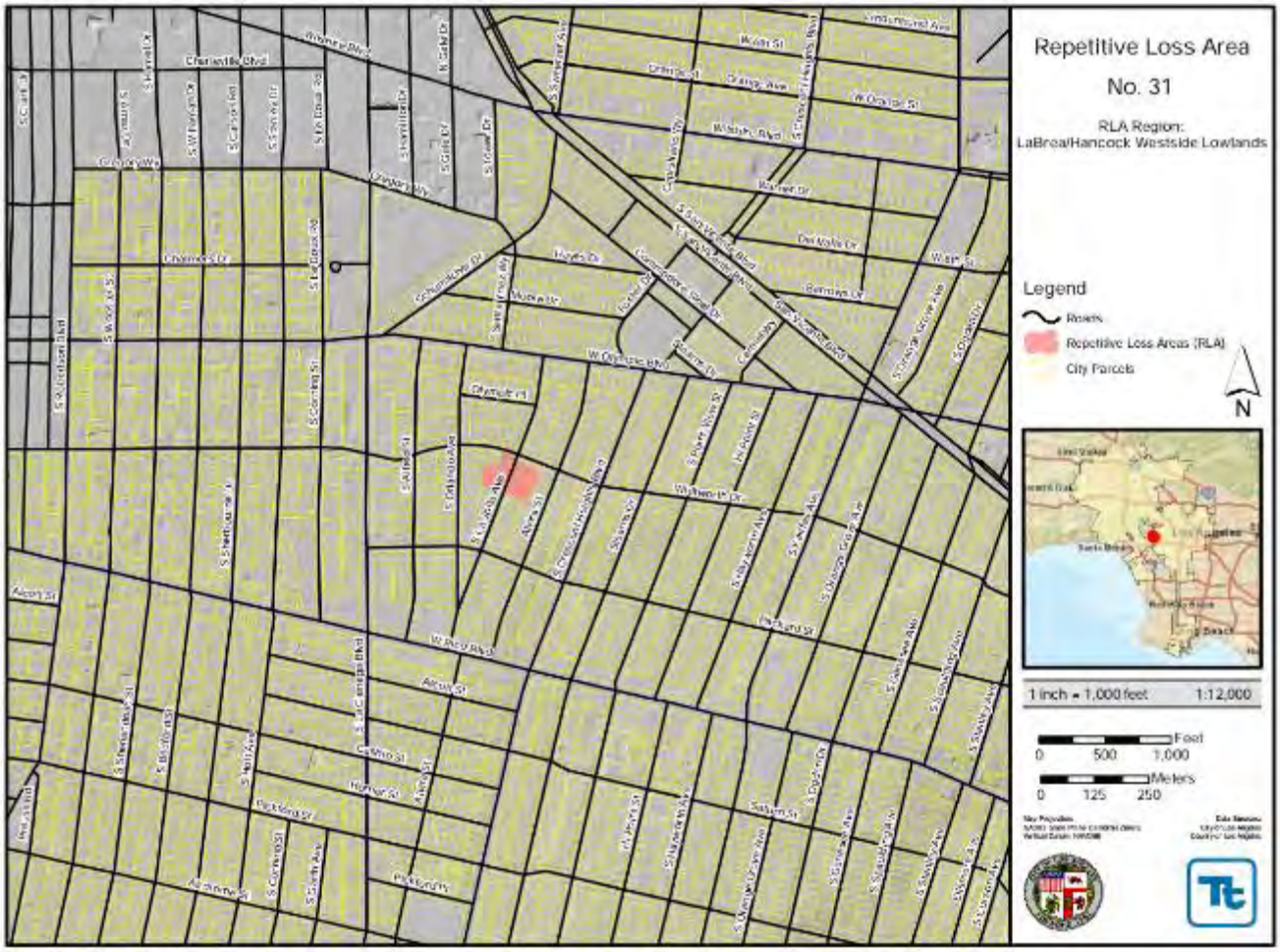

Figure 12-2. Repetitive Loss Area No. 31

12.8 REPETITIVE LOSS AREA NO. 32

12.8.1 Identified Repetitive Loss Properties

Table 12-13 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 12-13. Repetitive Loss Properties in Repetitive Loss Area 32

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138325	32	C	01/05, 02/98	$4,931	No

12.8.2 Properties Included in Repetitive Loss Area 32

One property with one structure has been identified in this repetitive loss area. Table 12-14 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 12-14. All Properties in Repetitive Loss Area 32

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LHW-32-1	2	Slab	D8C	Dry Flood Proof, Rain Garden, Directional Drainage

13. MANDEVILLE CANYON

13.1 PROBLEM STATEMENT

The Mandeville Canyon repetitive loss region is comprised of Repetitive Loss Areas 33-36. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues. A few properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners are required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area and are provided in Sections 13.2 through 13.5. Maps are not included for single-building repetitive loss areas due to privacy concerns.

13.2 REPETITIVE LOSS AREA NO. 33

13.2.1 Identified Repetitive Loss Properties

Table 13-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 13-1. Repetitive Loss Properties in Repetitive Loss Area 33

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
40571	33	X	03/83, 02/80, 03/79	$4,152	No

13.2.2 Properties Included in Repetitive Loss Area 33

Two properties with a total of two structures have been identified in this repetitive loss area. Table 13-2 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 13-2. All Properties in Repetitive Loss Area 33

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MVC-33-1	1	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof
MVC-33-2	1	Crawlspace	D10C	Elevate, Directional Drainage, Wet Flood Proof

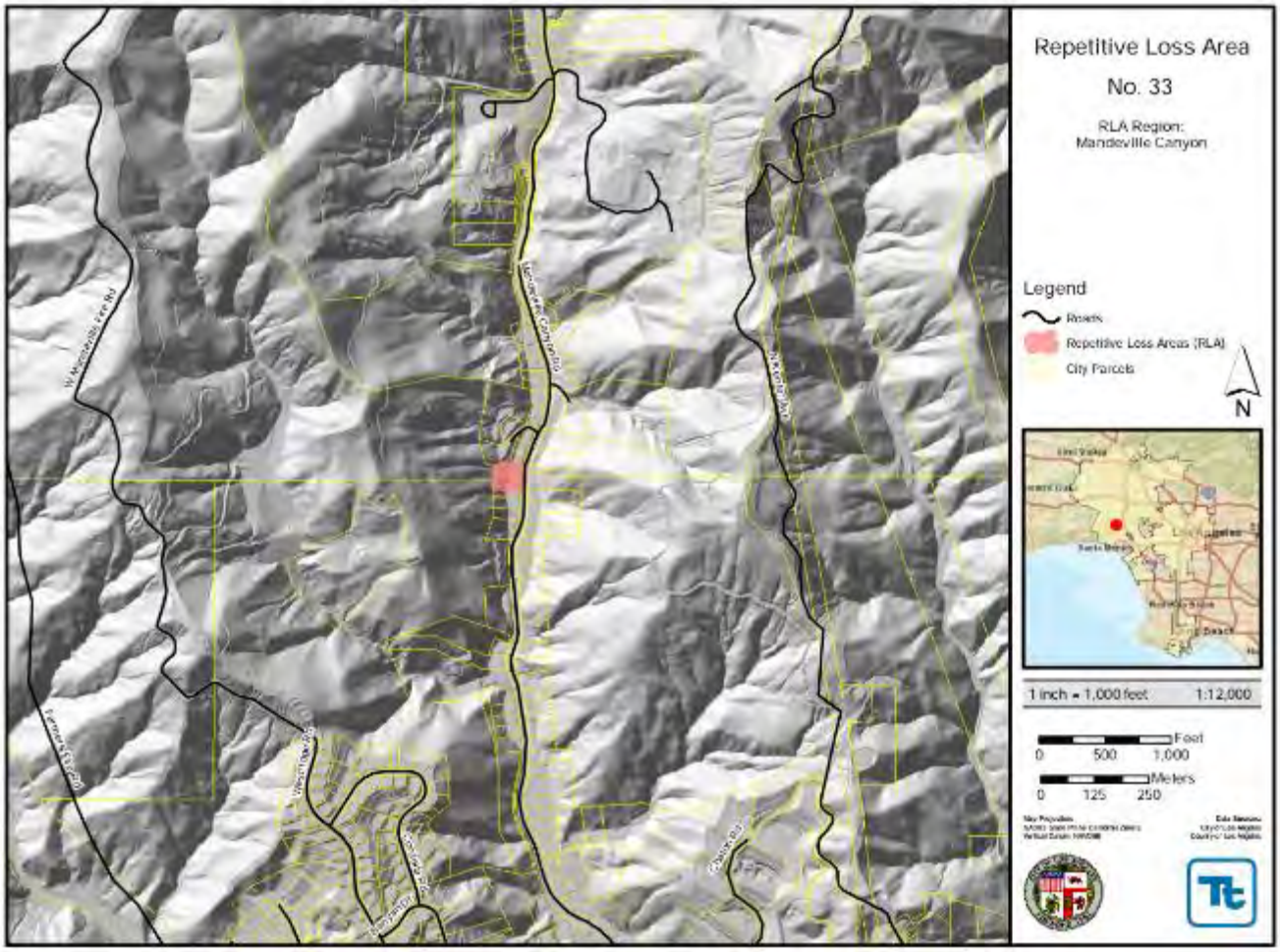

Figure 13-1. Repetitive Loss Area No. 33

13.3 REPETITIVE LOSS AREA NO. 34

13.3.1 Identified Repetitive Loss Properties

Table 13-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 13-3. Repetitive Loss Properties in Repetitive Loss Area 34

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
39055	34	X	01/05, 03/83, 02/80, 03/79	$9,547	No

13.3.2 Properties Included in Repetitive Loss Area 34

Two properties with a total of two structures have been identified in this repetitive loss area. Table 13-4 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 13-4. All Properties in Repetitive Loss Area 34

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MVC-34-1	1	Crawlspace	D8B	Elevate, Dry Flood Proof, Directional Drainage
MVC-34-2	1	Basement	D95B	Elevate, Wet Flood Proof, Directional Drainage

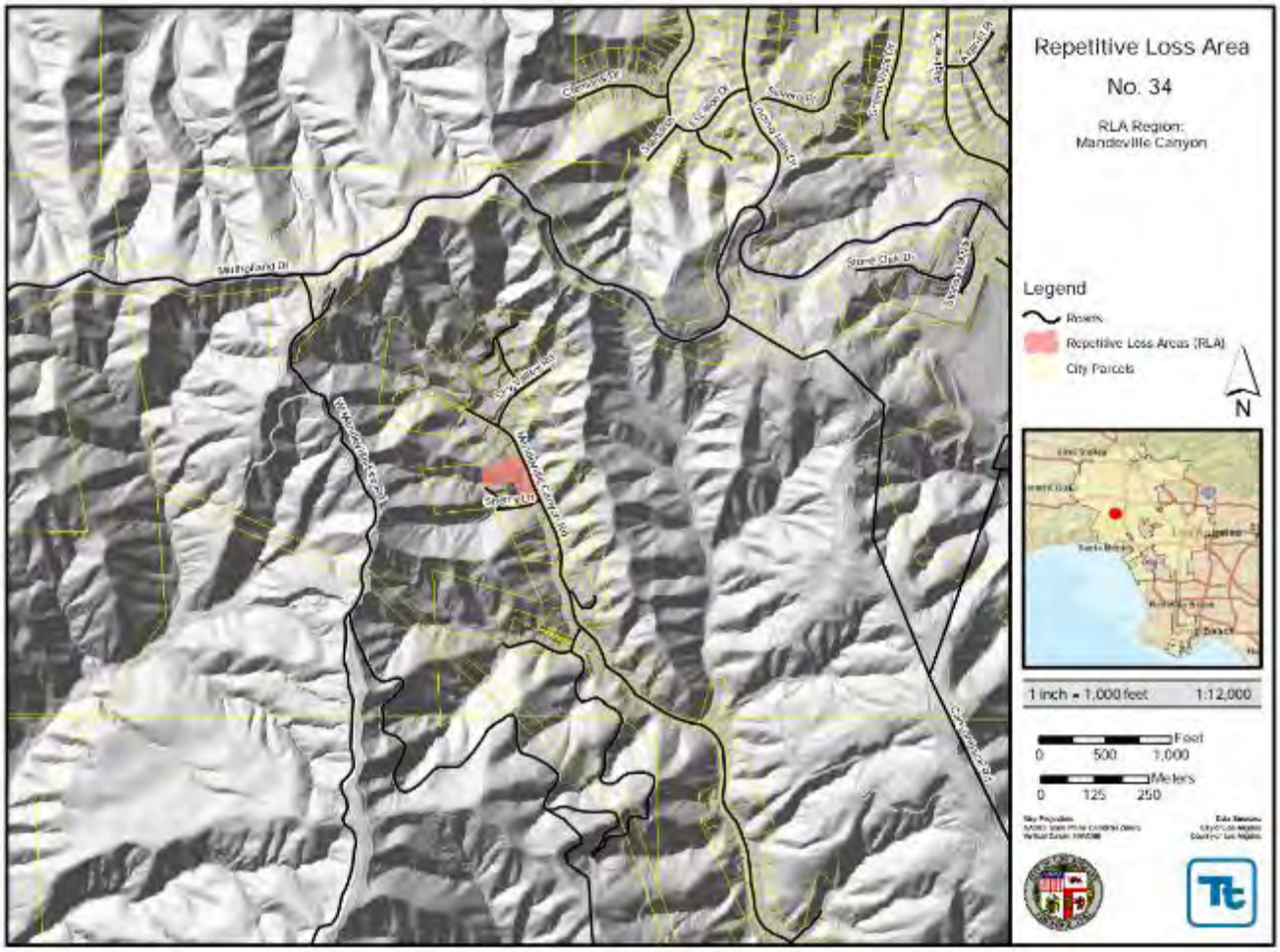

Figure 13-2. Repetitive Loss Area No. 34

13.4 REPETITIVE LOSS AREA NO. 35

13.4.1 Identified Repetitive Loss Properties

Table 13-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 13-5. Repetitive Loss Properties in Repetitive Loss Area 35

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
42283	35	A (SFHA)	03/83, 02/80	$1,897	No

13.4.2 Properties Included in Repetitive Loss Area 35

Three properties with a total of five structures have been identified in this repetitive loss area. Table 13-6 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 13-6. All Properties in Repetitive Loss Area 35

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MVC-35-1	1	Slab	D105C	Elevate, Dry Flood Proof, Directional Drainage
MVC-35-2	2	Crawlspace	D95D	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
MVC-35-3	2	Crawlspace	D85C	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage

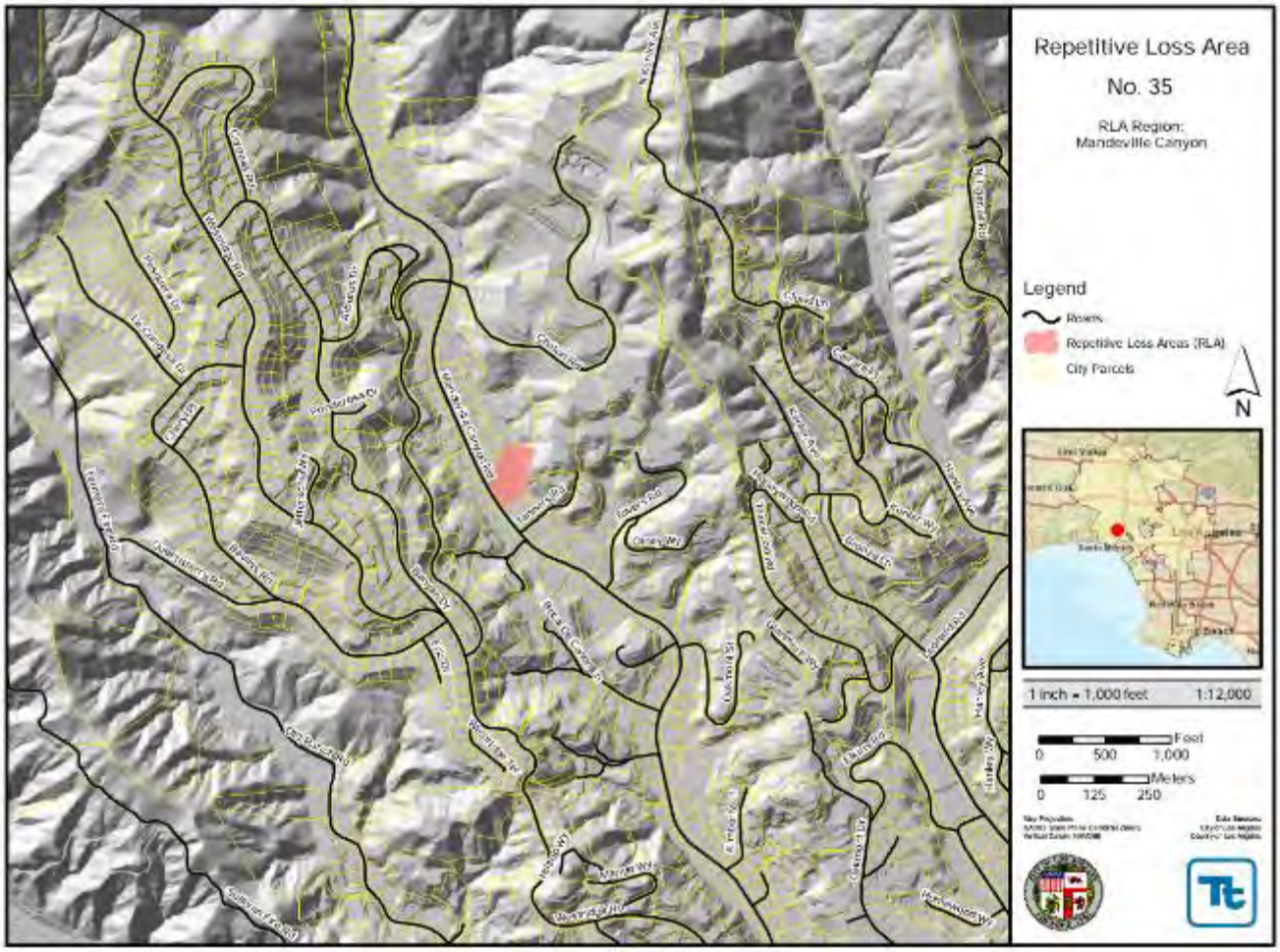

Figure 13-3. Repetitive Loss Area No. 35

13.5 REPETITIVE LOSS AREA NO. 36

13.5.1 Identified Repetitive Loss Properties

Table 13-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 13-7. Repetitive Loss Properties in Repetitive Loss Area 36

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
46600	36	X	03/83, 02/80	$49,200	No

13.5.2 Properties Included in Repetitive Loss Area 36

Five properties with a total of seven structures have been identified in this repetitive loss area. Table 13-8 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 13-8. All Properties in Repetitive Loss Area 36

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MVC-36-1	1	Crawlspace	D8D	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
MVC-36-2	1	Crawlspace	D85B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
MVC-36-3	3	Slab	D85B	Elevate, Dry Flood Proof, Directional Drainage
MVC-36-4	1	Crawlspace	D8C	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
MVC-36-5	1	Crawlspace	D9C	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage

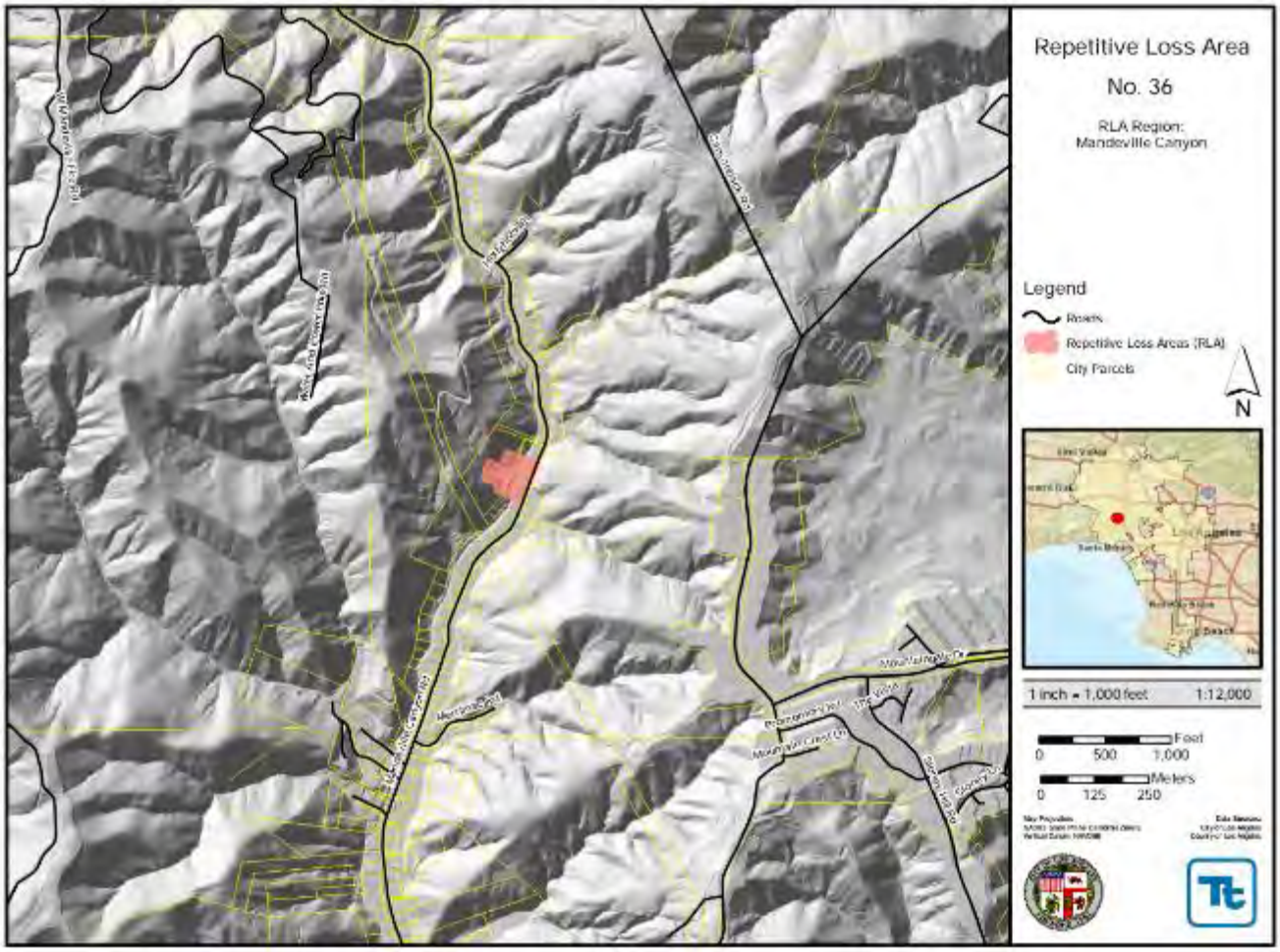

Figure 13-4. Repetitive Loss Area No. 36

14. NICHOLS CANYON

14.1 PROBLEM STATEMENT

The Nichols Canyon repetitive loss region is comprised of Repetitive Loss Areas 37-41. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon with some urbanized stormwater management issues. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 14.2 through Section 14.6. Maps are not included for single-building repetitive loss areas due to privacy concerns.

14.2 REPETITIVE LOSS AREA NO. 37

14.2.1 Identified Repetitive Loss Properties

Table 14-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 14-1. Repetitive Loss Properties in Repetitive Loss Area 37

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
13694	37	C	02/93, 02/92, 02/78	$2,482	No

14.2.2 Properties Included in Repetitive Loss Area 37

Two properties with a total of two structures have been identified in this repetitive loss area. Table 14-2 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 14-2. All Properties in Repetitive Loss Area 37

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
NIC-37-1	1	Slab	D75A	Elevate, Dry Flood Proof, Directional Drainage
NIC-37-2	1	Slab	D75C	Elevate, Dry Flood Proof, Directional Drainage

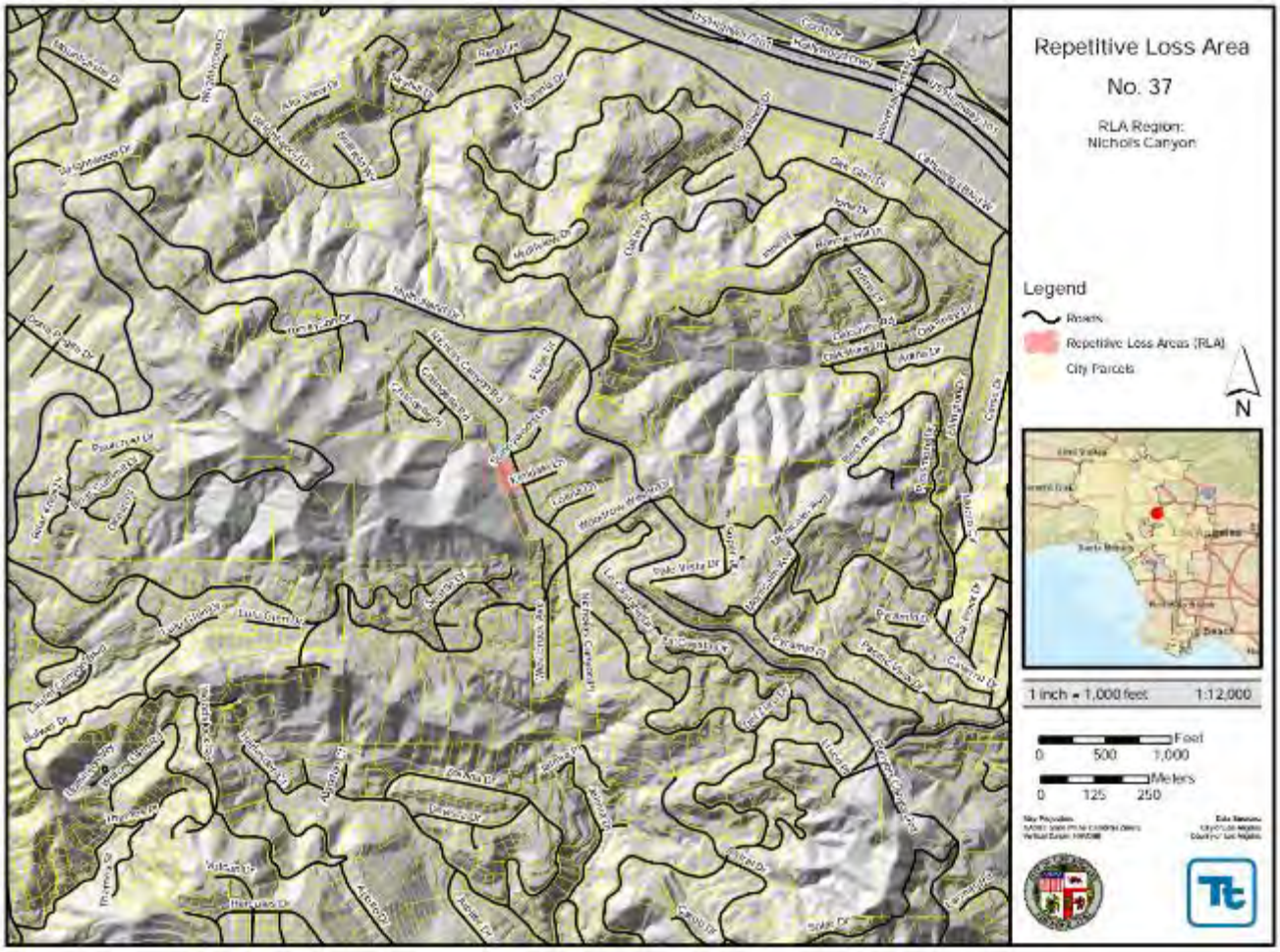

Figure 14-1. Repetitive Loss Area No. 37

14.3 REPETITIVE LOSS AREA NO. 38

14.3.1 Identified Repetitive Loss Properties

Table 14-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 14-3. Repetitive Loss Properties in Repetitive Loss Area 38

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
58034	38	C	01/83, 02/80	$5,922	No

14.3.2 Properties Included in Repetitive Loss Area 38

Three properties with a total of three structures have been identified in this repetitive loss area. Table 14-4 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 14-4. All Properties in Repetitive Loss Area 38

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
NIC-38-1	1	Crawlspace	D8B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
NIC-38-2	1	Slab	D8B	Elevate, Dry Flood Proof, Directional Drainage
NIC-38-3	1	Slab	D9A	Elevate, Dry Flood Proof, Directional Drainage

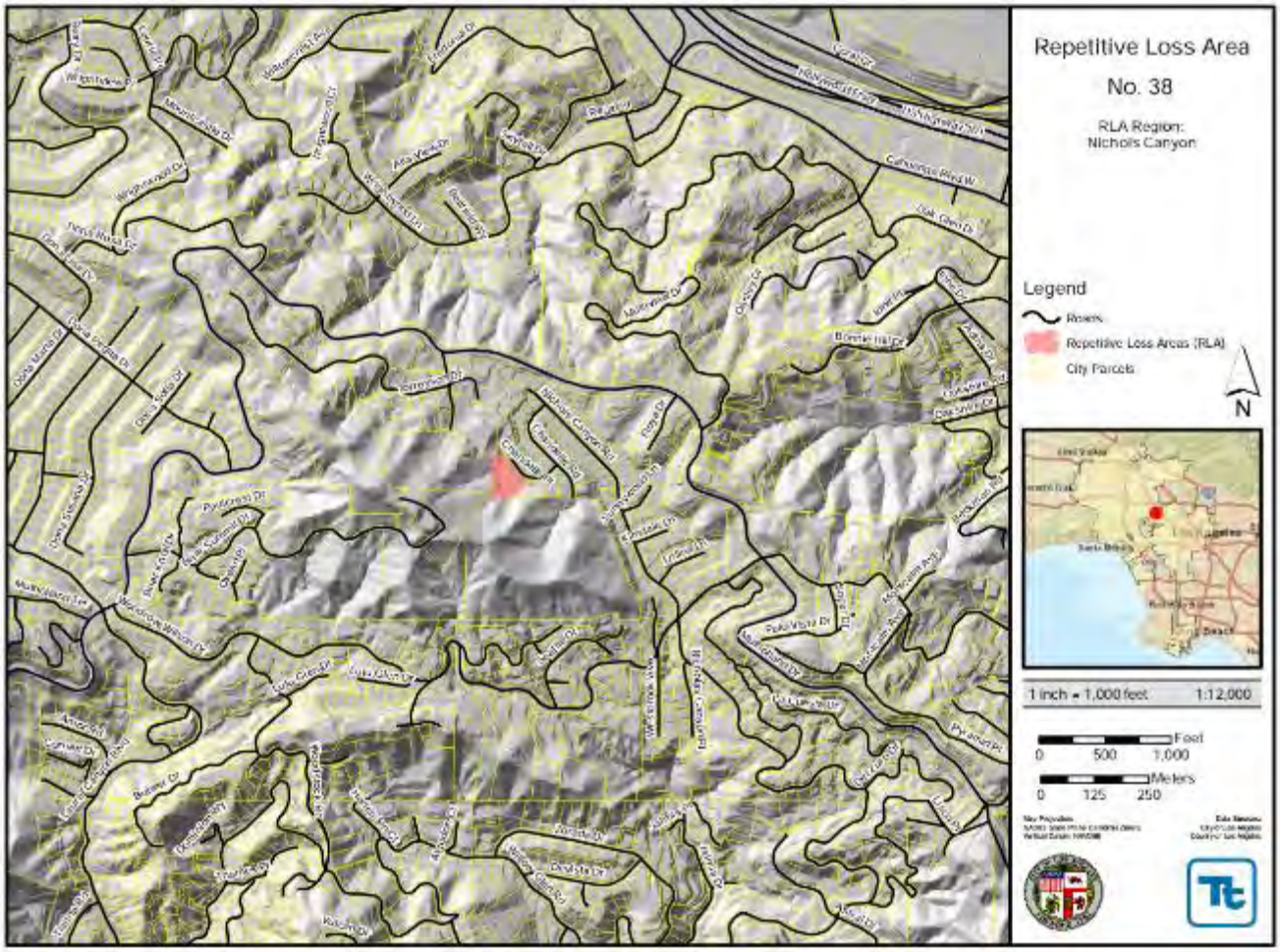

Figure 14-2. Repetitive Loss Area No. 38

14.4 REPETITIVE LOSS AREA NO. 39

14.4.1 Identified Repetitive Loss Properties

Table 14-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 14-5. Repetitive Loss Properties in Repetitive Loss Area 39

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
192020	39	C	02/10, 02/05	$9,836	No

14.4.2 Properties Included in Repetitive Loss Area 39

Two properties with a total of two structures have been identified in this repetitive loss area. Table 14-6 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 14-6. All Properties in Repetitive Loss Area 39

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
NIC-39-1	1	Basement	D75D	Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
NIC-39-2	1	Slab	D8D	Directional Drainage, Dry Flood Proof, Elevate

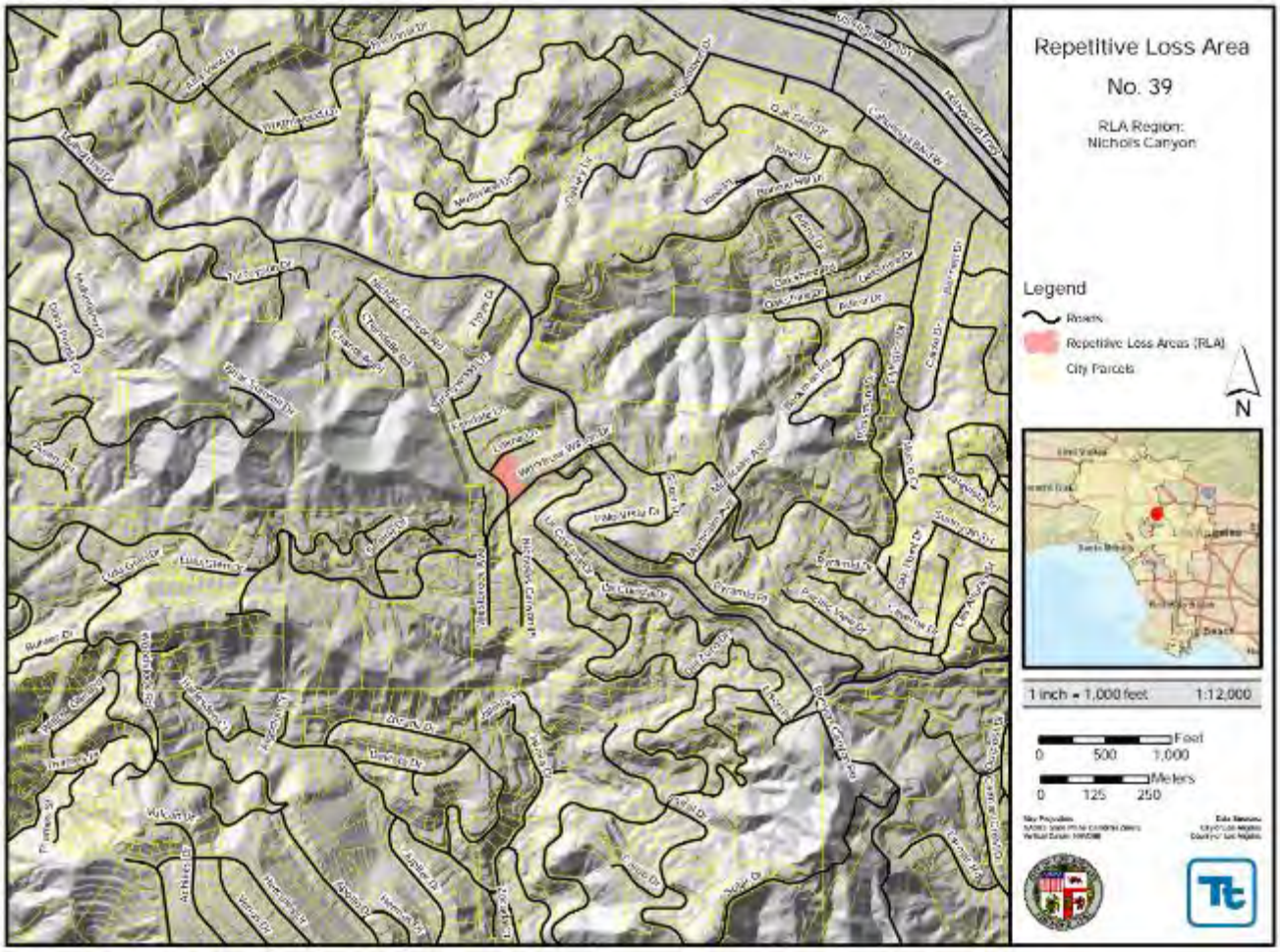

Figure 14-3. Repetitive Loss Area No. 39

14.5 REPETITIVE LOSS AREA NO. 40

14.5.1 Identified Repetitive Loss Properties

Table 14-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 14-7. Repetitive Loss Properties in Repetitive Loss Area 40

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137692	49	C	01/05, 01/95	$55,427	No

14.5.2 Properties Included in Repetitive Loss Area 40

One property with one structure has been identified in this repetitive loss area. Table 14-8 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 14-8. All Properties in Repetitive Loss Area 40

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
NIC-40-1	1	Crawlspace	No Information	Elevate, Acquisition/Demolition

14.6 REPETITIVE LOSS AREA NO. 41

14.6.1 Identified Repetitive Loss Properties

Table 14-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 14-9. Repetitive Loss Properties in Repetitive Loss Area 41

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
136863	41	C	01/05, 02/98	$10,371	No

14.6.2 Properties Included in Repetitive Loss Area 41

One property with one structure has been identified in this repetitive loss area. Table 14-10 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 14-10. All Properties in Repetitive Loss Area 41

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
NIC-41-1	4	Crawlspace	No Information	Elevate, Directional Drainage, Wet Flood Proof

15. OTHER - DOWNTOWN

15.1 PROBLEM STATEMENT

The Other - Downtown repetitive loss region is comprised of Repetitive Loss Area No. 40. In each of these repetitive loss areas, property damage from flooding is urbanized storm water. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 15.2. Maps are not included for single-building repetitive loss areas due to privacy concerns.

15.2 REPETITIVE LOSS AREA NO. 42

15.2.1 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 Repetitive Loss Area 42

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
70874	42	B	11/97, 12/94, 3/94	$7,863	No

15.2.2 Properties Included in Repetitive Loss Area 42

Seven properties with seven structures have been identified in this repetitive loss area. Table 15-2 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 15-2. All Properties in Repetitive Loss Area 42

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ODT-42-1	1	Slab	CX	Dry Flood Proof, Elevate Utilities, Elevate Structure
ODT-42-2	1	Slab	C5B	Dry Flood Proof, Elevate Utilities, Elevate Structure
ODT-42-3	1	Slab	C5	Dry Flood Proof, Elevate Utilities, Elevate Structure
ODT-42-4	1	Slab	C6B	Dry Flood Proof, Elevate Utilities, Elevate Structure
ODT-42-5	1	Slab	C6	Flood Shields/Gates for Openings, Interior Floor Elevation, Continuous Impermeable Walls, Acquisition/Demolition
ODT-42-6	1	Slab	C5B	Dry Flood Proof, Elevate Utilities, Elevate Structure
ODT-42-7	1	Slab	No Information	Dry Flood Proof, Elevate Utilities, Elevate Structure

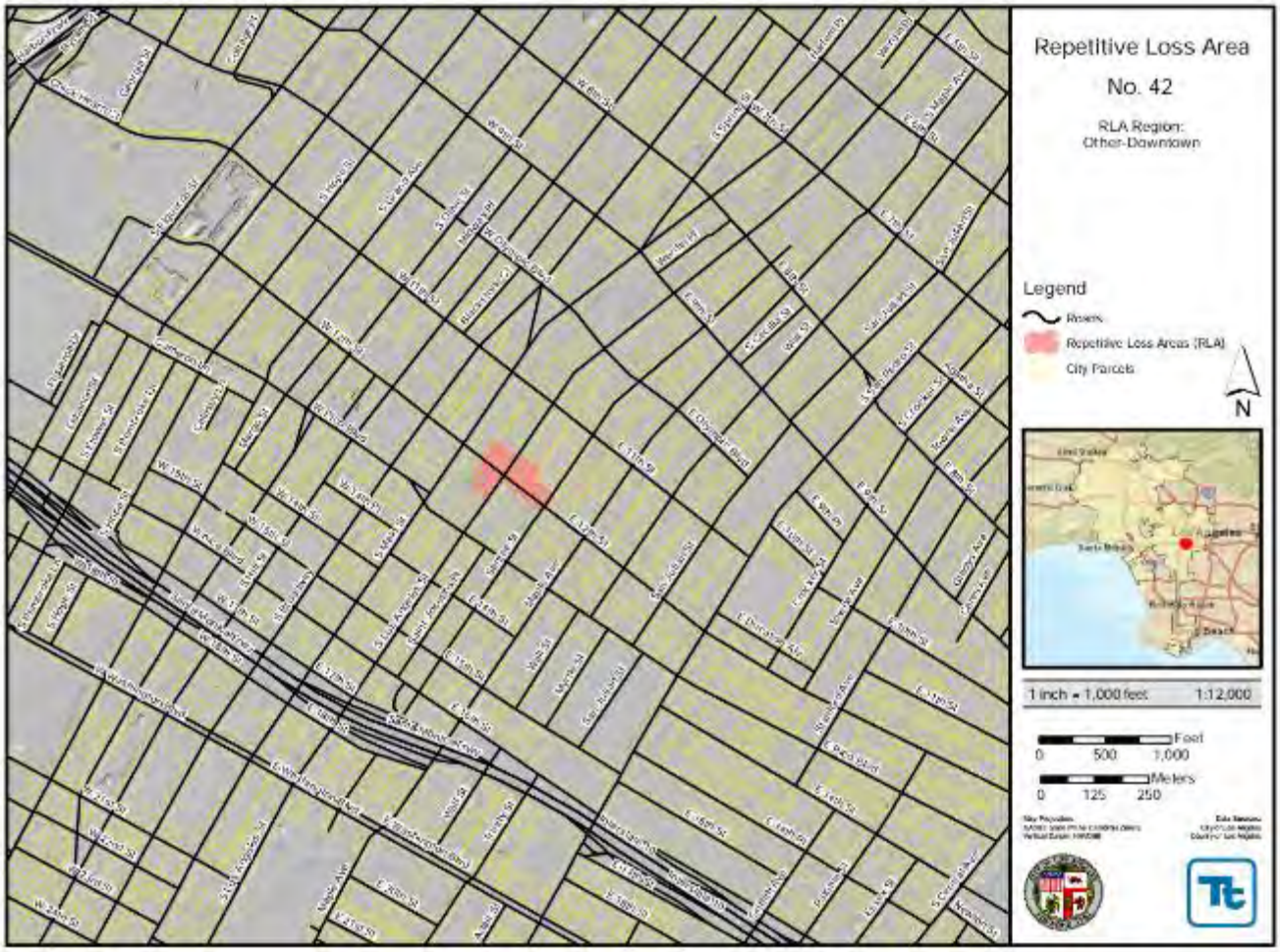

Figure 15-1. Repetitive Loss Area No. 42

16. OTHER – EAGLE ROCK

16.1 PROBLEM STATEMENT

The Other – Eagle Rock repetitive loss region is comprised of Repetitive Loss Area 43. This repetitive loss area, property damage from flooding is caused by urbanized stormwater management issues. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 16.2. Maps are not included for single-building repetitive loss areas due to privacy concerns.

16.2 REPETITIVE LOSS AREA NO. 43

16.2.1 Identified Repetitive Loss Properties

Table 16-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 16-1. Repetitive Loss Properties in Repetitive Loss Area 43

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
139586	43	C	01/05, 02/98	$1,538	No

16.2.2 Properties Included in Repetitive Loss Area 43

One property with one structure has been identified in this repetitive loss area. Table 16-2 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 16-2. All Properties in Repetitive Loss Area 43

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
OER-43-1	1	Slab	D5B	Dry Flood Proof, Elevate Utilities, Elevate Structure

17. OTHER – HYDE PARK

17.1 PROBLEM STATEMENT

The Other – Hyde Park repetitive loss region is comprised of Repetitive Loss Area 44. In each of this repetitive loss area, property damage from flooding is caused by urbanized stormwater runoff. Properties in this area are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners are required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 17.2. Maps are not included for single-building repetitive loss areas due to privacy concerns.

17.2 REPETITIVE LOSS AREA NO. 44

17.2.1 Identified Repetitive Loss Properties

Table 17-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 17-1. Repetitive Loss Properties in Repetitive Loss Area 44

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137203	44	AOB (SFHA)	01/05, 01/98	$2,623	No

17.2.2 Properties Included in Repetitive Loss Area 44

One property with one structure has been identified in this repetitive loss area. Table 17-2 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 17-2. All Properties in Repetitive Loss Area 44

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
OHP-44-1	1	Crawlspace	D6C	Wet Flood Proof, Elevate Utilities, Elevate Structure

18. OTHER - WESTSIDE

18.1 PROBLEM STATEMENT

The Other - Downtown repetitive loss region is comprised of Repetitive Loss Areas 45 and 46. In each of these repetitive loss areas, property damage from flooding is caused by urbanized stormwater runoff. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 18.2 through Section 18.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

18.2 REPETITIVE LOSS AREA NO. 45

18.2.1 Identified Repetitive Loss Properties

Table 18-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 18-1. Repetitive Loss Properties in Repetitive Loss Area 45

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
34379	45	X	03/81, 02/80	$5,392	No

18.2.2 Properties Included in Repetitive Loss Area 45

Five properties with a total of five structures have been identified in this repetitive loss area. Table 18-2 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 18-2. All Properties in Repetitive Loss Area 45

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
OWS-45-1	1	Slab	No Information	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure
OWS-45-2	1	Slab	No Information	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure
OWS-45-3	1	Slab	No Information	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure
OWS-45-4	1	Slab	No Information	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure
OWS-45-5	1	Elevated	No Information	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure

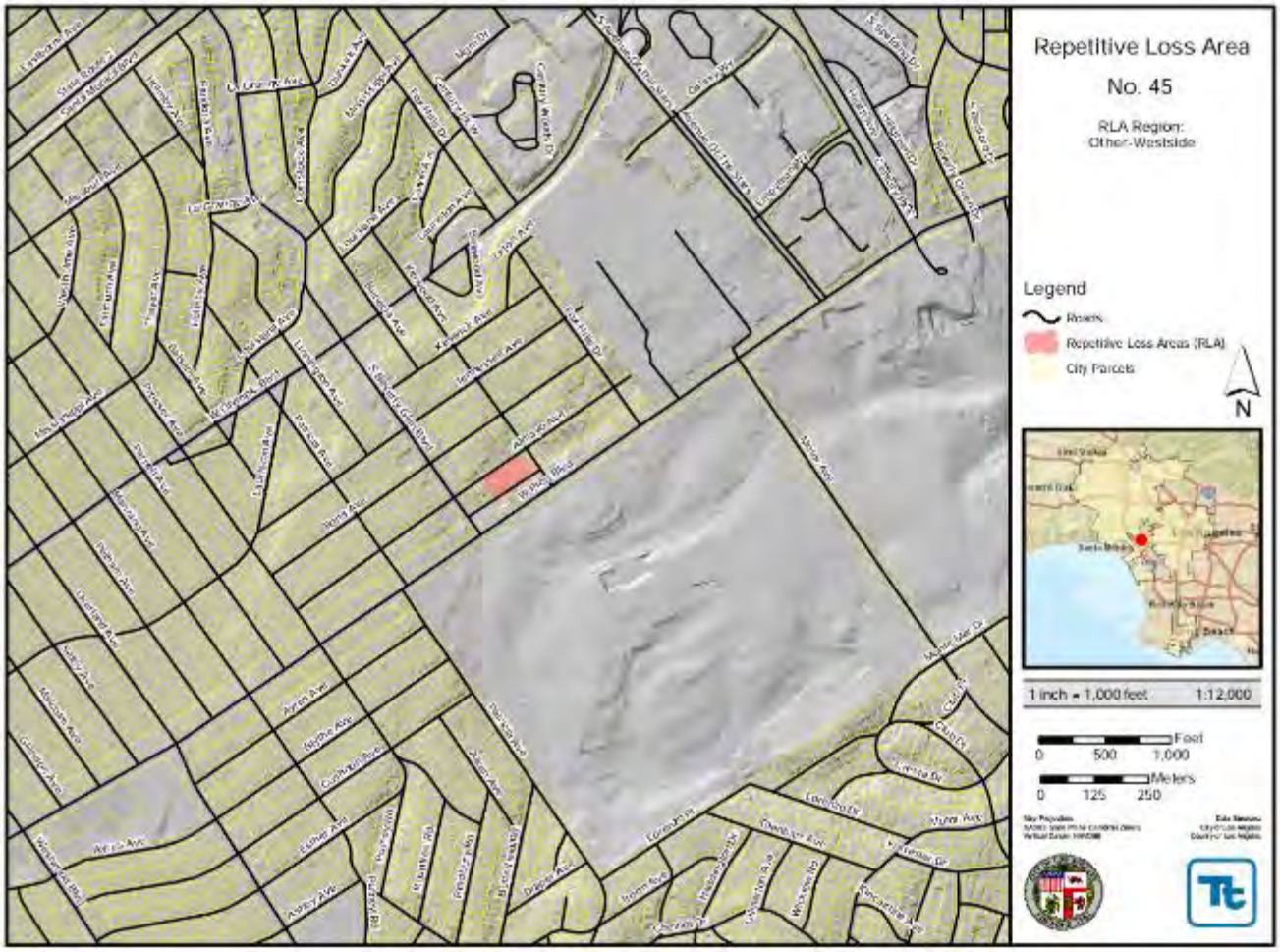

Figure 18-1. Repetitive Loss Area No. 45

18.3 REPETITIVE LOSS AREA NO. 46

18.3.1 Identified Repetitive Loss Properties

Table 18-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 18-3. Repetitive Loss Properties in Repetitive Loss Area 46

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
35091	46	X	2/80, 1/83	$9,395	No

18.3.2 Properties Included in Repetitive Loss Area 46

One property with one structure has been identified in this repetitive loss area. Table 18-4 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 18-4. All Properties in Repetitive Loss Area 46

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
OWS-46-1	1	Slab	D7	Elevate, Dry Flood Proof, Upgrade Stormwater Infrastructure

19. Reseda Boulevard Canyon

19.1 PROBLEM STATEMENT

The Reseda Boulevard Canyon repetitive loss region is comprised of Repetitive Loss Area 47. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon or urbanized stormwater runoff. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 19.2. Maps are not included for single-building repetitive loss areas due to privacy concerns.

19.2 REPETITIVE LOSS AREA NO. 47

19.2.1 Identified Repetitive Loss Properties

Table 19-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 19-1. Repetitive Loss Properties in Repetitive Loss Area 47

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
18341	47	X	01/86, 03/83	$5,692	No

19.2.2 Properties Included in Repetitive Loss Area 47

One property with one structure has been identified in this repetitive loss area. Table 19-2 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 19-2. All Properties in Repetitive Loss Area 47

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
RBC-47-1	1	Slab	No Information	Directional Drainage, Dry Flood Proof, Elevate

20. San Fernando Valley

20.1 PROBLEM STATEMENT

The San Fernando Valley repetitive loss region is comprised of Repetitive Loss Areas 48-59. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon or urbanized stormwater runoff. Some of these properties are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may be required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 20.2 through Section 20.13. Maps are not included for single-building repetitive loss areas due to privacy concerns.

20.2 REPETITIVE LOSS AREA NO. 48

20.2.1 Identified Repetitive Loss Properties

Table 20-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-1. Repetitive Loss Properties in Repetitive Loss Area 48

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
11060	48	X	02/93, 02/92	$2,969	No

20.2.2 Properties Included in Repetitive Loss Area 48

One property with one structure has been identified in this repetitive loss area. Table 20-2 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 20-2. All Properties in Repetitive Loss Area 48

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-48-1	1	Crawlspace	0530	Wet Flood Proof, Dry Flood Proof, Elevate

20.3 REPETITIVE LOSS AREA NO. 49

20.3.1 Identified Repetitive Loss Properties

Table 20-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-3. Repetitive Loss Properties in Repetitive Loss Area 49

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
34203	49	EMG	02/80, 01/80	$5,356	No

20.3.2 Properties Included in Repetitive Loss Area 49

Two properties with a total of two structures have been identified in this repetitive loss area. Table 20-4 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 20-4. All Properties in Repetitive Loss Area 49

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-49-1	1	Slab	CX	Dry Flood Proof, Elevate
SFV-49-2	1	Basement	C7B	Dry Flood Proof Gates, Elevate Interior Floor, Internal Drainage Systems

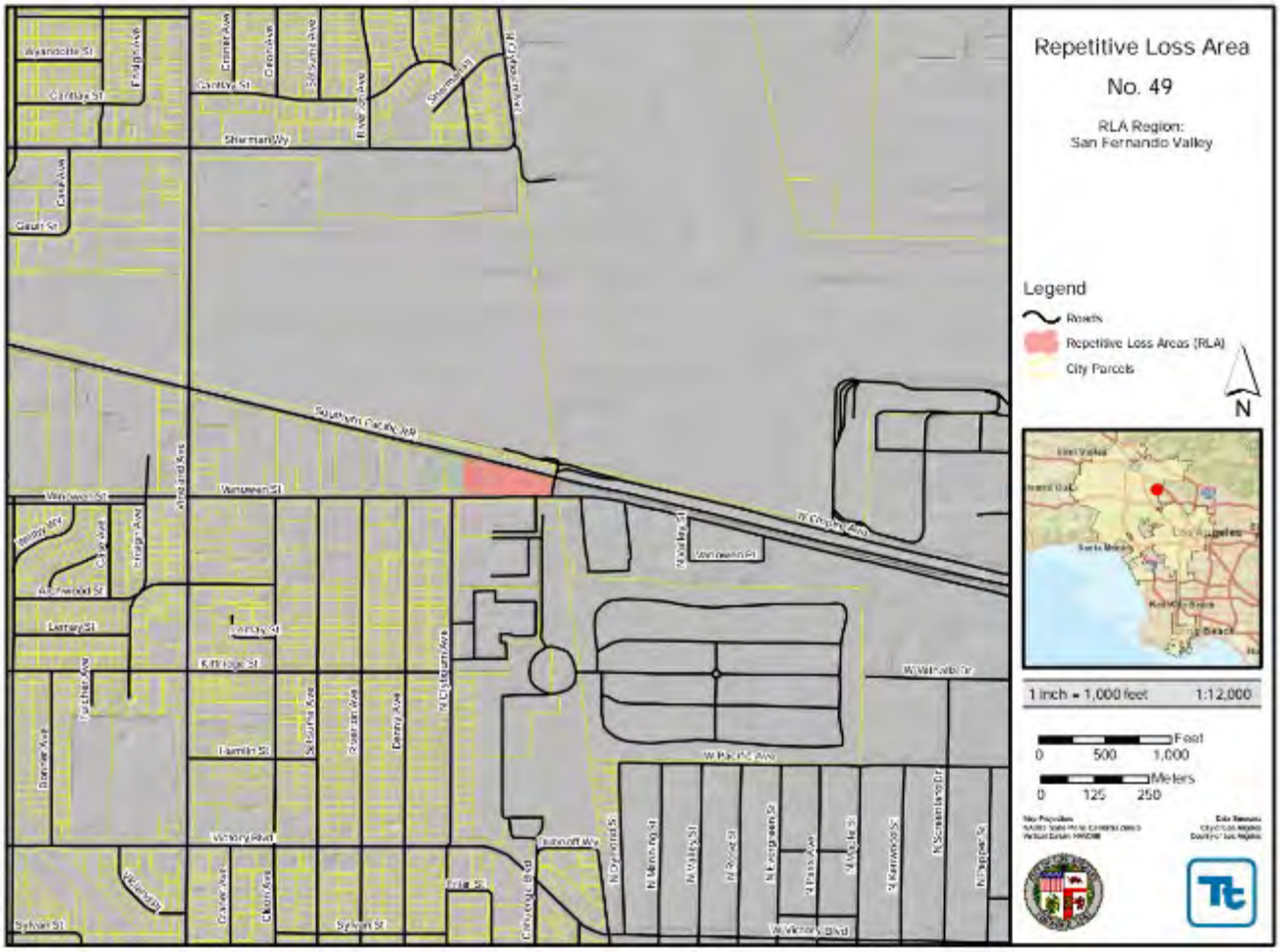

Figure 20-1. Repetitive Loss Area No. 49

20.4 REPETITIVE LOSS AREA NO. 50

20.4.1 Identified Repetitive Loss Properties

Table 20-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-5. Repetitive Loss Properties in Repetitive Loss Area 50

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
34954	50	EMG	02/80, 01/80	$2,310	No

20.4.2 Properties Included in Repetitive Loss Area 50

Seven properties with a total of eleven structures have been identified in this repetitive loss area. Table 20-6 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 20-6. All Properties in Repetitive Loss Area 50

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-50-1	1	Slab	D6	Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-2	1	Crawlspace	D6	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-3	1	Crawlspace	D7	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-4	2	Crawlspace	D6	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-5	3	Basement	D85C	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-6	2	Basement	D65B	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure
SFV-50-7	1	Basement	D75C	Wet Flood Proof, Dry Flood Proof, Elevate Utilities, Elevate Structure

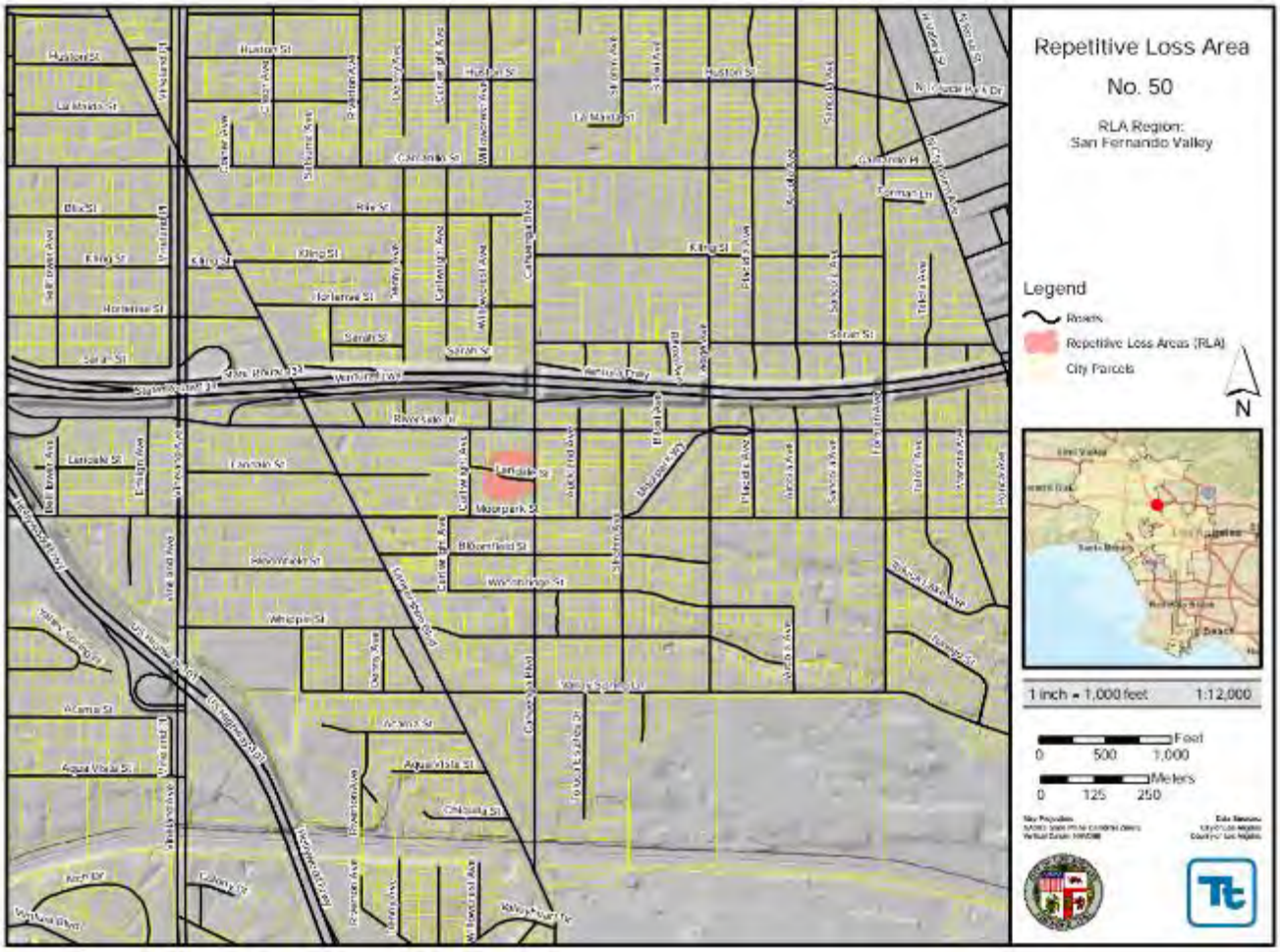

Figure 20-2. Repetitive Loss Area No. 50

20.5 REPETITIVE LOSS AREA NO. 51

20.5.1 Identified Repetitive Loss Properties

Table 20-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-7. Repetitive Loss Properties in Repetitive Loss Area 51

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
36936	51	X	03/83, 03/79	$5,896	No

20.5.2 Properties Included in Repetitive Loss Area 51

Two properties with a total of two structures have been identified in this repetitive loss area. Table 20-8 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 20-8. All Properties in Repetitive Loss Area 51

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-51-1	1	Slab	D7A	Elevate, Dry Flood Proof
SFV-51-2	1	Slab	D7C	Elevate, Dry Flood Proof

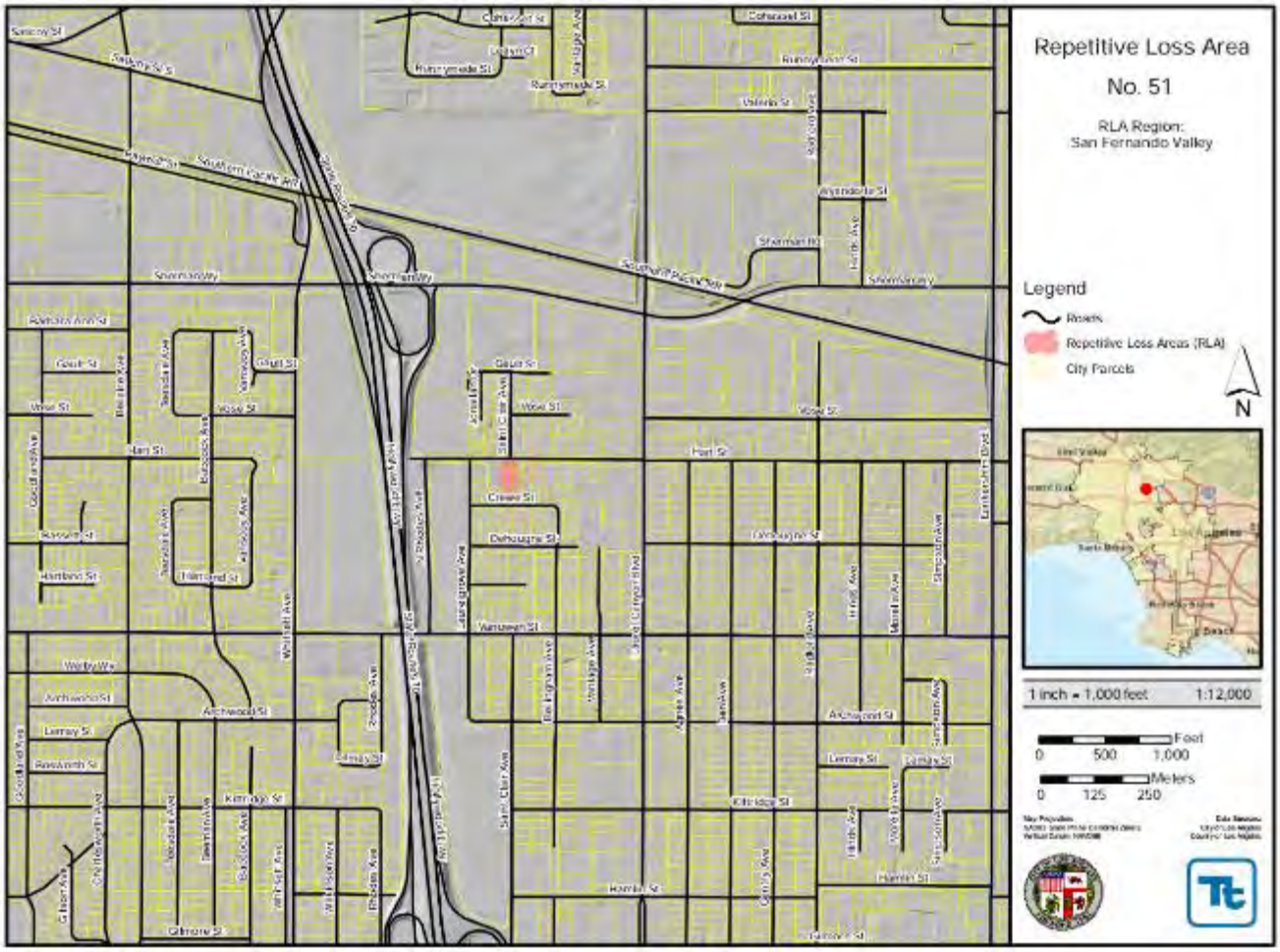

Figure 20-3. Repetitive Loss Area No. 51

20.6 REPETITIVE LOSS AREA NO. 52

20.6.1 Identified Repetitive Loss Properties

Table 20-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-9. Repetitive Loss Properties in Repetitive Loss Area 52

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
49539	52	C	02/92, 03/83	$43,808	No

20.6.2 Properties Included in Repetitive Loss Area 52

Two properties with a total of two structures have been identified in this repetitive loss area. Table 20-10 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 20-10. All Properties in Repetitive Loss Area 52

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-52-1	1	Basement	DX	Elevate, Evacuate Basement, Wet Flood Proof, Acquisition/Demolition
SFV-52-2	1	Basement	No Information	Elevate, Evacuate Basement, Wet Flood Proof, Acquisition/Demolition

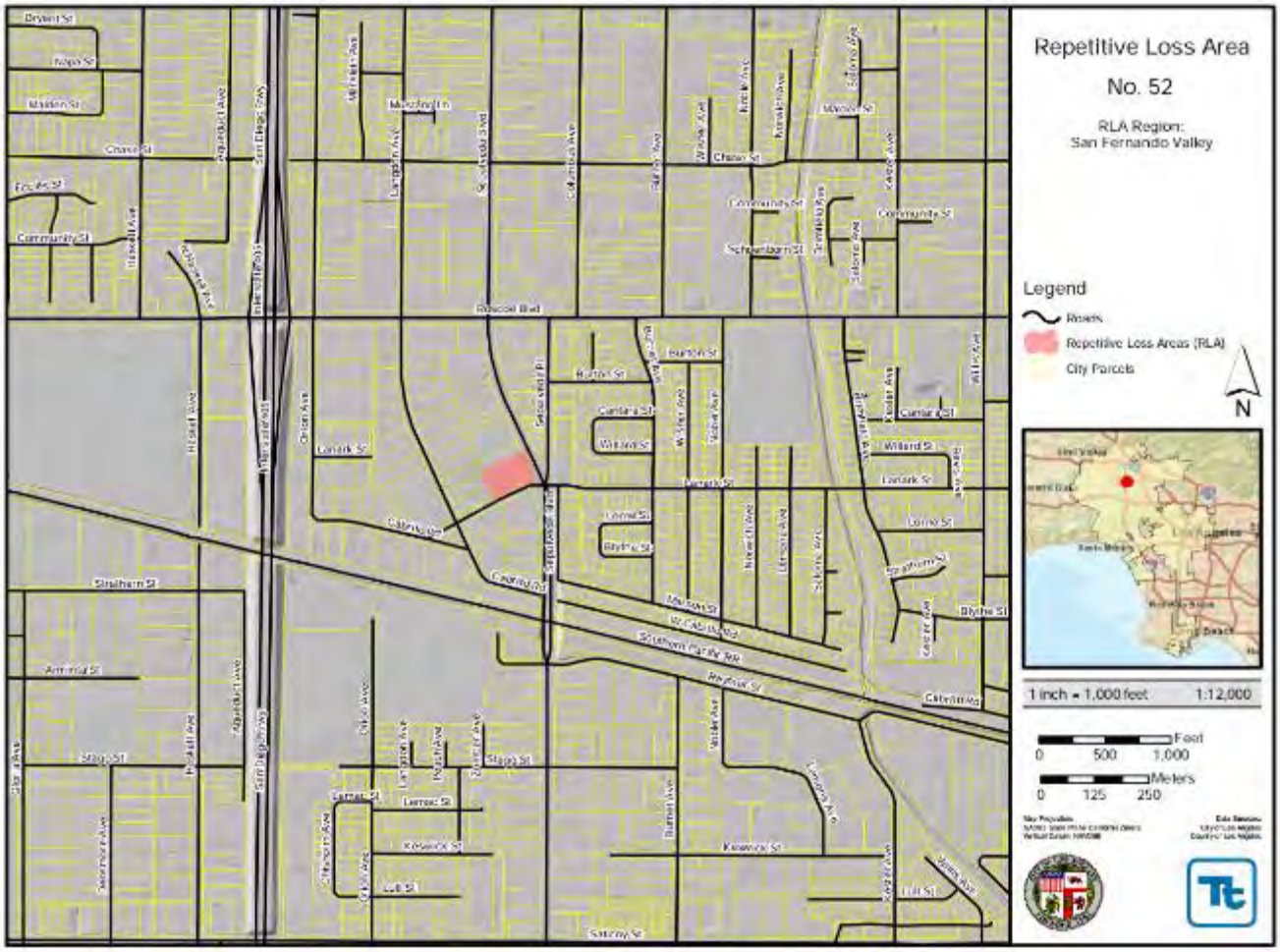

Figure 20-4. Repetitive Loss Area No. 52

20.7 REPETITIVE LOSS AREA NO. 53

20.7.1 Identified Repetitive Loss Properties

Table 20-11 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-11. Repetitive Loss Properties in Repetitive Loss Area 53

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
57931	53	X	03/83, 03/80	$3,307	No

20.7.2 Properties Included in Repetitive Loss Area 53

One property with one structure has been identified in this repetitive loss area. Table 20-12 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 20-12. All Properties in Repetitive Loss Area 53

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-53-1	1	Slab	D85B	Directional Drainage, Dry Flood Proof, Elevate

20.8 REPETITIVE LOSS AREA NO. 54

20.8.1 Identified Repetitive Loss Properties

Table 20-13 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-13. Repetitive Loss Properties in Repetitive Loss Area 54

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
92317	54	X	02/98, 02/98	$3,828	No

20.8.2 Properties Included in Repetitive Loss Area 54

One property with one structure has been identified in this repetitive loss area. Table 20-14 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 20-14. All Properties in Repetitive Loss Area 54

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-54-1	2	Crawlspace	D8D	Elevate Utilities, Wet Flood Proof, Elevate Structure

20.9 REPETITIVE LOSS AREA NO. 55

20.9.1 Identified Repetitive Loss Properties

Table 20-15 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-15. Repetitive Loss Properties in Repetitive Loss Area 55

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
113344	55	X	01/08, 04/01, 02/98	$14,810	No

20.9.2 Properties Included in Repetitive Loss Area 55

Four properties with a total of five structures have been identified in this repetitive loss area. Table 20-16 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 20-16. All Properties in Repetitive Loss Area 55

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-55-1	1	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof
SFV-55-2	1	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof
SFV-55-3	2	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof
SFV-55-4	1	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof

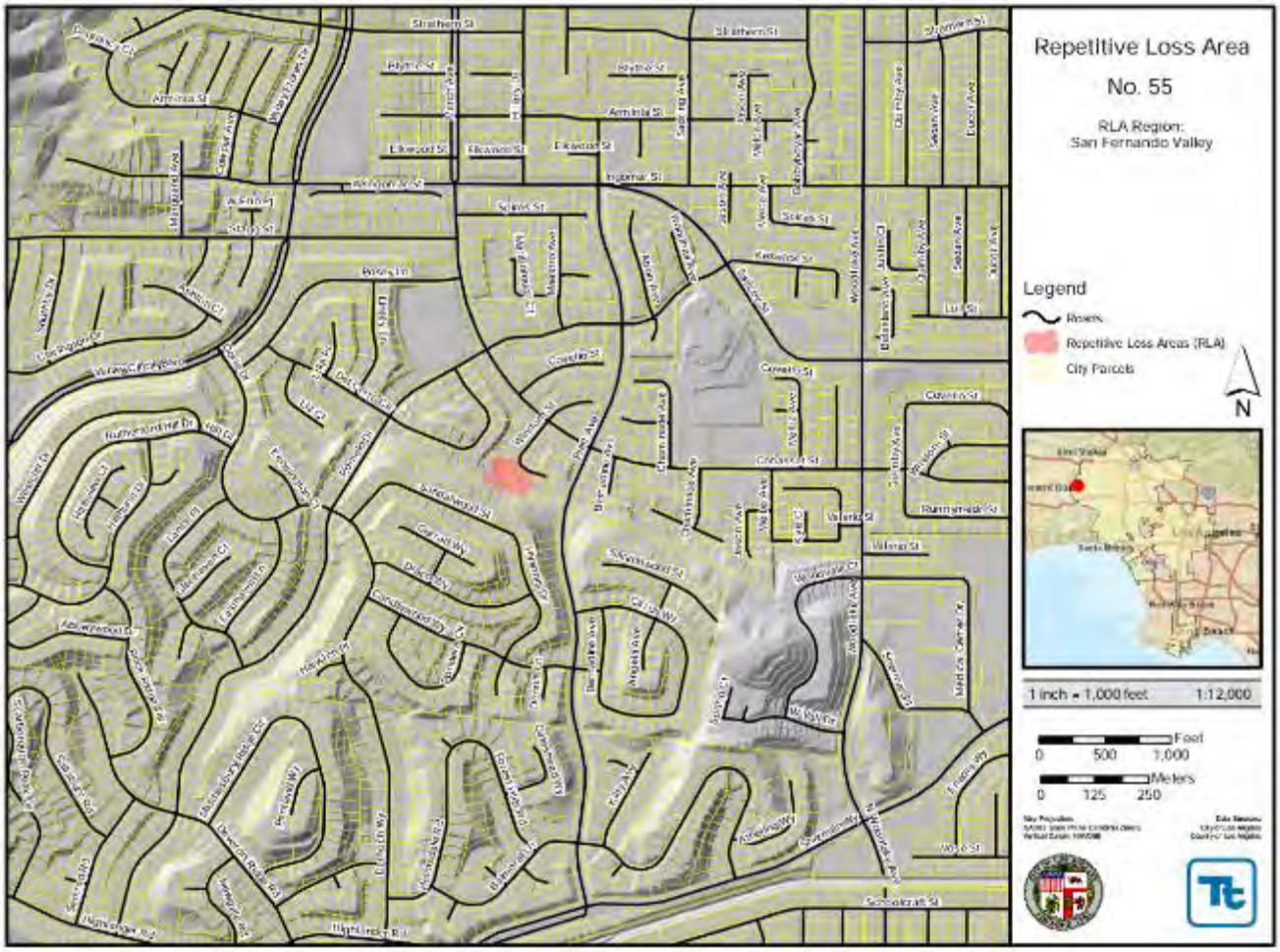

Figure 20-5. Repetitive Loss Area No. 55

20.10 REPETITIVE LOSS AREA NO. 56

20.10.1 Identified Repetitive Loss Properties

Table 20-17 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-17. Repetitive Loss Properties in Repetitive Loss Area 56

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
245944	56	C	03/11, 02/05	$70,792	No

20.10.2 Properties Included in Repetitive Loss Area 56

One property with one structure has been identified in this repetitive loss area. Table 20-18 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 20-18. All Properties in Repetitive Loss Area 56

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-56-1	2	Slab	C8C	Elevate, Acquisition/Demolition

20.11 REPETITIVE LOSS AREA NO. 57

20.11.1 Identified Repetitive Loss Properties

Table 20-19 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-19. Repetitive Loss Properties in Repetitive Loss Area 57

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138450	57	X	03/11, 01/05	$7,839	No

20.11.2 Properties Included in Repetitive Loss Area 57

One property with one structure has been identified in this repetitive loss area. Table 20-20 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 20-20. All Properties in Repetitive Loss Area 57

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-57-1	5	Slab	D6B	Elevate, Directional Drainage, Dry Flood Proof

20.12 REPETITIVE LOSS AREA NO. 58

20.12.1 Identified Repetitive Loss Properties

Table 20-21 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-21. Repetitive Loss Properties in Repetitive Loss Area 58

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
136852	58	X	12/04, 02/98	$5,404	No

20.12.2 Properties Included in Repetitive Loss Area 58

One property with two structures has been identified in this repetitive loss area. Table 20-22 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 20-22. All Properties in Repetitive Loss Area 58

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-58-1	2	Slab	D8B	Elevate, Dry Flood Proof

20.13 REPETITIVE LOSS AREA NO. 59

20.13.1 Identified Repetitive Loss Properties

Table 20-23 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 20-23. Repetitive Loss Properties in Repetitive Loss Area 59

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
121962	59	C	12/02, 02/98	$2,511	No

20.13.2 Properties Included in Repetitive Loss Area 59

Two properties with a total of two structures have been identified in this repetitive loss area. Table 20-24 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 20-24. All Properties in Repetitive Loss Area 59

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SFV-59-1	1	Slab	D7A	Directional Drainage, Dry Flood Proof, Elevate
SFV-59-2	1	Slab	D7A	Directional Drainage, Dry Flood Proof, Elevate

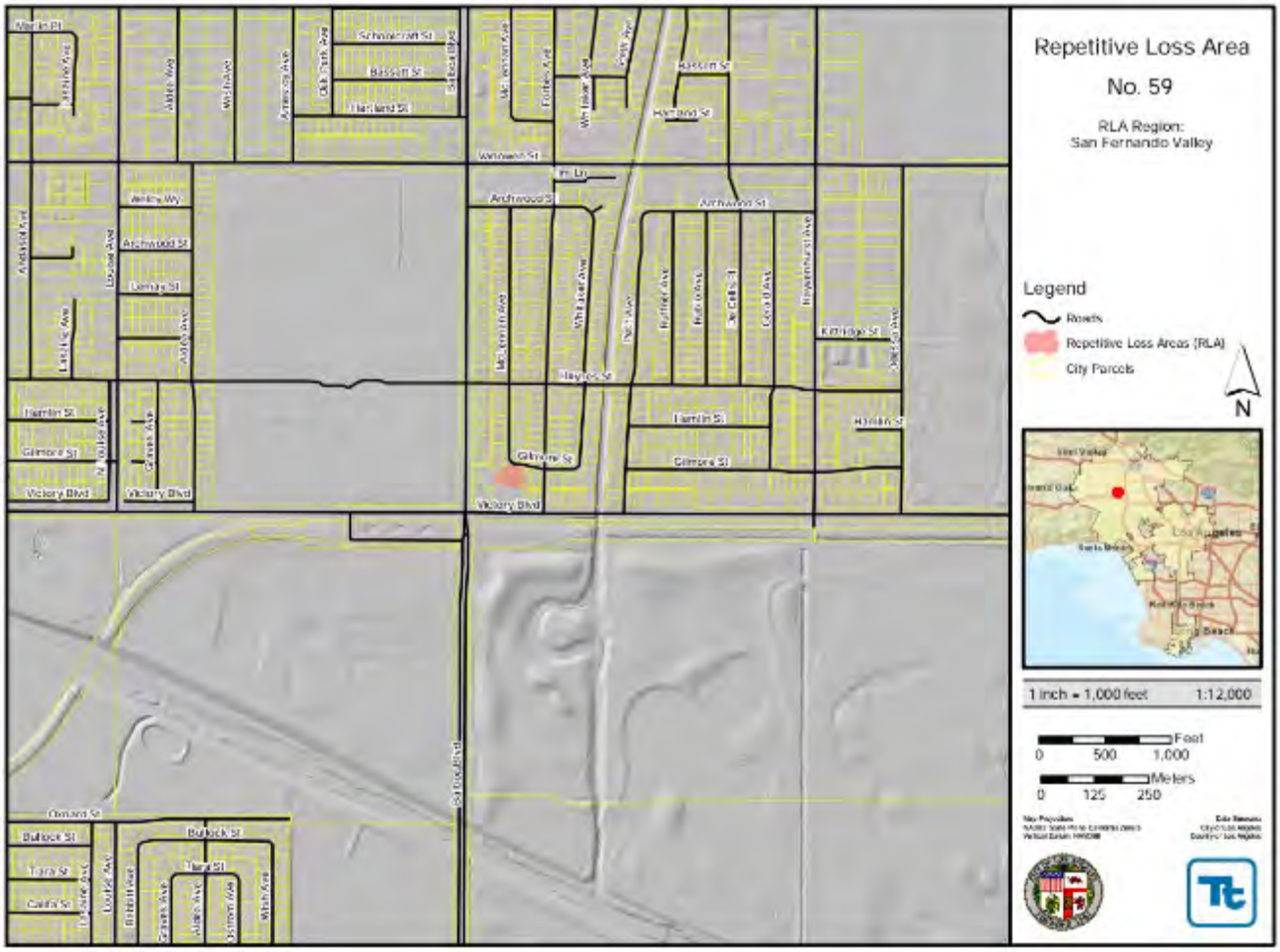

Figure 20-6. Repetitive Loss Area No. 59

21. PLAYA DEL REY

21.1 PROBLEM STATEMENT

The Playa del Rey repetitive loss region is comprised of Repetitive Loss Areas 60-62. In each of these repetitive loss areas, property damage from flooding is caused by urbanized stormwater runoff. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 21.2 through Section 21.4. Maps are not included for single-building repetitive loss areas due to privacy concerns.

21.2 REPETITIVE LOSS AREA NO. 60

21.2.1 Identified Repetitive Loss Properties

Table 21-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 21-1. Repetitive Loss Properties in Repetitive Loss Area 60

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
10457	60	X	01/88, 01/83	$9,703	No

21.2.2 Properties Included in Repetitive Loss Area 60

Thirty-four properties with a total of 48 structures have been identified in this repetitive loss area. Table 21-2 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 21-2. All Properties in Repetitive Loss Area 60

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
PDR-60-1	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-2	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-3	15	Basement	No Information	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-4	1	Crawlspace	D65	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-5	1	Slab	D8	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-6	1	Crawlspace	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-7	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-8	1	Crawlspace	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-9	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-10	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-11	1	Crawlspace	D65	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
PDR-60-12	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-13	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-14	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-15	1	Basement	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-16	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-17	1	Basement	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-18	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-19	1	Slab	D7	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-20	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-21	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-22	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-23	1	Slab	D65	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-24	1	Basement	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-25	1	Slab	D9B	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-26	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-27	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-28	1	Basement	D6	Enhance Directional Drainage, Wet Flood Proof, Dry Flood Proof, Elevate
PDR-60-29	1	Slab	D10A	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-30	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-31	1	Slab	D7B	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-32	1	Slab	D6	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-33	1	Slab	D9B	Enhance Directional Drainage, Dry Flood Proof, Elevate
PDR-60-34	1	Slab	D65	Enhance Directional Drainage, Dry Flood Proof, Elevate
Total	48			

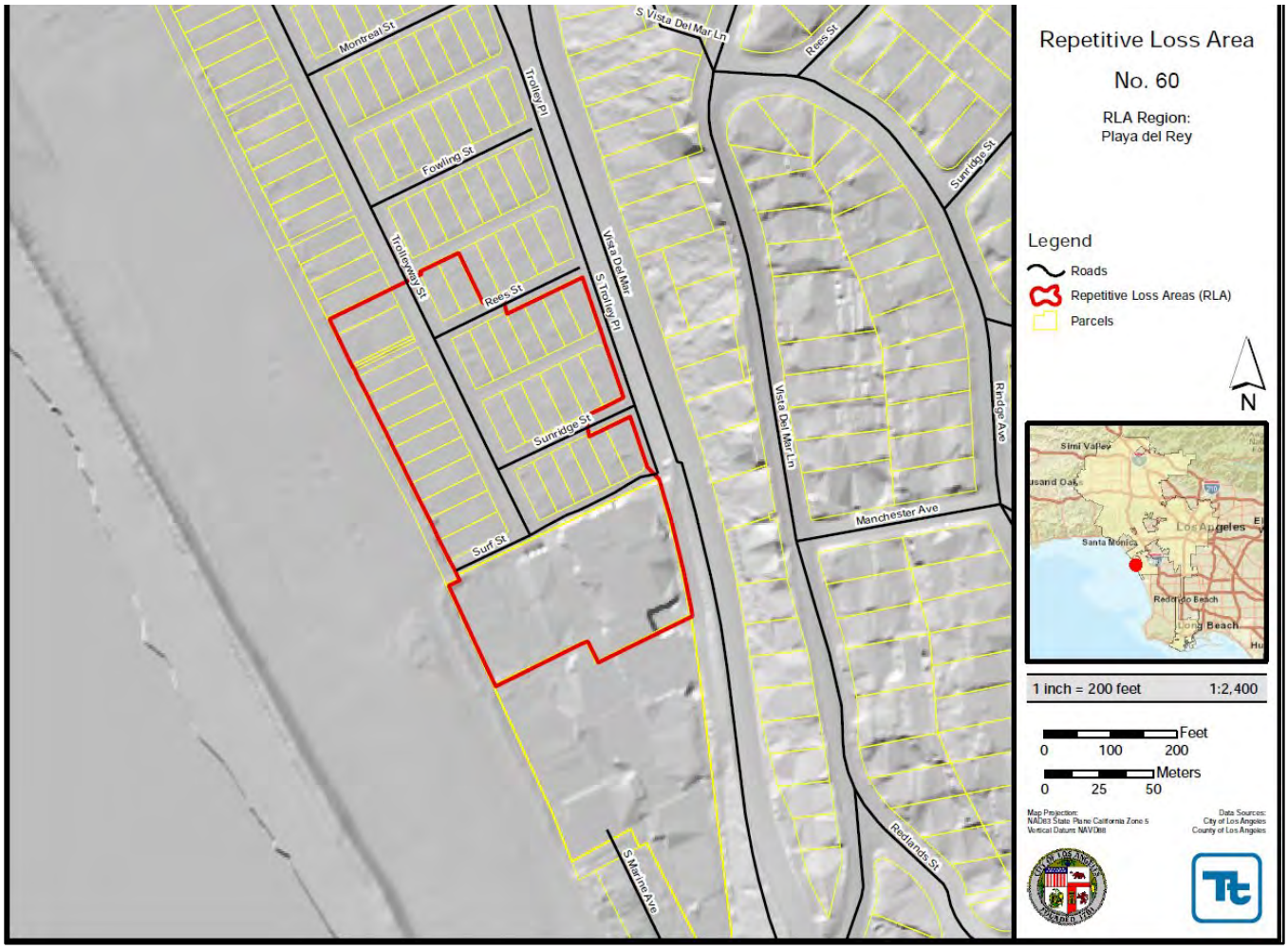

Figure 21-1. Repetitive Loss Area No. 60

21.3 REPETITIVE LOSS AREA NO. 61

21.3.1 Identified Repetitive Loss Properties

Table 21-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 21-3. Repetitive Loss Properties in Repetitive Loss Area 61

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
270833	61	X	08/17, 02/14	$7,969	No

21.3.2 Properties Included in Repetitive Loss Area 61

One property with one structure has been identified in this repetitive loss area. Table 21-4 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 21-4. All Properties in Repetitive Loss Area 61

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
PDR-61-1	1	Crawlspace	D85	Wet Flood Proof Garage, Elevate Utilities, Enhance Drainage, Elevate Structure

21.4 REPETITIVE LOSS AREA NO. 62

21.4.1 Identified Repetitive Loss Properties

Table 21-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 21-5. Repetitive Loss Properties in Repetitive Loss Area 62

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137802	62	B	02/05, 02/98	$4,699	No

21.4.2 Properties Included in Repetitive Loss Area 62

Two properties with a total of two structures have been identified in this repetitive loss area. Table 21-6 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 21-6. All Properties in Repetitive Loss Area 62

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
PDR-62-1	1	Crawlspace	No Information	Wet Flood Proof, Enhance Drainage, Elevate

22. Santa Monica Mountains Foothills

22.1 PROBLEM STATEMENT

The Santa Monica Mountains Foothills repetitive loss region is comprised of Repetitive Loss Areas 63-98. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon or by urbanized stormwater runoff. Some of these properties are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may be required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 22.2 through Section 22.37.

22.2 REPETITIVE LOSS AREA NO. 63

22.2.1 Identified Repetitive Loss Properties

Table 22-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-1. Repetitive Loss Properties in Repetitive Loss Area 63

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
1157	63	X	02/93, 12/92	$6,497	No

22.2.2 Properties Included in Repetitive Loss Area 63

One property with one structure 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 Repetitive Loss Area 63

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-63-1	1	Slab	D12B	Directional Drainage, Elevate, Dry Flood Proof

22.3 REPETITIVE LOSS AREA NO. 64

22.3.1 Identified Repetitive Loss Properties

Table 22-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-3. Repetitive Loss Properties in Repetitive Loss Area 64

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
2988	64	X	01/93, 02/92	$8,925	No

22.3.2 Properties Included in Repetitive Loss Area 64

One property with one structure has been identified in this repetitive loss area. Table 22-4 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 22-4. All Properties in Repetitive Loss Area 64

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-64-1	1	Slab	D8C	Elevate, Directional Drainage, Dry Flood Proof

22.4 REPETITIVE LOSS AREA NO. 65

22.4.1 Identified Repetitive Loss Properties

Table 22-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-5. Repetitive Loss Properties in Repetitive Loss Area 65

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
13679	65	C	03/92, 02/92	$1,536	No

22.4.2 Properties Included in Repetitive Loss Area 80

One property with one structure has been identified in this repetitive loss area. Table 22-6 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 22-6. All Properties in Repetitive Loss Area 65

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-65-1	1	Crawlspace	D75B	Elevate, Directional Drainage, Wet Flood Proof

22.5 REPETITIVE LOSS AREA NO. 66

22.5.1 Identified Repetitive Loss Properties

Table 22-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-7. Repetitive Loss Properties in Repetitive Loss Area 66

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14895	66	A11	03/83, 02/80, 03/78	$7,625	No

22.5.2 Properties Included in Repetitive Loss Area 66

One property with one structure has been identified in this repetitive loss area. Table 22-8 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 22-8. All Properties in Repetitive Loss Area 66

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-66-1	1	Crawlspace	D9A	Elevate, Wet Flood Proof, Directional Drainage

22.6 REPETITIVE LOSS AREA NO. 67

22.6.1 Identified Repetitive Loss Properties

Table 22-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-9. Repetitive Loss Properties in Repetitive Loss Area 67

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
17937	67	C	02/86, 03/78	$7,610	No

22.6.2 Properties Included in Repetitive Loss Area 67

One property with two structures has been identified in this repetitive loss area. Table 22-10 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 22-10. All Properties in Repetitive Loss Area 67

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-67-1	2	Slab	D9C	Elevate, Directional Drainage, Dry Flood Proof

22.7 REPETITIVE LOSS AREA NO. 68

22.7.1 Identified Repetitive Loss Properties

Table 22-11 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-11. Repetitive Loss Properties in Repetitive Loss Area 68

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28307	68	EMG	03/79, 02/78	$2,062	No

22.7.2 Properties Included in Repetitive Loss Area 68

Sixteen properties with a total of 20 structures have been identified in this repetitive loss area. Table 22-12 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 22-12. All Properties in Repetitive Loss Area 68

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-68-1	1	Crawlspace	D8C	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-2	1	Basement	D75B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-3	1	Crawlspace	D75C	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-4	1	Slab	D8C	Elevate, Dry Flood Proof, Directional Drainage
SMF-68-5	1	Basement	D75B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-6	1	Slab	D95C	Elevate, Dry Flood Proof, Directional Drainage
SMF-68-7	1	Slab	D7B	Elevate, Dry Flood Proof, Directional Drainage
SMF-68-8	3	Slab	D55B	Elevate, Dry Flood Proof, Directional Drainage
SMF-68-9	2	Basement	D11A	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-10	1	Basement	D75B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-11	1	Basement	D75B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-12	1	Crawlspace	D5B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-13	1	Slab	No Information	Elevate, Dry Flood Proof, Directional Drainage
SMF-68-14	1	Crawlspace	D7B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-15	2	Crawlspace	D6B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
SMF-68-16	1	Crawlspace	D55B	Elevate, Wet Flood Proof, Dry Flood Proof, Directional Drainage
Total	20			

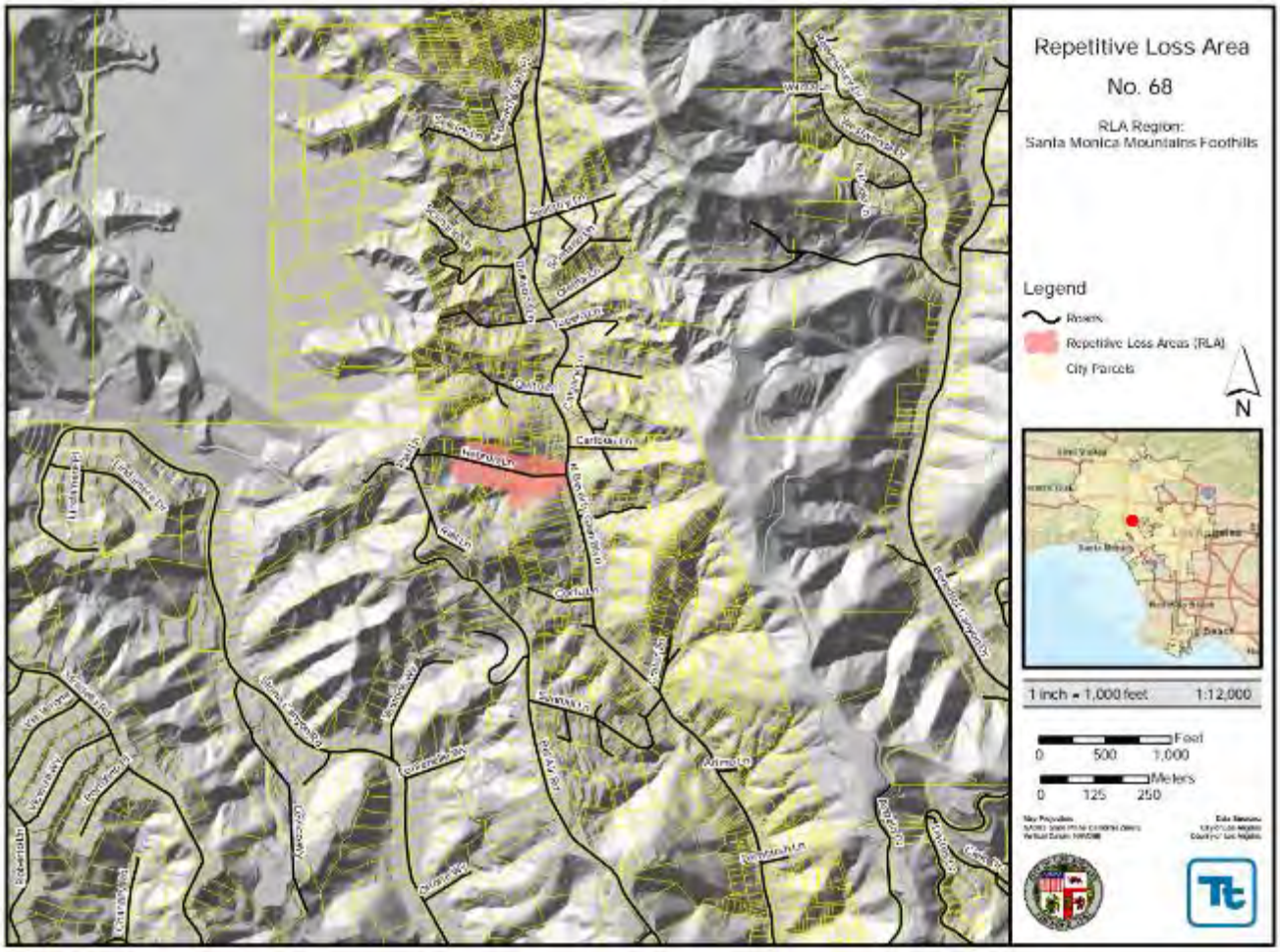

Figure 22-1. Repetitive Loss Area No. 68

22.8 REPETITIVE LOSS AREA NO. 69

22.8.1 Identified Repetitive Loss Properties

Table 22-13 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-13. Repetitive Loss Properties in Repetitive Loss Area 69

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28400	69	X	02/80, 02/78	$1,204	No

22.8.2 Properties Included in Repetitive Loss Area 69

Three properties with a total of four structures have been identified in this repetitive loss area. Table 22-14 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 22-14. All Properties in Repetitive Loss Area 69

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-69-1	2	Crawlspace	D65B	Elevate, Wet Flood Proof, Directional Drainage, Dry Flood Proof
SMF-69-2	1	Crawlspace	D75C	Elevate, Wet Flood Proof, Directional Drainage, Dry Flood Proof
SMF-69-3	1	Crawlspace	D75B	Elevate, Wet Flood Proof, Directional Drainage, Dry Flood Proof

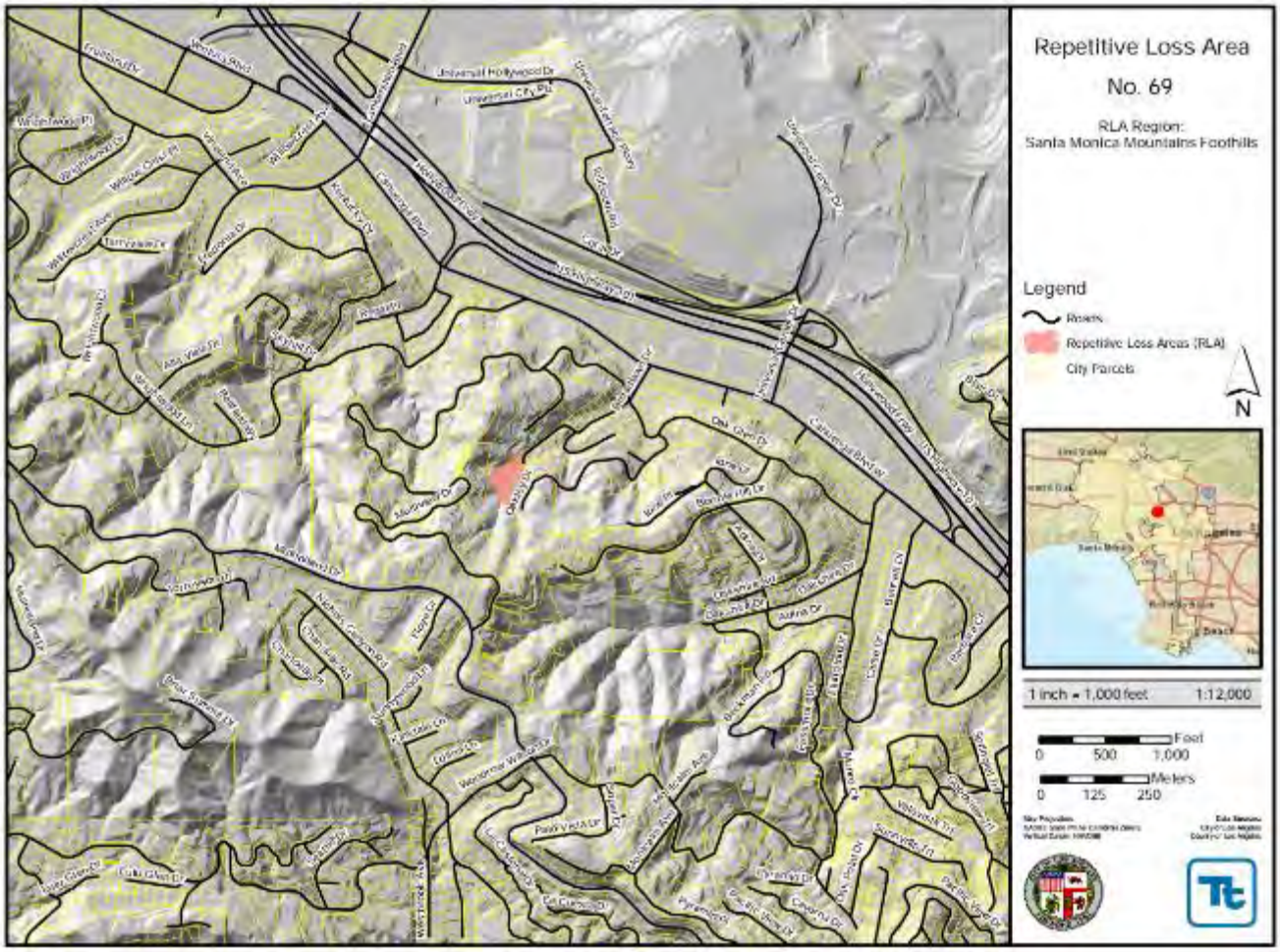

Figure 22-2. Repetitive Loss Area No. 69

22.9 REPETITIVE LOSS AREA NO. 70

22.9.1 Identified Repetitive Loss Properties

Table 22-15 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-15. Repetitive Loss Properties in Repetitive Loss Area 70

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
34711	70	B	02/93, 03/83, 01/83, 02/80	$13,202	No

22.9.2 Properties Included in Repetitive Loss Area 70

One property with one structure has been identified in this repetitive loss area. Table 22-16 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 22-16. All Properties in Repetitive Loss Area 70

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-70-1	1	Crawlspace	D85B	Acquisition/Demolition, Wet Flood Proof, Dry Flood Proof, Elevate

22.10 REPETITIVE LOSS AREA NO. 71

22.10.1 Identified Repetitive Loss Properties

Table 22-17 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-17. Repetitive Loss Properties in Repetitive Loss Area 71

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
38943	71	C	01/83, 02/80	$4,613	No

22.10.2 Properties Included in Repetitive Loss Area 71

One property with one structure has been identified in this repetitive loss area. Table 22-18 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 22-18. All Properties in Repetitive Loss Area 71

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-71-1	1	Crawlspace	D9A	Elevate, Wet Flood Proof, Directional Drainage, Dry Flood Proof

22.11 REPETITIVE LOSS AREA NO. 72

22.11.1 Identified Repetitive Loss Properties

Table 22-19 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-19. Repetitive Loss Properties in Repetitive Loss Area 72

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
40572	72	EMG	02/80, 01/79	$28,240	No

22.11.2 Properties Included in Repetitive Loss Area 72

One property with one structure has been identified in this repetitive loss area. Table 22-20 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 22-20. All Properties in Repetitive Loss Area 72

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-72-1	1	Crawlspace	DX	Elevate, Directional Drainage, Wet Flood Proof

22.12 REPETITIVE LOSS AREA NO. 73

22.12.1 Identified Repetitive Loss Properties

Table 22-21 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-21. Repetitive Loss Properties in Repetitive Loss Area 73

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
45890	73	C	03/83	$2,843	No

22.12.2 Properties Included in Repetitive Loss Area 73

One property with three structures has been identified in this repetitive loss area. Table 22-22 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 22-22. All Properties in Repetitive Loss Area 73

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-73-1	3	Crawlspace	D95A	Elevation, Directional Drainage, Wet Flood Proof

22.13 REPETITIVE LOSS AREA NO. 74

22.13.1 Identified Repetitive Loss Properties

Table 22-23 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-23. Repetitive Loss Properties in Repetitive Loss Area 74

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
46649	74	C	01/83, 02/80	$2,465	No

22.13.2 Properties Included in Repetitive Loss Area 74

One property with two structures have been identified in this repetitive loss area. Table 22-24 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 22-24. All Properties in Repetitive Loss Area 74

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-74-1	2	Crawlspace	No Information	Elevate Primary, Wet Flood Proof/Elevate Secondary Structures

22.14 REPETITIVE LOSS AREA NO. 75

22.14.1 Identified Repetitive Loss Properties

Table 22-25 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-25. Repetitive Loss Properties in Repetitive Loss Area 75

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
46812	75	X	03/11, 01/88, 03/83, 01/83, 02/80	$58,936	No

22.14.2 Properties Included in Repetitive Loss Area 75

One property with three structures has been identified in this repetitive loss area. Table 22-26 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 22-26. All Properties in Repetitive Loss Area 75

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-75-1	3	Basement	DX	Acquisition/Demolition, Elevate

22.15 REPETITIVE LOSS AREA NO. 76

22.15.1 Identified Repetitive Loss Properties

Table 22-27 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-27. Repetitive Loss Properties in Repetitive Loss Area 76

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
51293	76	X	02/86, 01/83	$6,355	No

22.15.2 Properties Included in Repetitive Loss Area 76

One property with one structure has been identified in this repetitive loss area. Table 22-28 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 22-28. All Properties in Repetitive Loss Area 76

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-76-1	1	Slab	D8D	Elevate, Dry Flood Proof

22.16 REPETITIVE LOSS AREA NO. 77

22.16.1 Identified Repetitive Loss Properties

Table 22-29 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-29. Repetitive Loss Properties in Repetitive Loss Area 77

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
58032	77	C	03/95, 02/93, 01/83	$5,522	No

22.16.2 Properties Included in Repetitive Loss Area 77

Two properties with a total of two structures have been identified in this repetitive loss area. Table 22-30 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 22-30. All Properties in Repetitive Loss Area 77

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-77-1	1	Crawlspace	D85C	Elevate, Wet Flood Proof, Directional Drainage
SMF-77-2	1	Crawlspace	D10B	Elevate, Wet Flood Proof, Directional Drainage

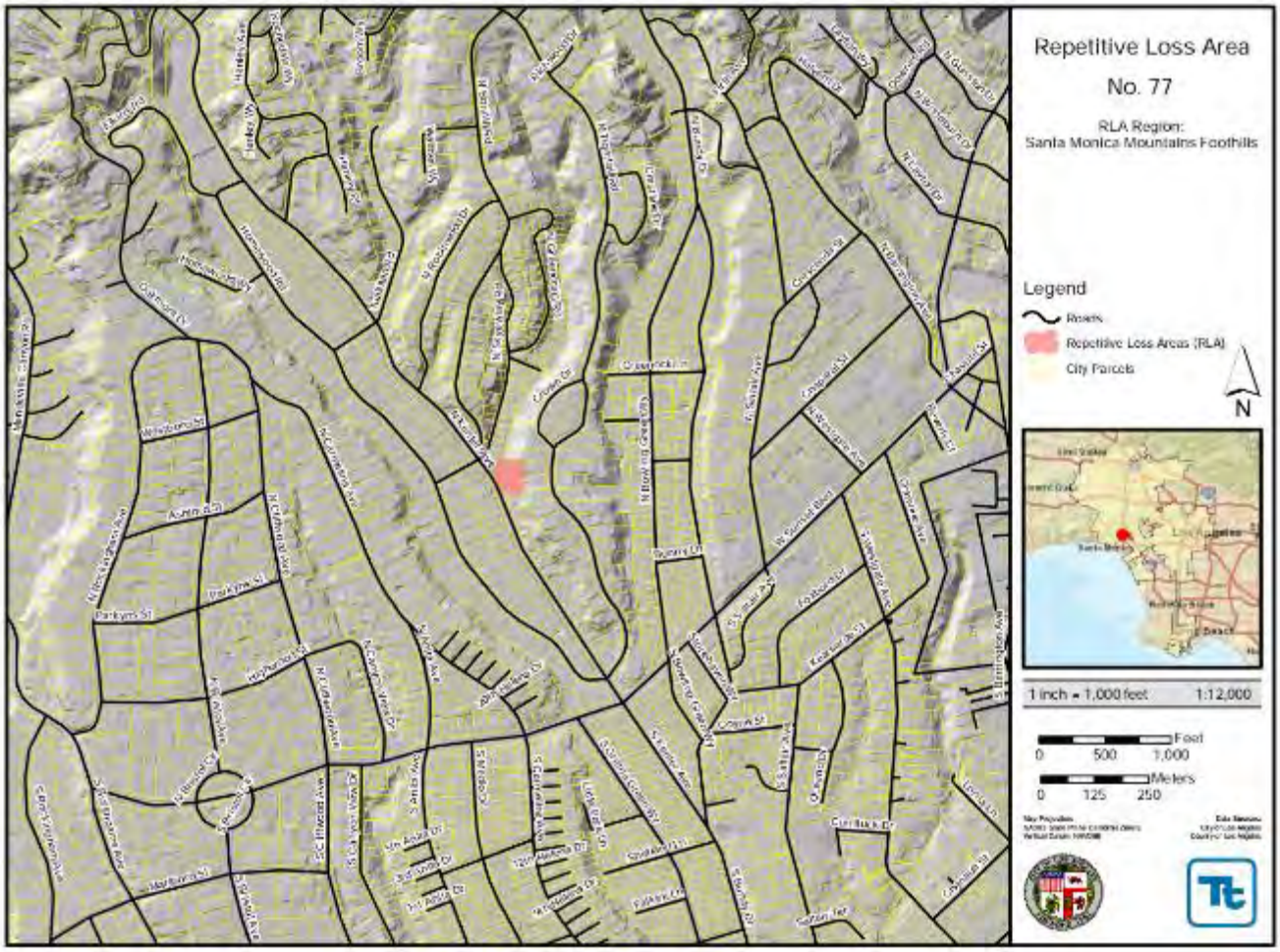

Figure 22-3. Repetitive Loss Area No. 77

22.17 REPETITIVE LOSS AREA NO. 78

22.17.1 Identified Repetitive Loss Properties

Table 22-31 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-31. Repetitive Loss Properties in Repetitive Loss Area 78

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
58033	78	C	03/98, 02/93, 03/83	$10,756	No

22.17.2 Properties Included in Repetitive Loss Area 78

One property with three structures has been identified in this repetitive loss area. Table 22-32 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 22-32. All Properties in Repetitive Loss Area 78

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-78-1	3	Crawlspace	D10A	Elevate, Wet Flood Proof

22.18 REPETITIVE LOSS AREA NO. 79

22.18.1 Identified Repetitive Loss Properties

Table 22-33 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-33. Repetitive Loss Properties in Repetitive Loss Area 79

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
58038	79	X	02/93, 03/83	$8,983	No

22.18.2 Properties Included in Repetitive Loss Area 79

Eighteen properties with 24 structures have been identified in this repetitive loss area. Table 22-34 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 22-34. All Properties in Repetitive Loss Area 79

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-79-1	1	Crawlspace	D85B	Elevate Structure and Utilities
SMF-79-2	2	Crawlspace	D11B	Elevate Structures and Utilities
SMF-79-3	1	Slab	D10B	Elevate Structure and Utilities
SMF-79-4	2	Slab	D9D	Elevate Structures and Utilities
SMF-79-5	1	Slab	D85B	Elevate Structure and Utilities
SMF-79-6	1	Crawlspace	D11D	Elevate Structure and Utilities
SMF-79-7	1	Crawlspace	D9C	Elevate Structure and Utilities
SMF-79-8	2	Slab	D85D	Elevate Structures and Utilities
SMF-79-9	1	Crawlspace	D7B	Elevate Structure and Utilities
SMF-79-10	1	Crawlspace	D10A	Elevate Structure and Utilities
SMF-79-11	2	Slab	D7D	Elevate Structures and Utilities
SMF-79-12	2	Crawlspace	D9C	Elevate Structures and Utilities
SMF-79-13	1	Crawlspace	D8D	Elevate Structure and Utilities
SMF-79-14	1	Crawlspace	D9C	Elevate Structure and Utilities
SMF-79-15	2	Crawlspace	D75D	Elevate Structures and Utilities
SMF-79-16	1	Slab	D9B	Elevate Structure and Utilities
SMF-79-17	1	Crawlspace	D8D	Elevate Structure and Utilities
SMF-79-18	1	Slab	D85C	Elevate Structure and Utilities
Total	24			

Figure 22-4. Repetitive Loss Area No. 79

22.19 REPETITIVE LOSS AREA NO. 80

22.19.1 Identified Repetitive Loss Properties

Table 22-35 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-35. Repetitive Loss Properties in Repetitive Loss Area 80

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
72134	80	X	01/95, 01/93	$5,240	No

22.19.2 Properties Included in Repetitive Loss Area 80

Two properties with a total of two structures has been identified in this repetitive loss area. Table 22-36 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 22-36. All Properties in Repetitive Loss Area 80

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-80-1	1	Crawlspace	D11D	Elevate, Directional Drainage, Wet Flood Proof
SMF-80-2	1	Crawlspace	D11C	Elevate, Directional Drainage, Wet Flood Proof

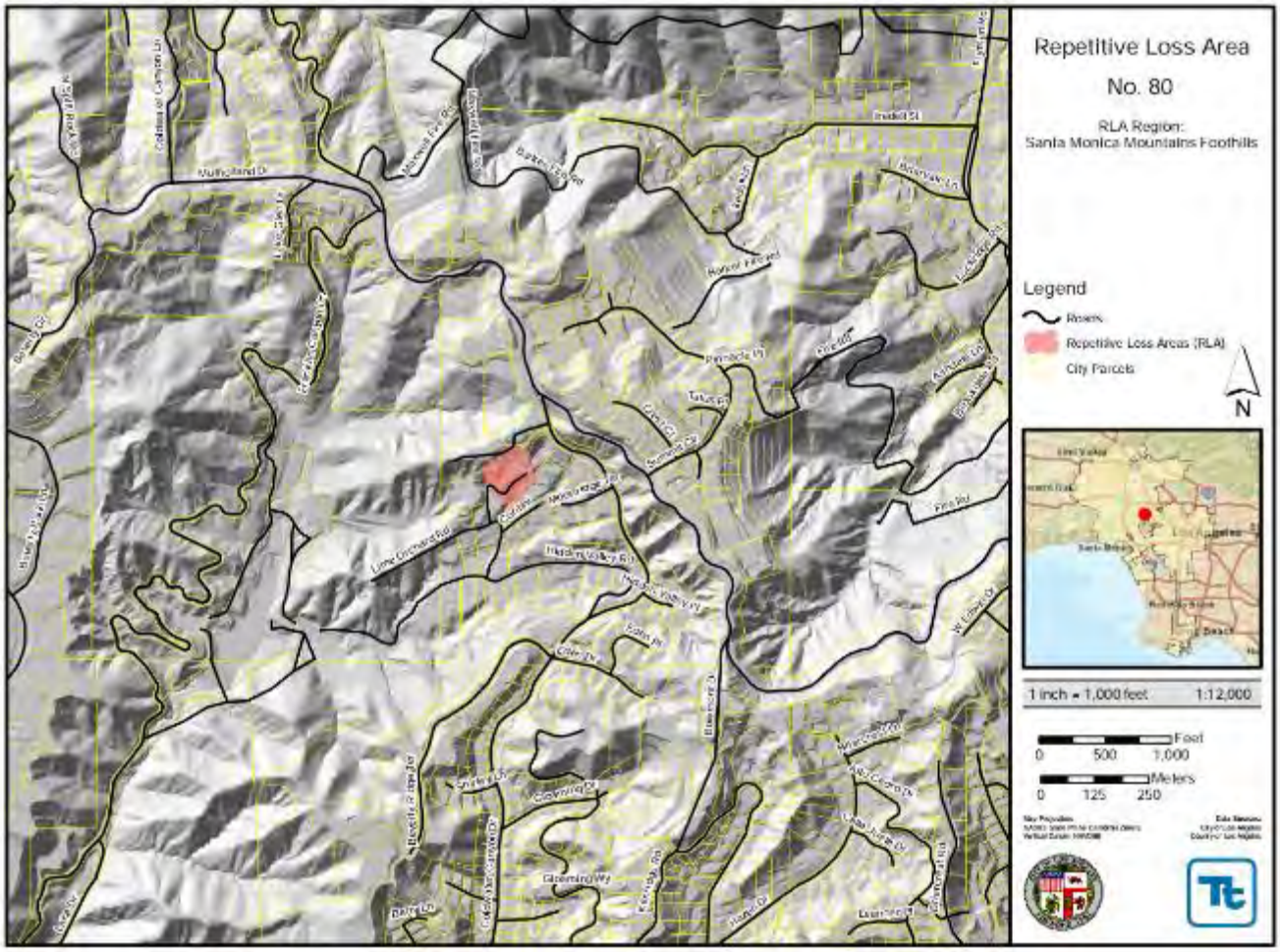

Figure 22-5. Repetitive Loss Area No. 80

22.20 REPETITIVE LOSS AREA NO. 81

22.20.1 Identified Repetitive Loss Properties

Table 22-37 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-37. Repetitive Loss Properties in Repetitive Loss Area 81

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
76800	81	X	03/95, 02/93	$3,602	No

22.20.2 Properties Included in Repetitive Loss Area 81

One property with one structure has been identified in this repetitive loss area. Table 22-38 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 22-38. All Properties in Repetitive Loss Area 81

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-81-1	1	Crawlspace	D105B	Dry Flood Proof Garage, Enhance Drainage, Elevate Floor

22.21 REPETITIVE LOSS AREA NO. 82

22.21.1 Identified Repetitive Loss Properties

Table 22-39 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-39. Repetitive Loss Properties in Repetitive Loss Area 82

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
94073	82	X	02/98, 12/92	$3,134	No

22.21.2 Properties Included in Repetitive Loss Area 82

Two properties with a total of two structures have been identified in this repetitive loss area. Table 22-40 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 22-40. All Properties in Repetitive Loss Area 82

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-82-1	1	Slab	D65B	Elevate, Directional Drainage, Dry Flood Proof
SMF-82-2	1	Crawlspace	D10D	Elevate, Directional Drainage, Wet/ Dry Flood Proof

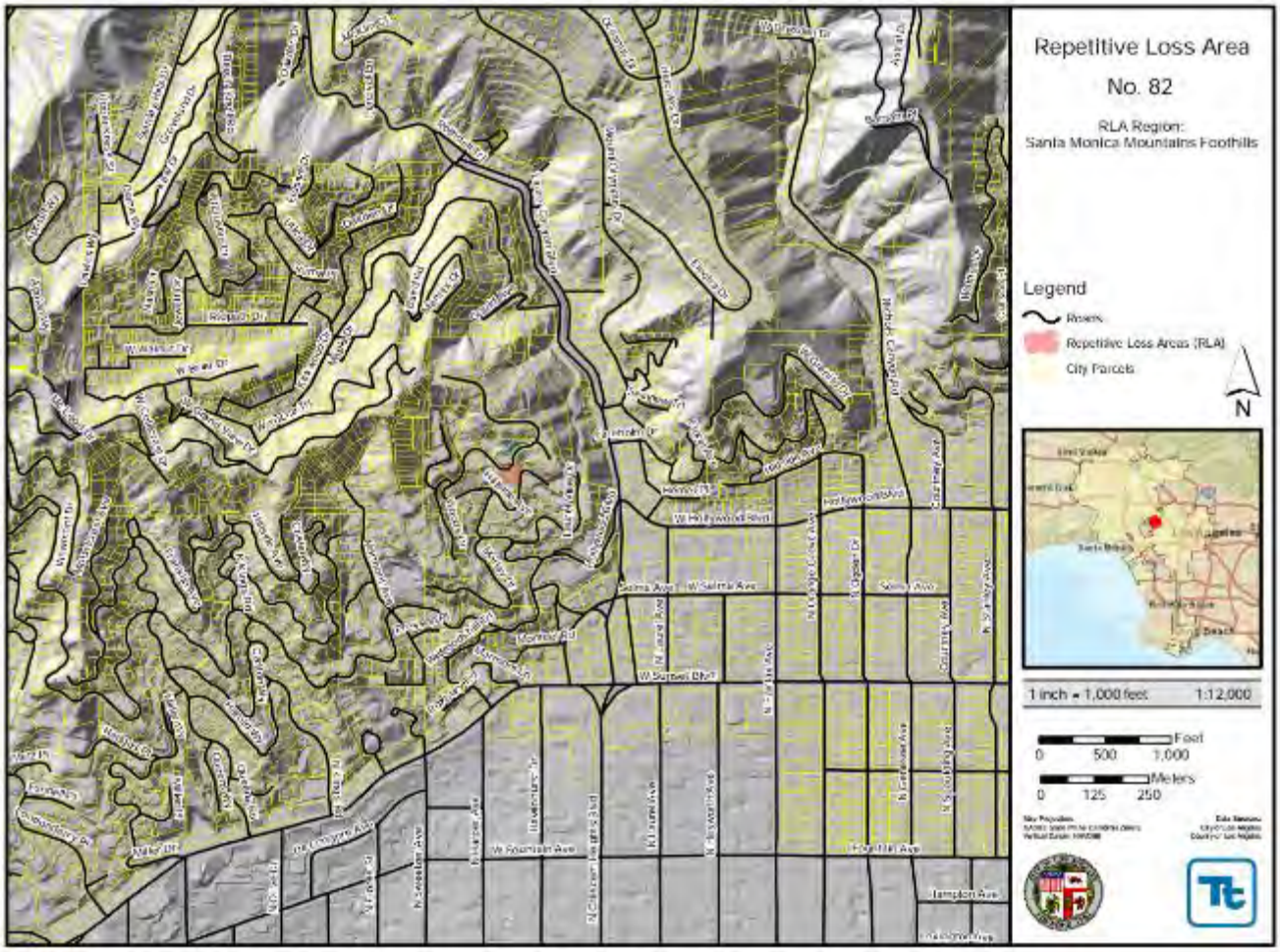

Figure 22-6. Repetitive Loss Area No. 82

22.22 REPETITIVE LOSS AREA NO. 83

22.22.1 Identified Repetitive Loss Properties

Table 22-41 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-41. Repetitive Loss Properties in Repetitive Loss Area 83

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
94922	83	X	03/98, 02/98	$6,747	No

22.22.2 Properties Included in Repetitive Loss Area 83

One property with three structures has been identified in this repetitive loss area. Table 22-42 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 22-42. All Properties in Repetitive Loss Area 83

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-83-1	3	Crawlspace	D12D	Elevate, Directional Drainage, Wet/Dry Flood Proof

22.23 REPETITIVE LOSS AREA NO. 84

22.23.1 Identified Repetitive Loss Properties

Table 22-43 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-43. Repetitive Loss Properties in Repetitive Loss Area 84

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
11964	84	X	01/01, 03/98	$32,060	No

22.23.2 Properties Included in Repetitive Loss Area 84

Two properties with a total of two structures have been identified in this repetitive loss area. Table 22-44 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 22-44. All Properties in Repetitive Loss Area 84

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-84-1	1	Slab	D115D	Elevate, Dry Flood Proof, Directional Drainage, Barrier
SMF-84-2	1	Crawlspace	D11D	Elevate, Wet/Dry Flood Proof, Directional Drainage, Barrier

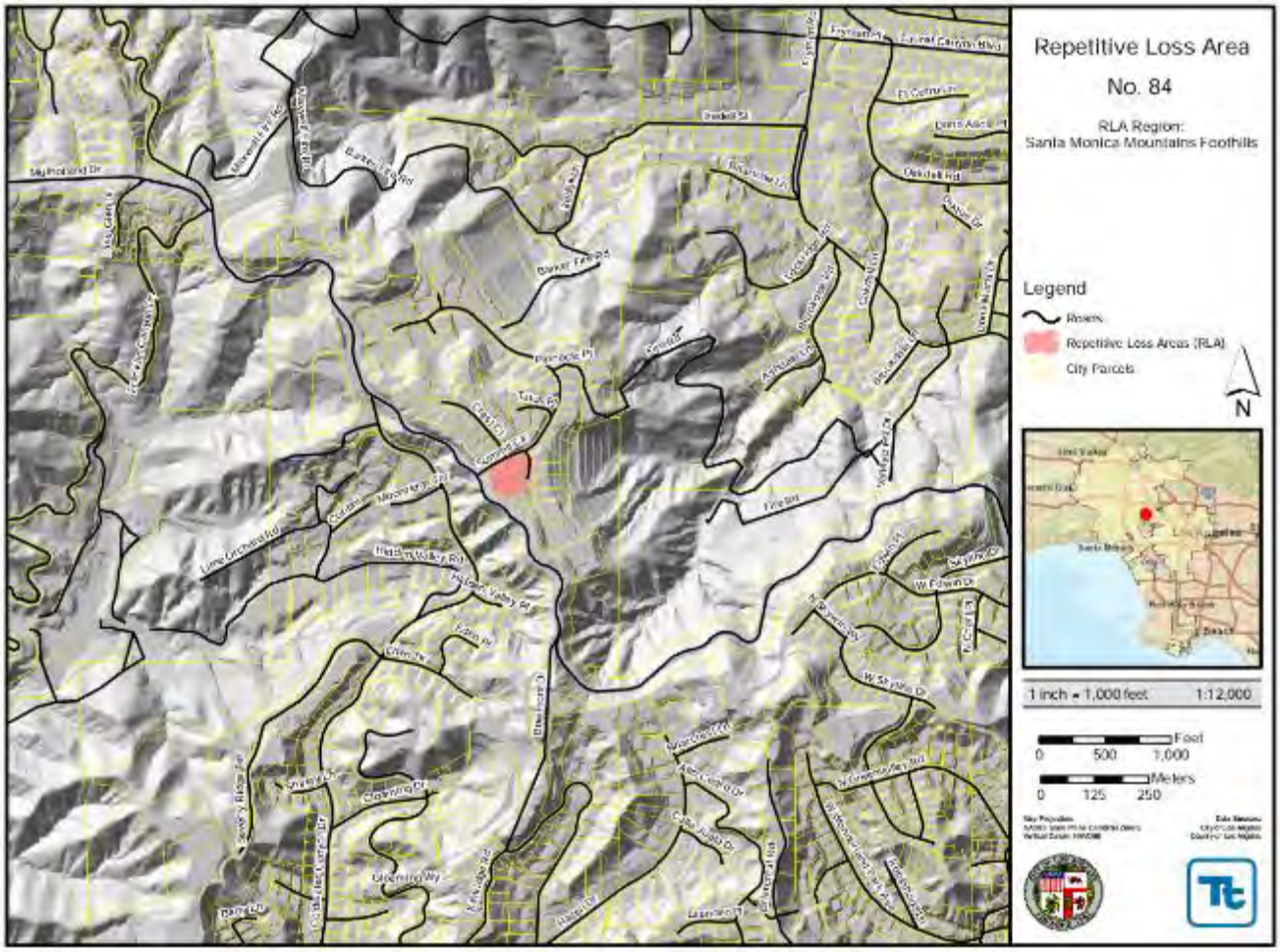

Figure 22-7. Repetitive Loss Area No. 84

22.24 REPETITIVE LOSS AREA NO. 85

22.24.1 Identified Repetitive Loss Properties

Table 22-45 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-45. Repetitive Loss Properties in Repetitive Loss Area 85

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
111736	85	X	12/04, 02/01, 02/98	$29,415	No

22.24.2 Properties Included in Repetitive Loss Area 85

Three properties with a total of three structures have been identified in this repetitive loss area. Table 22-46 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 22-46. All Properties in Repetitive Loss Area 85

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-85-1	1	Slab	D3A	Elevate, Directional Drainage to Street, Dry Flood Proof
SMF-85-2	1	Crawlspace	D35A	Elevate, Directional Drainage to Street, Wet/Dry Flood Proof
SMF-85-3	1	Basement	D4C	Elevate, Directional Drainage to Street, Wet/Dry Flood Proof

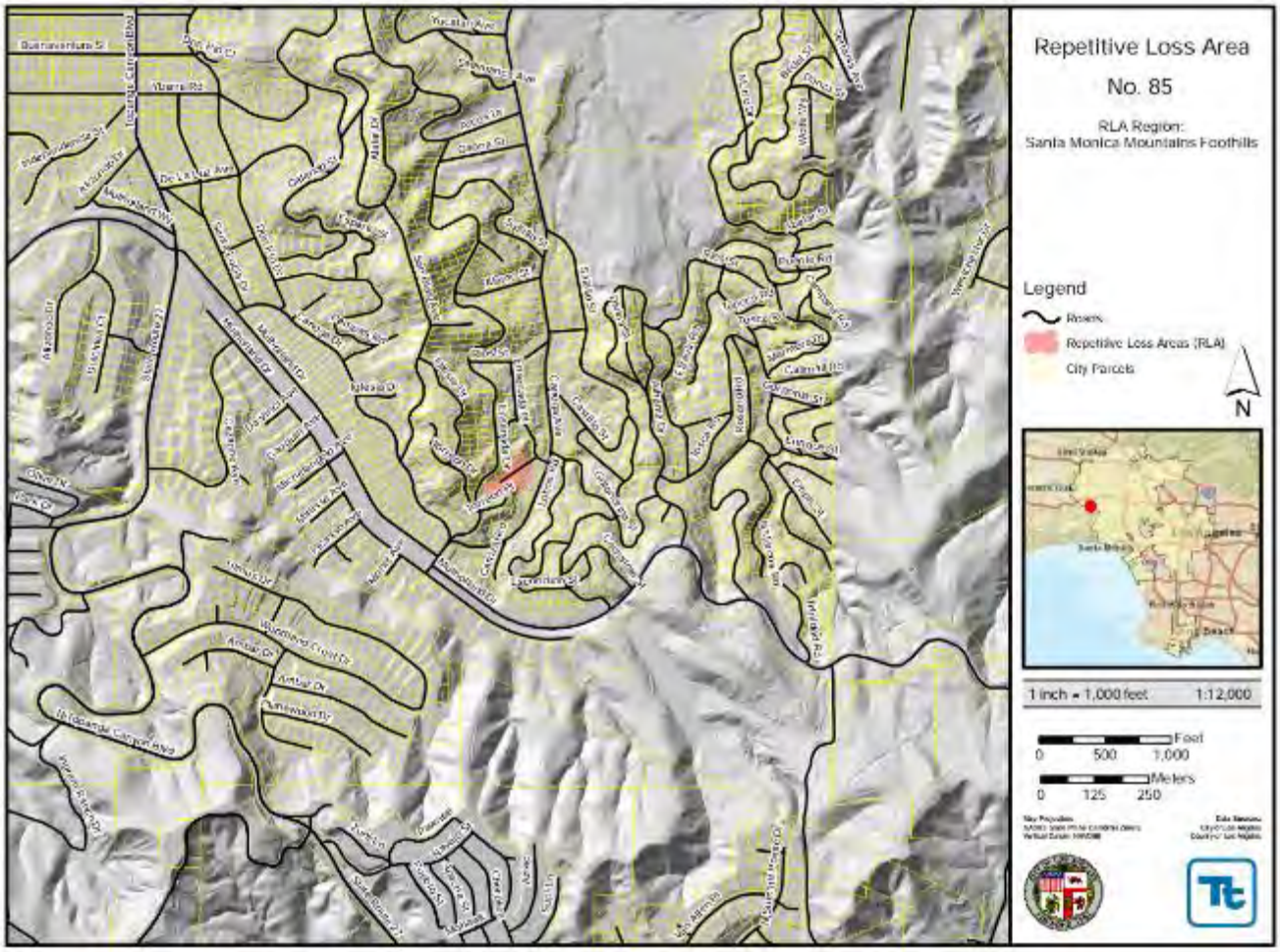

Figure 22-8. Repetitive Loss Area No. 85

22.25 REPETITIVE LOSS AREA NO. 86

22.25.1 Identified Repetitive Loss Properties

Table 22-47 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-47. Repetitive Loss Properties in Repetitive Loss Area 86

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
139491	86	X	03/11, 02/05, 02/00	$40,539	No

22.25.2 Properties Included in Repetitive Loss Area 86

One property with two structures has been identified in this repetitive loss area. Table 22-48 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 22-48. All Properties in Repetitive Loss Area 86

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-86-1	2	Crawlspace	D8B	Elevate, Acquisition/Demolition

22.26 REPETITIVE LOSS AREA NO. 87

22.26.1 Identified Repetitive Loss Properties

Table 22-49 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-49. Repetitive Loss Properties in Repetitive Loss Area 87

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
192747	87	X	03/10, 12/02	$23,802	No

22.26.2 Properties Included in Repetitive Loss Area 87

One property with one structure has been identified in this repetitive loss area. Table 22-50 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 22-50. All Properties in Repetitive Loss Area 87

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-87-1	1	Crawlspace	C9B	Elevate, Wet Flood Proof, Directional Drainage

22.27 REPETITIVE LOSS AREA NO. 88

22.27.1 Identified Repetitive Loss Properties

Table 22-51 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-51. Repetitive Loss Properties in Repetitive Loss Area 88

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
192705	88	X	02/10, 01/08	$42,224	No

22.27.2 Properties Included in Repetitive Loss Area 88

Two properties with a total of two structures have been identified in this repetitive loss area. Table 22-52 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 22-52. All Properties in Repetitive Loss Area 88

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-88-1	1	Slab	D10D	Elevate, Directional Drainage, Dry Flood Proof
SMF-88-2	1	Slab	D7B	Elevate, Directional Drainage, Dry Flood Proof

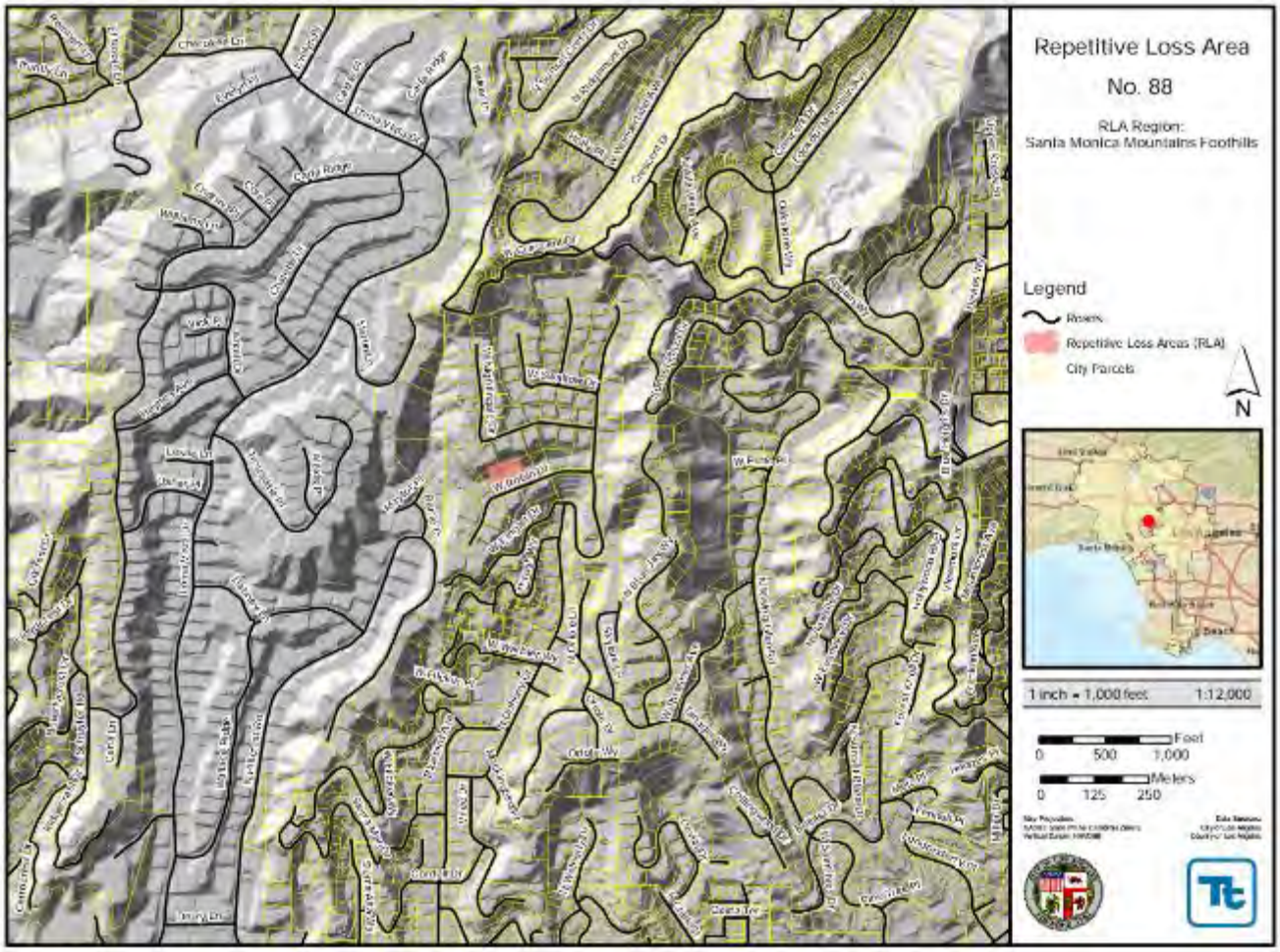

Figure 22-9. Repetitive Loss Area No. 88

22.28 REPETITIVE LOSS AREA NO. 89

22.28.1 Identified Repetitive Loss Properties

Table 22-53 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-53. Repetitive Loss Properties in Repetitive Loss Area 89

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
174594	89	X	01/08, 02/01	$3,974	No

22.28.2 Properties Included in Repetitive Loss Area 89

One property with two structures has been identified in this repetitive loss area. Table 22-54 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 22-54. All Properties in Repetitive Loss Area 89

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-89-1	2	Crawlspace	D8B	Wet/Dry Flood Proof Garage, Enhance Drainage, Elevate Driveway/Garage Floor

22.29 REPETITIVE LOSS AREA NO. 90

22.29.1 Identified Repetitive Loss Properties

Table 22-55 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-55. Repetitive Loss Properties in Repetitive Loss Area 90

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
139702	90	X	02/05, 03/98	$16,754	No

22.29.2 Properties Included in Repetitive Loss Area 90

Two properties with a total of four structures have been identified in this repetitive loss area. Table 22-56 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 22-56. All Properties in Repetitive Loss Area 90

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-90-1	2	Crawlspace	D7C	Directional Drainage, Elevate, Wet/Dry Flood Proof
SMF-90-2	2	Crawlspace	D12C	Directional Drainage, Elevate, Wet/Dry Flood Proof

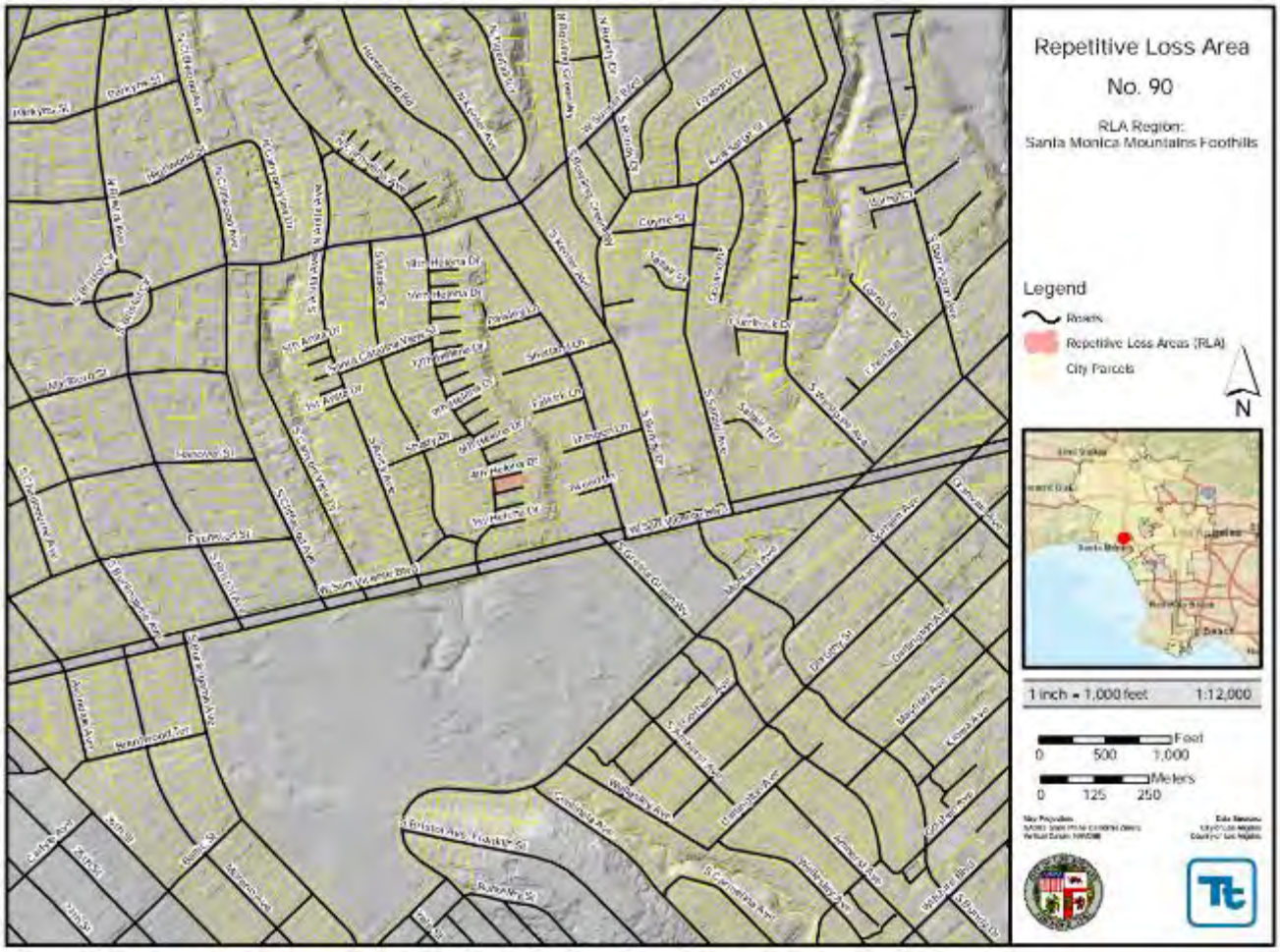

Figure 22-10. Repetitive Loss Area No. 90

22.30 REPETITIVE LOSS AREA NO. 91

22.30.1 Identified Repetitive Loss Properties

Table 22-57 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-57. Repetitive Loss Properties in Repetitive Loss Area 91

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138318	91	X	01/05, 02/98	$26,363	No

22.30.2 Properties Included in Repetitive Loss Area 91

Six properties with a total of six structures have been identified in this repetitive loss area. Table 22-58 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 22-58. All Properties in Repetitive Loss Area 91

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-91-1	1	Crawlspace	D7D	Elevate, Wet/Dry Flood Proof, Directional Drainage
SMF-91-2	1	Crawlspace	D8A	Elevate, Wet/Dry Flood Proof, Directional Drainage
SMF-91-3	2	Slab	D75B	Elevate, Dry Flood Proof, Directional Drainage
SMF-91-4	1	Slab	D7B	Elevate, Dry Flood Proof, Directional Drainage
SMF-91-5	1	Crawlspace	D7B	Elevate, Wet/Dry Flood Proof, Directional Drainage

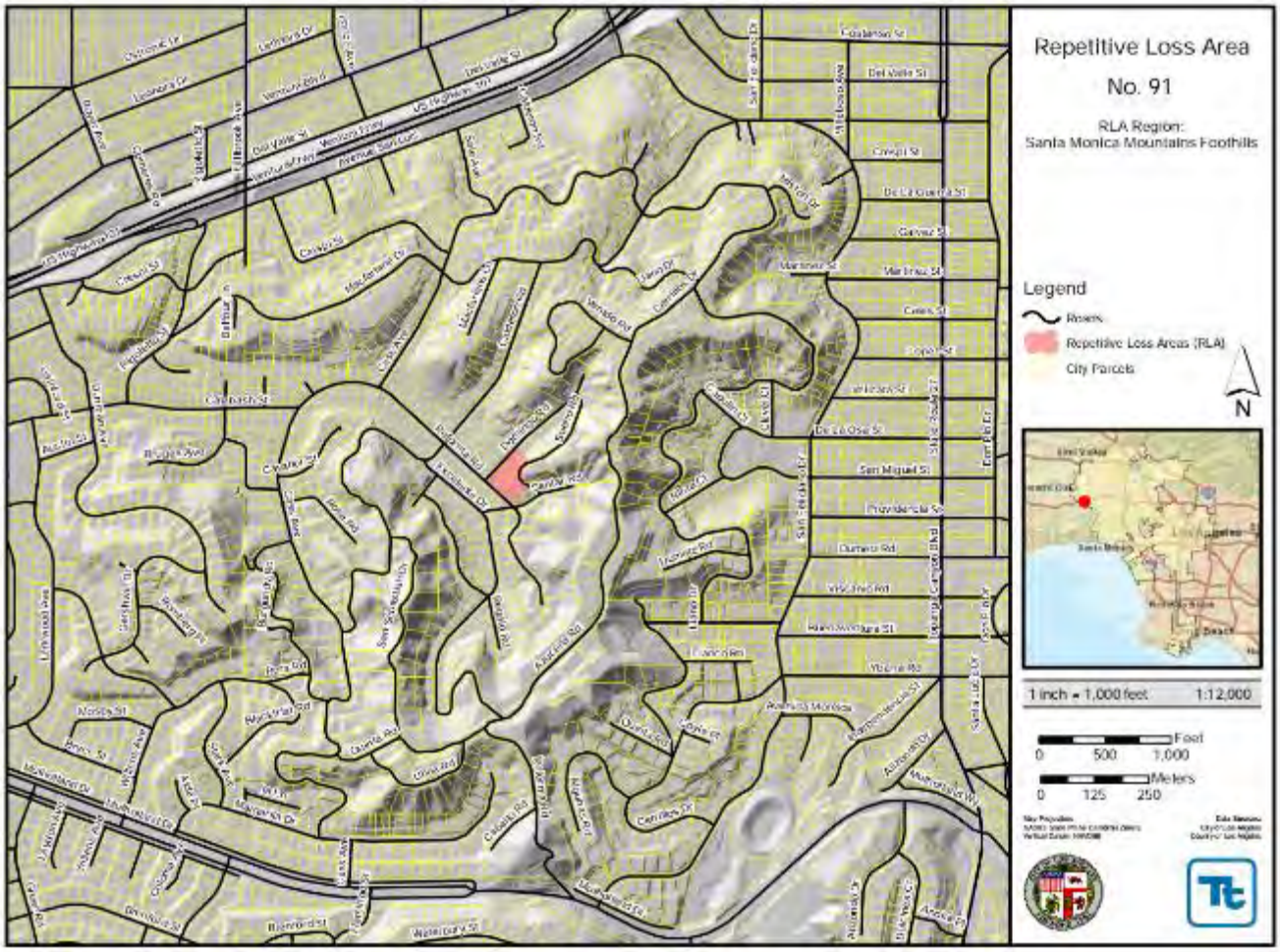

Figure 22-11. Repetitive Loss Area No. 91

22.31 REPETITIVE LOSS AREA NO. 92

22.31.1 Identified Repetitive Loss Properties

Table 22-59 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-59. Repetitive Loss Properties in Repetitive Loss Area 92

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138217	92	X	02/05, 01/05	$1,504	No

22.31.2 Properties Included in Repetitive Loss Area 92

One property with one structure has been identified in this repetitive loss area. Table 22-60 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 22-60. All Properties in Repetitive Loss Area 92

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-92-1	1	Slab	D105A	Dry Flood Proof, Enhance Drainage, Elevate Garage Floor

22.32 REPETITIVE LOSS AREA NO. 93

22.32.1 Identified Repetitive Loss Properties

Table 22-61 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-61. Repetitive Loss Properties in Repetitive Loss Area 93

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
136616	93	X	01/05. 01/01	$5,354	No

22.32.2 Properties Included in Repetitive Loss Area 93

One property with one structure has been identified in this repetitive loss area. Table 22-62 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 22-62. All Properties in Repetitive Loss Area 93

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-93-1	1	Slab	DX	Directional Drainage, Rain Garden, Elevate

22.33 REPETITIVE LOSS AREA NO. 94

22.33.1 Identified Repetitive Loss Properties

Table 22-63 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-63. Repetitive Loss Properties in Repetitive Loss Area 94

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
136151	94	X	12/04, 02/98	$11,904	No

22.33.2 Properties Included in Repetitive Loss Area 94

One property with two structures has been identified in this repetitive loss area. Table 22-64 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 22-64. All Properties in Repetitive Loss Area 94

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-94-1	2	Basement	D8B	Elevate, Wet/Dry Flood Proof

22.34 REPETITIVE LOSS AREA NO. 95

22.34.1 Identified Repetitive Loss Properties

Table 22-65 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-65. Repetitive Loss Properties in Repetitive Loss Area 95

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
135368	95	X	10/04, 02/98	$9,808	No

22.34.2 Properties Included in Repetitive Loss Area 95

One property with one structure has been identified in this repetitive loss area. Table 22-66 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 22-66. All Properties in Repetitive Loss Area 95

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-95-1	1	Crawlspace	D75A	Elevate, Wet/Dry Flood Proof, Directional Drainage

22.35 REPETITIVE LOSS AREA NO. 96

22.35.1 Identified Repetitive Loss Properties

Table 22-67 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-67. Repetitive Loss Properties in Repetitive Loss Area 96

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
122949	96	X	02/03, 02/00	$7,443	No

22.35.2 Properties Included in Repetitive Loss Area 96

One property with one structure has been identified in this repetitive loss area. Table 22-68 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 22-68. All Properties in Repetitive Loss Area 96

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-96-1	1	Crawlspace	D75C	Elevate, Directional Drainage

22.36 REPETITIVE LOSS AREA NO. 97

22.36.1 Identified Repetitive Loss Properties

Table 22-69 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-69. Repetitive Loss Properties in Repetitive Loss Area 97

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138264	97	X	01/05, 08/98	$13,245	No

22.36.2 Properties Included in Repetitive Loss Area 97

One property with two structures has been identified in this repetitive loss area. Table 22-70 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 22-70. All Properties in Repetitive Loss Area 97

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-97-1	2	Crawlspace	D8C	Elevate, Directional Drainage, Wet Flood Proof

22.37 REPETITIVE LOSS AREA NO. 98

22.37.1 Identified Repetitive Loss Properties

Table 22-71 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 22-71. Repetitive Loss Properties in Repetitive Loss Area 98

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28413	98	X	01/83	$1,734.36	No

22.37.2 Properties Included in Repetitive Loss Area 98

One property with two structures has been identified in this repetitive loss area. Table 22-72 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 22-72. All Properties in Repetitive Loss Area 98

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SMF-98-1	2	Crawlspace	No Information	Elevate, Directional Drainage, Wet/Dry Flood Proof

23. Sepulveda Boulevard Canyon

23.1 PROBLEM STATEMENT

The Sepulveda Boulevard Canyon repetitive loss region is comprised of Repetitive Loss Areas 99-103. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 23.2 through Section 23.6.

23.2 REPETITIVE LOSS AREA NO. 99

23.2.1 Identified Repetitive Loss Properties

Table 23-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 23-1. Repetitive Loss Properties in Repetitive Loss Area 99

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14906	99	X	02/80, 03/78	$33,695	No

23.2.2 Properties Included in Repetitive Loss Area 99

One property with one structure has been identified in this repetitive loss area. 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 Repetitive Loss Area 99

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SBC-99-1	1	Crawlspace	D9B	Elevate, Directional Drainage

23.3 REPETITIVE LOSS AREA NO. 100

23.3.1 Identified Repetitive Loss Properties

Table 23-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 23-3. Repetitive Loss Properties in Repetitive Loss Area 100

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28306	100	X	02/80, 02/78	$37,100	No

23.3.2 Properties Included in Repetitive Loss Area 100

Five properties with seven structures have been identified in this repetitive loss area. Table 23-4 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 23-4. All Properties in Repetitive Loss Area 100

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SBC-100-1	1	Crawlspace	D85C	Elevate, Directional Drainage, Wet/Dry Flood Proof
SBC-100-2	2	Crawlspace	No Information	Elevate, Directional Drainage, Wet/Dry Flood Proof
SBC-100-3	2	Crawlspace	D8D	Elevate, Directional Drainage, Wet/Dry Flood Proof
SBC-100-4	1	Crawlspace	No Information	Elevate, Directional Drainage, Wet/Dry Flood Proof
SBC-100-5	1	Basement	D95C	Elevate, Directional Drainage, Wet/Dry Flood Proof
Total	7			

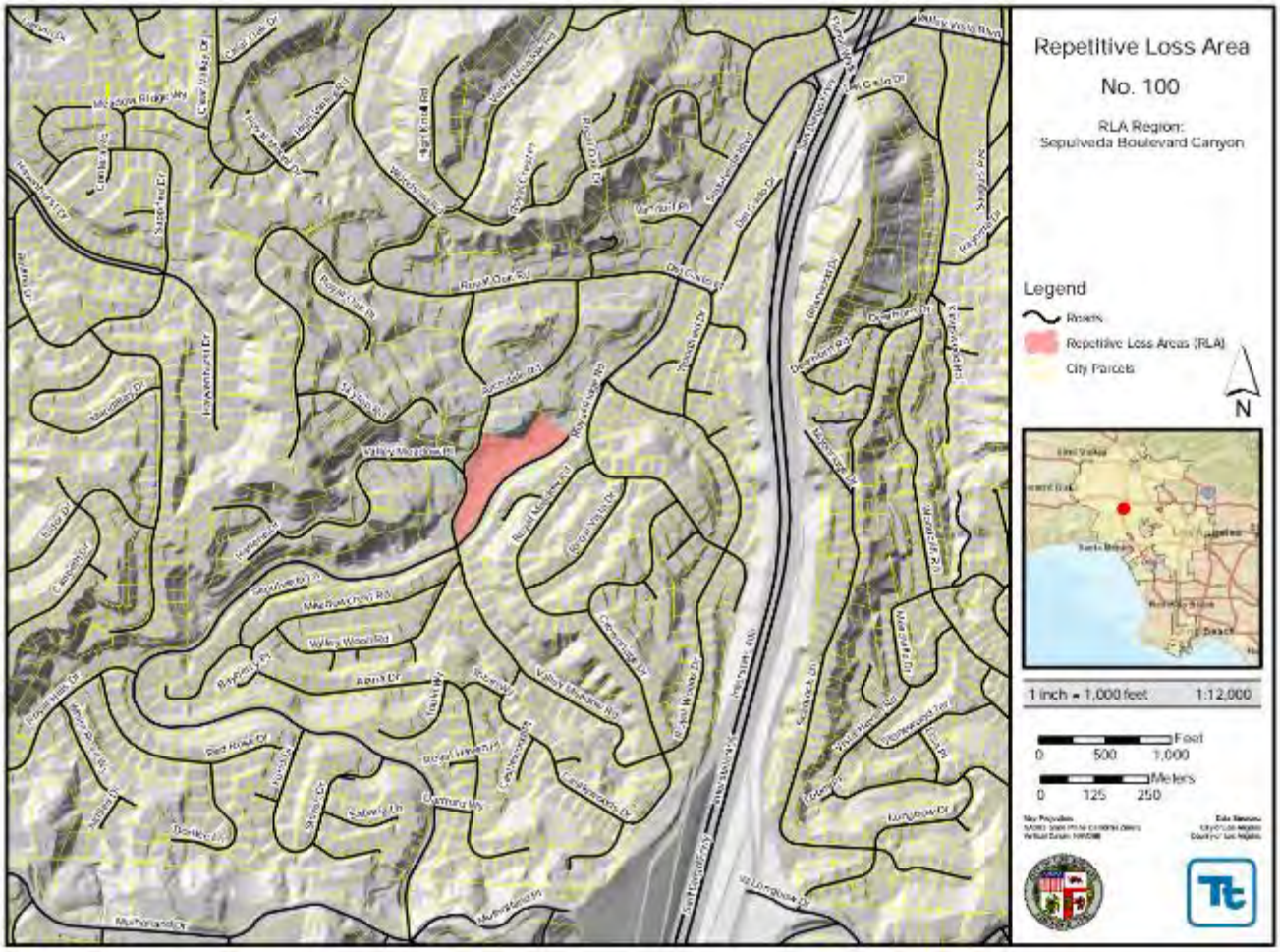

Figure 23-1. Repetitive Loss Area No. 100

23.4 REPETITIVE LOSS AREA NO. 101

23.4.1 Identified Repetitive Loss Properties

Table 23-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 23-5. Repetitive Loss Properties in Repetitive Loss Area 101

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
35040	101	X	02/80, 03/79	$30,710	No

23.4.2 Properties Included in Repetitive Loss Area 101

Two properties with a total of two structures have been identified in this repetitive loss area. Table 23-6 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 23-6. All Properties in Repetitive Loss Area 101

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SBC-101-1	1	Crawlspace	D10C	Wet Flood Proof, Elevate Utilities, Raise Interior Floor Height, Directional Drainage
SBC-101-2	1	Basement	D95C	Elevate, Wet Flood Proof, Directional Drainage

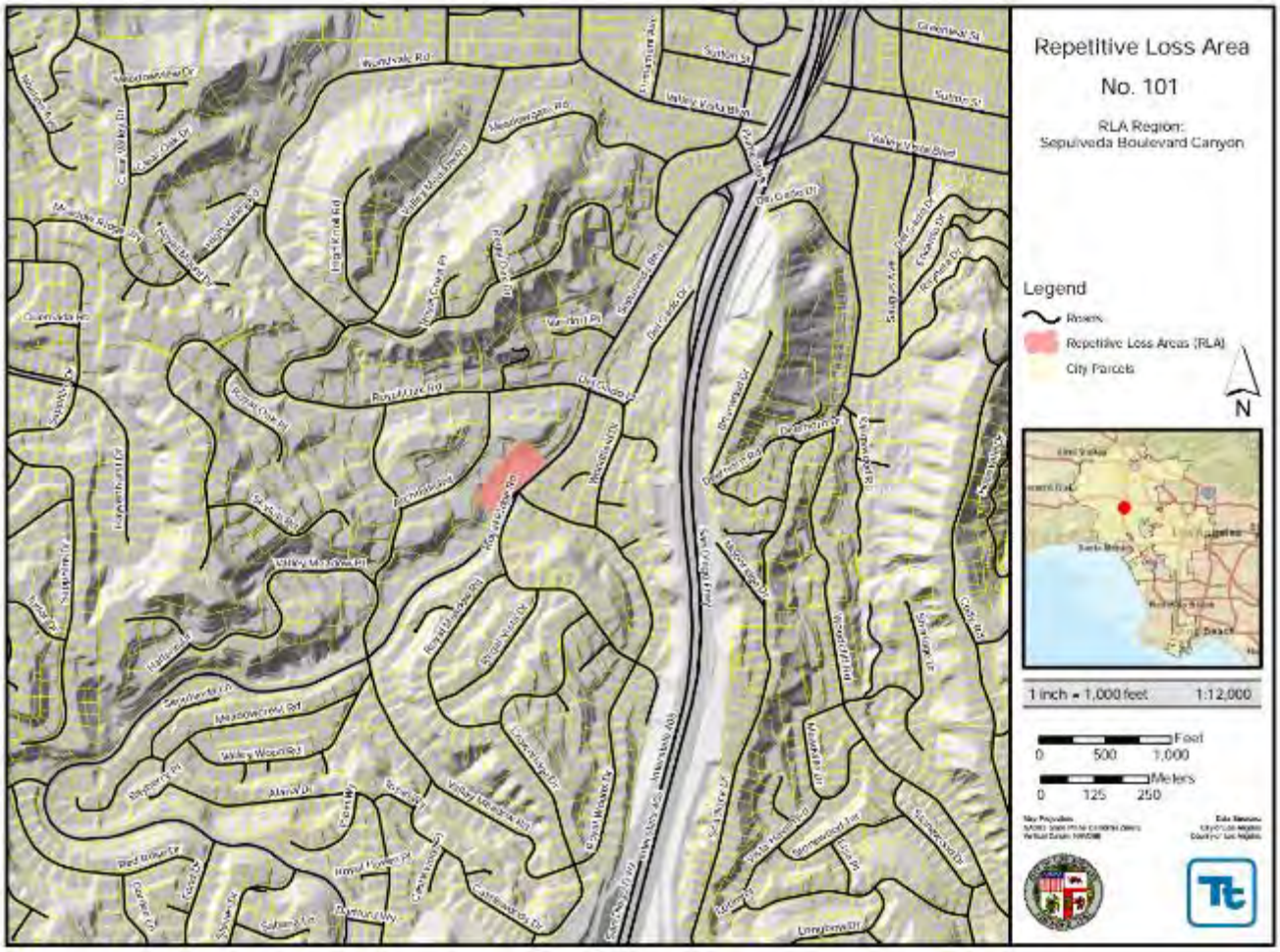

Figure 23-2. Repetitive Loss Area No. 101

23.5 REPETITIVE LOSS AREA NO. 102

23.5.1 Identified Repetitive Loss Properties

Table 23-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 23-7. Repetitive Loss Properties in Repetitive Loss Area 102

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
71419	102	X	03/11, 01/05, 02/04, 02/01, 01/95, 02/92	$13,627	No

23.5.2 Properties Included in Repetitive Loss Area 102

One property with one structure has been identified in this repetitive loss area. Table 23-8 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 23-8. All Properties in Repetitive Loss Area 102

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SBC-102-1	1	Slab	D85C	Elevate, Dry Flood Proof, Directional Drainage, Acquisition/Demolition

23.6 REPETITIVE LOSS AREA NO. 103

23.6.1 Identified Repetitive Loss Properties

Table 23-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 23-9. Repetitive Loss Properties in Repetitive Loss Area 103

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
122853	103	X	02/03, 03/01	$30,400	No

23.6.2 Properties Included in Repetitive Loss Area 103

Three properties with a total of seven structures have been identified in this repetitive loss area. Table 23-10 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 23-10. All Properties in Repetitive Loss Area 103

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SBC-103-1	2	Slab	D8C	Directional Drainage, Dry Flood Proof, Elevate
SBC-103-2	3	Slab	D8C	Directional Drainage, Dry Flood Proof, Elevate
SBC-103-3	2	Slab	D8C	Directional Drainage, Dry Flood Proof, Elevate

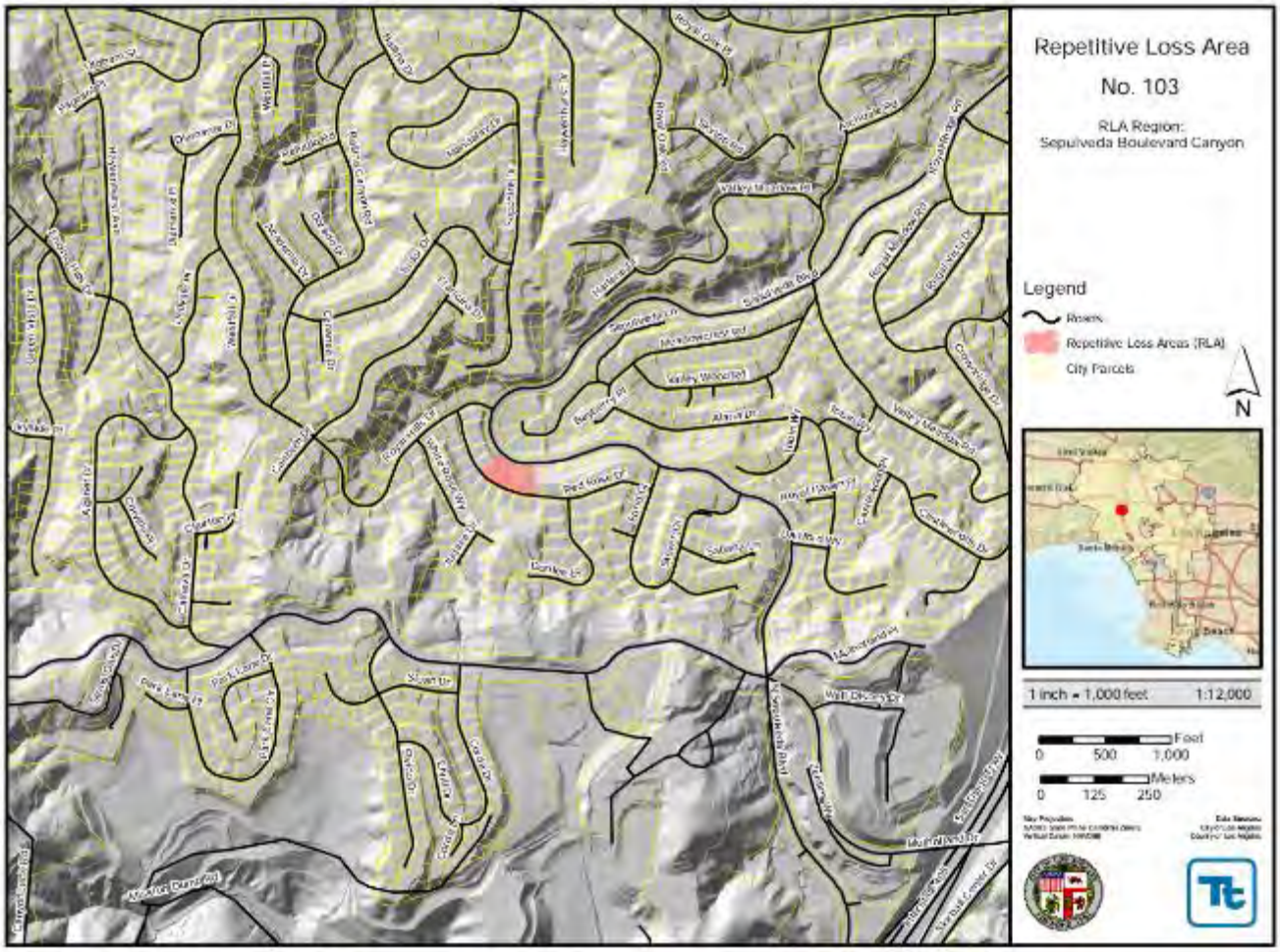

Figure 23-3. Repetitive Loss Area No. 103

24. Stone Canyon

24.1 PROBLEM STATEMENT

The Stone Canyon repetitive loss region is comprised of Repetitive Loss Areas 104 and 105. In each of these repetitive loss areas, property damage from flooding is caused by urbanized stormwater runoff. Many of these properties are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may be required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 24.2 through Section 24.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

24.2 REPETITIVE LOSS AREA NO. 104

24.2.1 Identified Repetitive Loss Properties

Table 24-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 24-1. Repetitive Loss Properties in Repetitive Loss Area 104

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
40261	104	AO (SFHA)	01/83, 02/80	$3,278	Yes
95748	104	AO (SFHA)	02/98, 01/93	$9,497	No
122550	104	AO (SFHA)	03/03, 12/02, 02/00	$19,983	No
72245	104	AO (SFHA)	03/98, 01/95, 01/93	$11,762	No

24.2.2 Properties Included in Repetitive Loss Area 104

Ninety-six properties with one hundred forty-six structures have been identified in this repetitive loss area. Table 24-2 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 24-2. All Properties in Repetitive Loss Area 104

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
STC-104-1	4	Slab	CX	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-2	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-3	2	Crawlspace	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-4	1	Crawlspace	D10B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-5	2	Crawlspace	D125C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-6	1	Slab	D11A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-7	2	Crawlspace	D11A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-8	3	Crawlspace	D125A	Elevate Structures, Elevate Utilities, Flood Proofing

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
STC-104-9	2	Slab	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-10	1	Crawlspace	D125D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-11	1	Crawlspace	No Information	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-12	2	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-13	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-14	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-15	1	Crawlspace	C115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-16	1	Slab	No Information	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-17	1	Slab	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-18	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-19	1	Crawlspace	D85B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-20	2	Slab	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-21	2	Slab	D95D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-22	2	Slab	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-23	1	Slab	D10B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-24	1	Slab	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-25	1	Crawlspace	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-26	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-27	1	Crawlspace	No Information	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-28	3	Crawlspace	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-29	1	Crawlspace	DX	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-30	2	Crawlspace	D12A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-31	1	Crawlspace	D115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-32	2	Crawlspace	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-33	1	Slab	D115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-34	1	Crawlspace	D95D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-35	1	Slab	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-36	2	Slab	D115C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-37	1	Crawlspace	D125C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-38	2	Crawlspace	D10D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-39	1	Slab	D11A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-40	1	Slab	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-41	1	Crawlspace	D125D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-42	1	Slab	D105B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-43	2	Crawlspace	D12C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-44	2	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-45	1	Slab	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-46	1	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-47	1	Crawlspace	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-48	1	Slab	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-49	2	Slab	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-50	2	Slab	D10D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-51	1	Basement	D105D	Elevate Structures, Elevate Utilities, Flood Proofing

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
STC-104-52	1	Slab	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-53	2	Slab	D11C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-54	1	Slab	D10D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-55	2	Crawlspace	D11B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-56	1	Slab	D12B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-57	2	Crawlspace	D11C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-58	1	Crawlspace	D13D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-59	1	Slab	D11D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-60	2	Crawlspace	D10D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-61	2	Slab	D105A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-62	1	Slab	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-63	1	Slab	D95D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-64	1	Basement	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-65	2	Crawlspace	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-66	2	Crawlspace	D125D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-67	1	Basement	D85D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-68	2	Slab	D11D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-69	1	Slab	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-70	1	Slab	0125D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-71	2	Crawlspace	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-72	2	Crawlspace	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-73	2	Crawlspace	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-74	1	Crawlspace	D115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-75	1	Slab	D105D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-76	2	Crawlspace	D115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-77	2	Slab	D11D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-78	2	Slab	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-79	1	Crawlspace	No Information	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-80	4	Basement	D10C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-81	2	Crawlspace	D10A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-82	1	Slab	D10B	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-83	1	Crawlspace	D125D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-84	2	Crawlspace	D12D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-85	2	Crawlspace	D12D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-86	1	Crawlspace	C115C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-87	1	Crawlspace	D105C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-88	1	Slab	D95C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-89	1	Slab	D12A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-90	1	Crawlspace	D9C	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-91	1	Slab	No Information	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-92	1	Basement	D105A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-93	1	Crawlspace	D105A	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-94	1	Slab	D8C	Elevate Structures, Elevate Utilities, Flood Proofing

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
STC-104-95	1	Crawlspace	D115D	Elevate Structures, Elevate Utilities, Flood Proofing
STC-104-96	8	Basement	D11C	Elevate Structures, Elevate Utilities, Flood Proofing
Total	146			

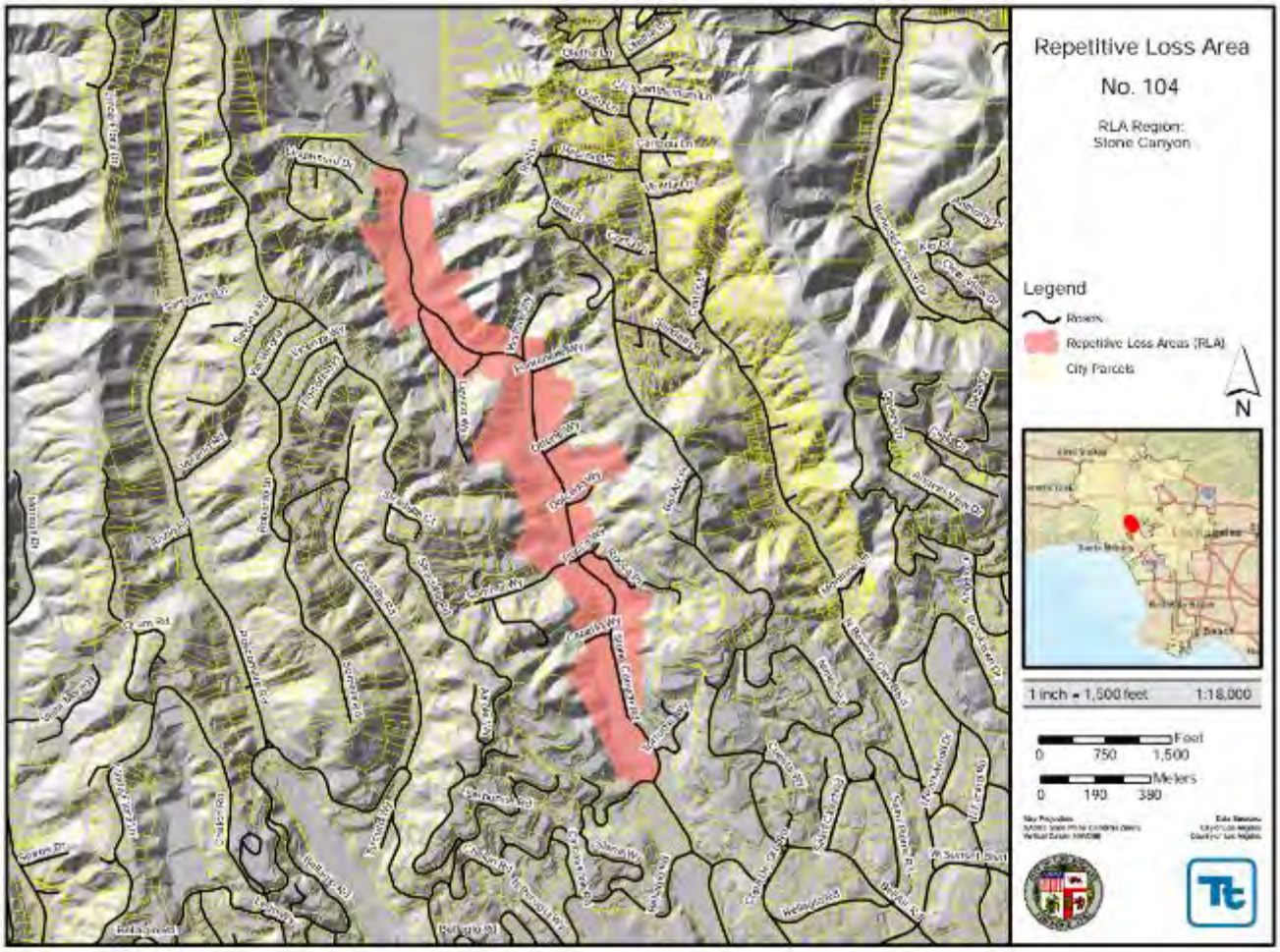

Figure 24-1. Repetitive Loss Area No. 104

24.3 REPETITIVE LOSS AREA NO. 105

24.3.1 Identified Repetitive Loss Properties

Table 24-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 24-3. Repetitive Loss Properties in Repetitive Loss Area 105

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
212545	105	X	11/11, 01/10	$3,058	No

24.3.2 Properties Included in Repetitive Loss Area 105

One property with one structure has been identified in this repetitive loss area. Table 24-4 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 24-4. All Properties in Repetitive Loss Area 105

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
STC-105-1	1	Slab	D95C	Elevate, Directional Drainage, Dry Flood Proof

25. Stone Canyon Avenue

25.1 PROBLEM STATEMENT

The Stone Canyon Avenue repetitive loss region is comprised of Repetitive Loss Areas 106 and 107. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 25.2 through Section 25.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

25.2 REPETITIVE LOSS AREA NO. 106

25.2.1 Identified Repetitive Loss Properties

Table 25-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 25-1. Repetitive Loss Properties in Repetitive Loss Area 106

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14897	106	C	03/83, 02/80, 03/78	$10,303	No

25.2.2 Properties Included in Repetitive Loss Area 106

Six properties with a total of eight structures have been identified in this repetitive loss area. 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 Repetitive Loss Area 106

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SCA-106-1	2	Slab	D7B	Elevate, Directional Drainage, Dry Flood Proof
SCA-106-2	1	Slab	D8A	Elevate, Directional Drainage, Dry Flood Proof
SCA-106-3	1	Slab	D75B	Elevate, Directional Drainage, Dry Flood Proof
SCA-106-4	2	Slab	D8B	Elevate, Directional Drainage, Dry Flood Proof
SCA-106-5	1	Slab	D75B	Elevate, Directional Drainage, Dry Flood Proof
SCA-106-6	1	Slab	D10A	Elevate, Directional Drainage, Dry Flood Proof
Total	8			

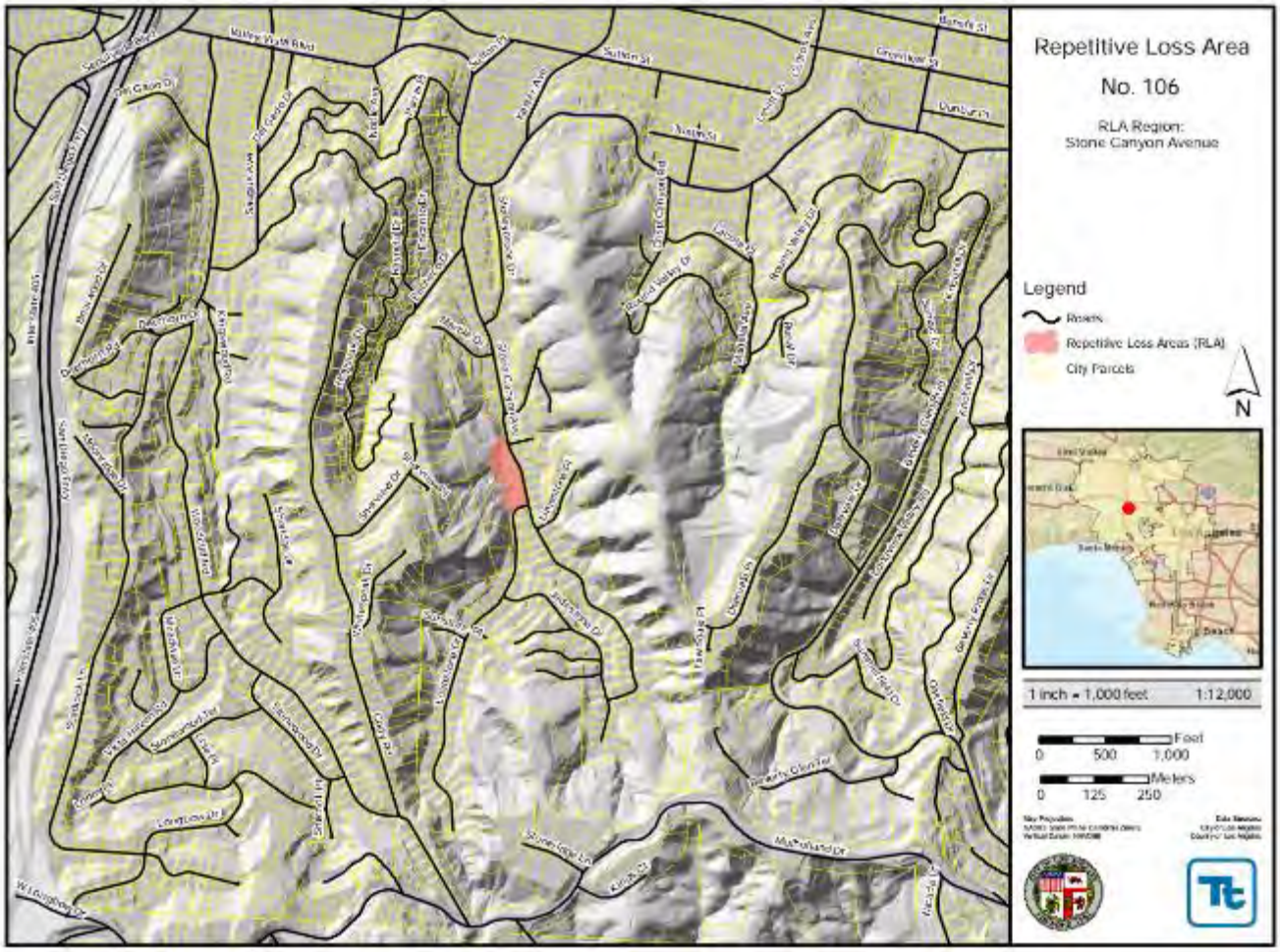

Figure 25-1. Repetitive Loss Area No. 106

25.3 REPETITIVE LOSS AREA NO. 107

25.3.1 Identified Repetitive Loss Properties

Table 25-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 25-3. Repetitive Loss Properties in Repetitive Loss Area 107

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
39782	107	X	02/93, 03/83	$5,769	No

25.3.2 Properties Included in Repetitive Loss Area 107

Two properties with a total of two structures have been identified in this repetitive loss area. Table 25-4 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 25-4. All Properties in Repetitive Loss Area 107

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SCA-107-1	1	Slab	D75B	Elevate, Directional Drainage, Dry Flood Proof
SCA-107-2	1	Slab	D75B	Elevate, Directional Drainage, Dry Flood Proof

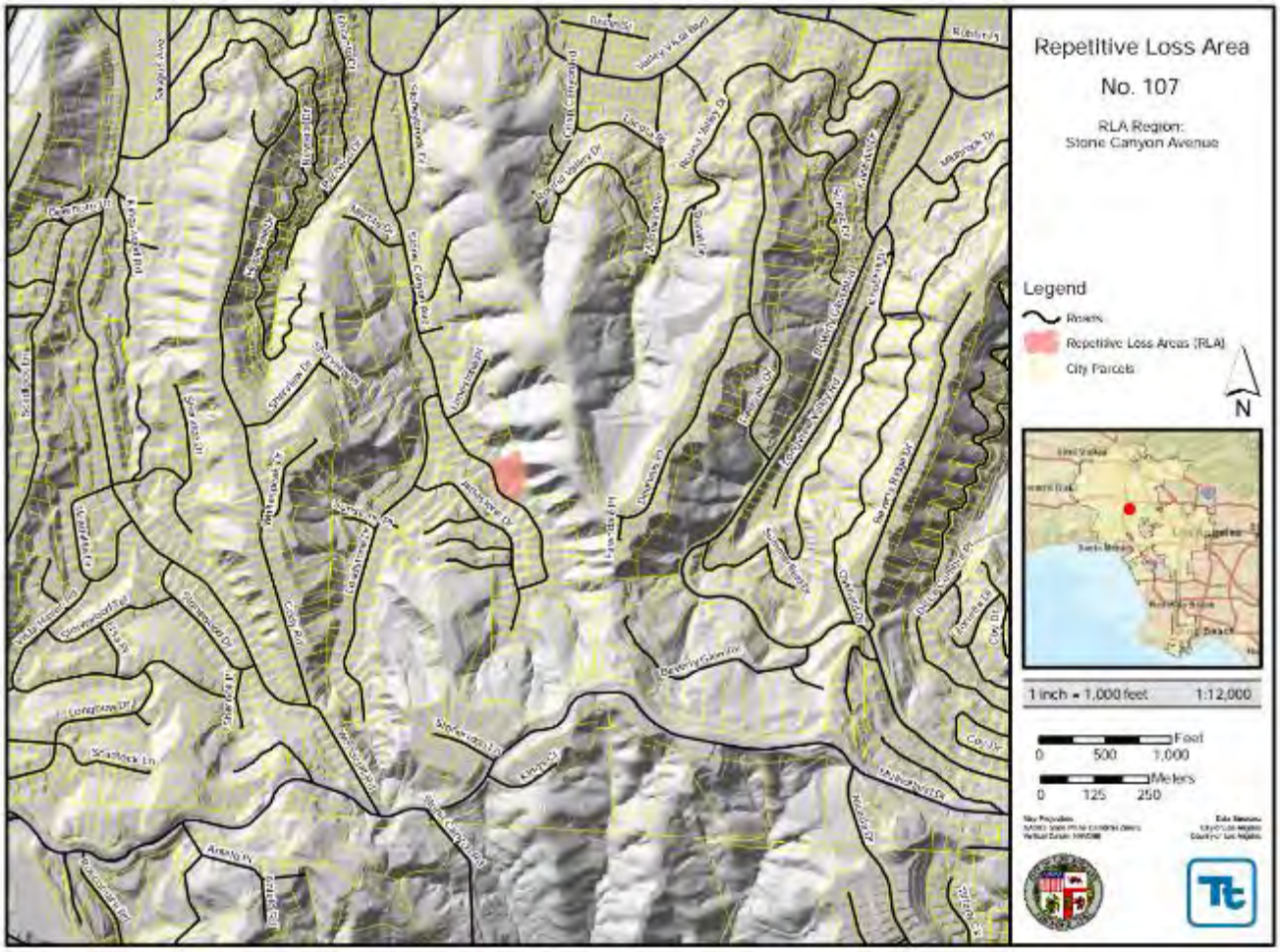

Figure 25-2. Repetitive Loss Area No. 107

26. SULLIVAN CANYON

26.1 PROBLEM STATEMENT

The Sullivan Canyon Avenue repetitive loss region is comprised of Repetitive Loss Areas 108 and 109. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. A few properties are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may be required to have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 26.2 through Section 25.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

26.2 REPETITIVE LOSS AREA NO. 108

26.2.1 Identified Repetitive Loss Properties

Table 26-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 26-1. Repetitive Loss Properties in Repetitive Loss Area 108

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
37246	108	A (SFHA)	03/83, 02/80	$12,658	No

26.2.2 Properties Included in Repetitive Loss Area 108

Three properties with a total of three structures have been identified in this repetitive loss area. Table 26-2 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 26-2. All Properties in Repetitive Loss Area 108

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SUL-108-1	1	Crawlspace	D10D	Elevate, Directional Drainage, Wet/Dry Flood Proofing
SUL-108-2	1	Crawlspace	No Information	Elevate, Directional Drainage, Wet/Dry Flood Proofing
SUL-108-3	1	Crawlspace	No Information	Elevate, Directional Drainage, Wet/Dry Flood Proofing

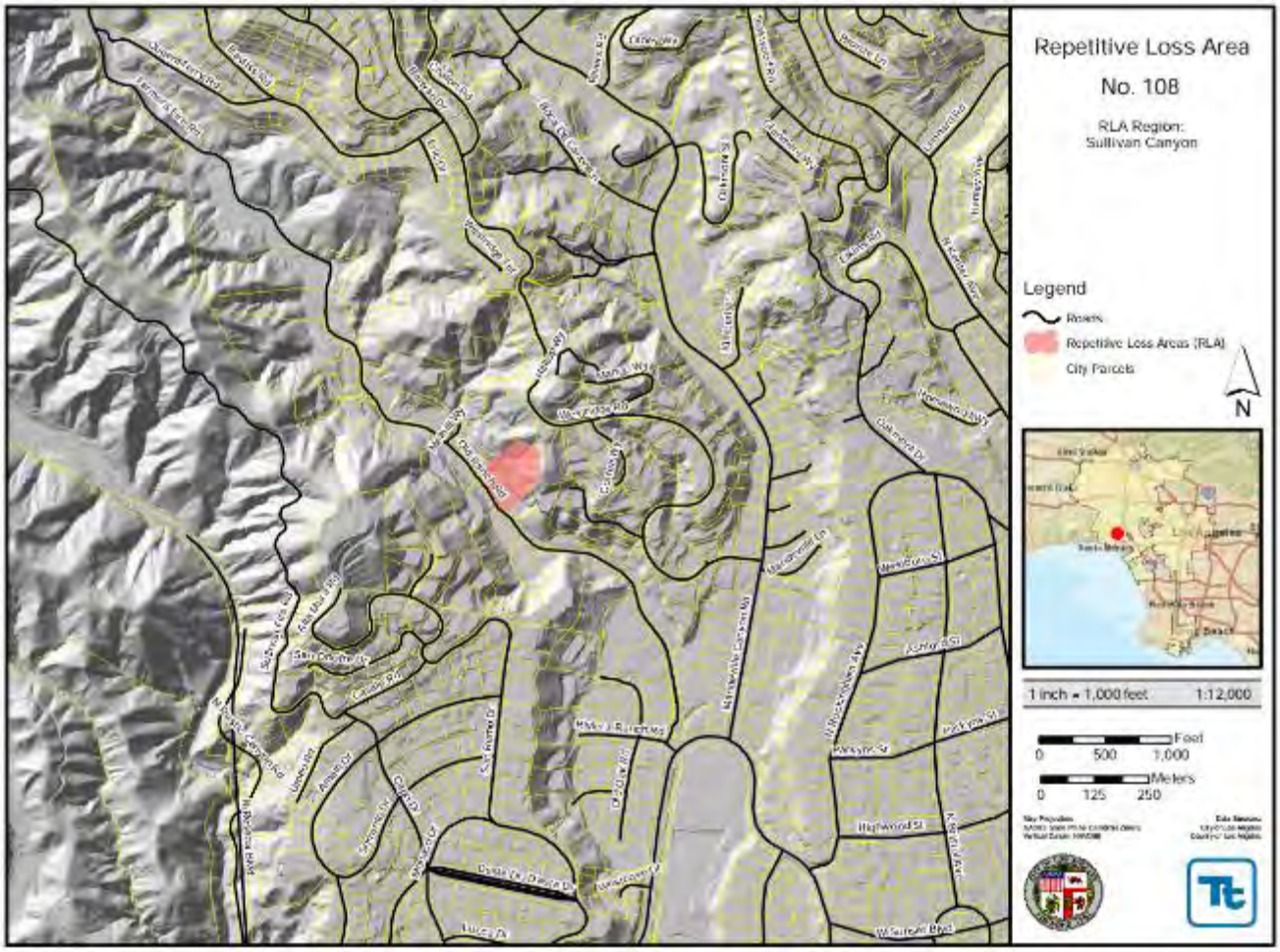

Figure 26-1. Repetitive Loss Area No. 108

26.3 REPETITIVE LOSS AREA NO. 109

26.3.1 Identified Repetitive Loss Properties

Table 26-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 26-3. Repetitive Loss Properties in Repetitive Loss Area 109

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
58040	109	X	04/98, 02/92, 02/80	$4,478	No

26.3.2 Properties Included in Repetitive Loss Area 109

Three properties with a total of nine properties have been identified in this repetitive loss area. Table 26-4 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 26-4. All Properties in Repetitive Loss Area 109

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
SUL-109-1	2	Crawlspace	D85B	Elevate, Directional Drainage, Flood Proof Secondary Structures
SUL-109-2	2	Slab	No Information	Elevate, Directional Drainage, Flood Proof Secondary Structures
SUL-109-3	5	Crawlspace	No Information	Elevate, Directional Drainage, Flood Proof Secondary Structures
Total	9			

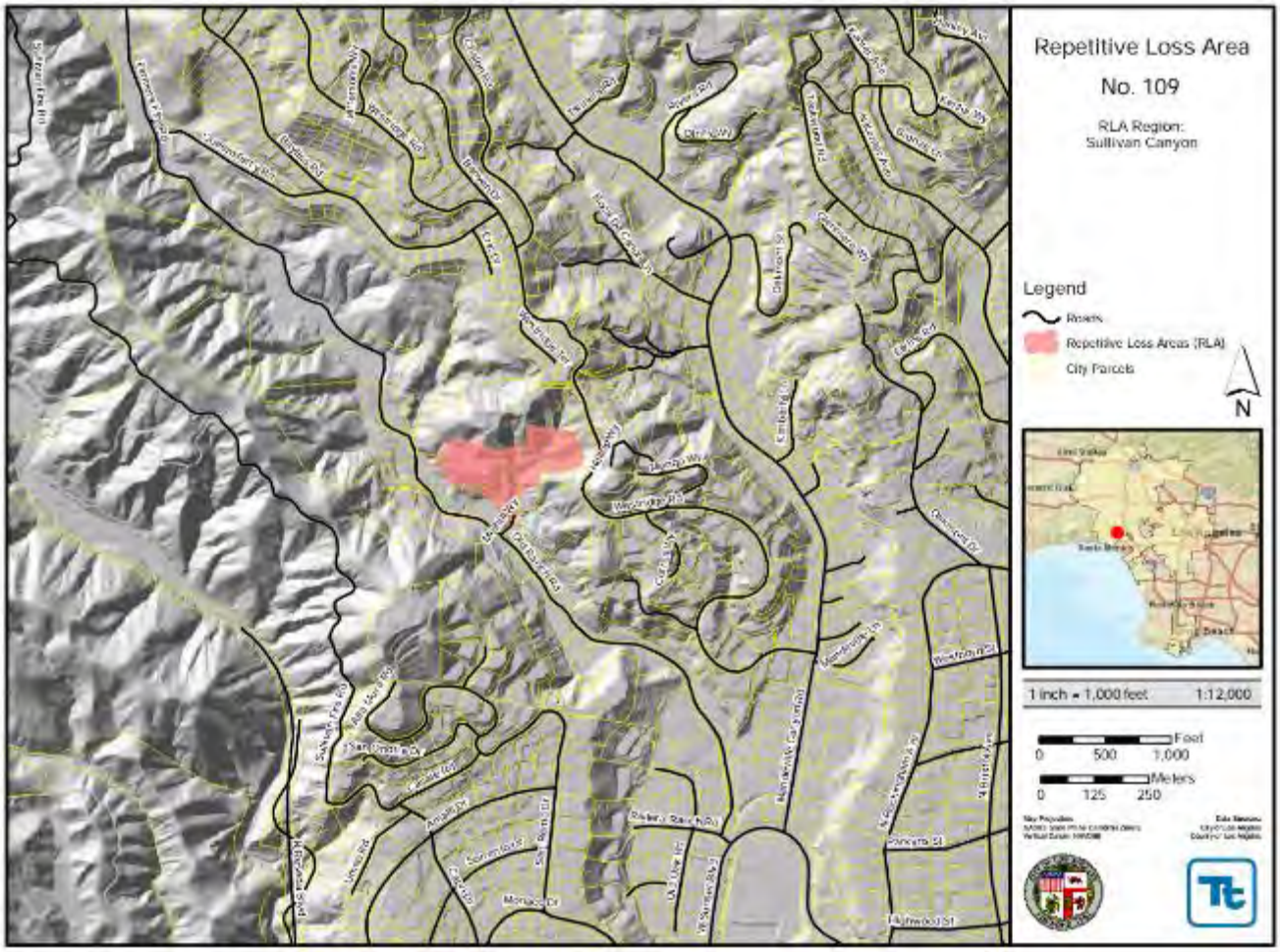

Figure 26-2. Repetitive Loss Area No. 109

27. VANALDEN AVENUE CANYON

27.1 PROBLEM STATEMENT

The Vanalden Avenue Canyon repetitive loss region is comprised of Repetitive Loss Areas 110 and 111. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 27.2 through Section 27.3. Maps are not included for single-building repetitive loss areas due to privacy concerns.

27.2 REPETITIVE LOSS AREA NO. 110

27.2.1 Identified Repetitive Loss Properties

Table 27-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 27-1. Repetitive Loss Properties in Repetitive Loss Area 110

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
4266	110	X	02/86, 11/82, 12/80	$3,881	No

27.2.2 Properties Included in Repetitive Loss Area 110

One property with one structure has been identified in this repetitive loss area. Table 27-2 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 27-2. All Properties in Repetitive Loss Area 110

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VAN-110-1	1	Slab	D8B	Elevate, Dry Flood Proof, Directional Drainage

27.3 REPETITIVE LOSS AREA NO. 111

27.3.1 Identified Repetitive Loss Properties

Table 27-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 27-3. Repetitive Loss Properties in Repetitive Loss Area 111

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
116479	111	X	03/11, 01/01, 02/98	$22,309	No

27.3.2 Properties Included in Repetitive Loss Area 133

Two properties with a total of four structures have been identified in this repetitive loss area. Table 27-4 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 27-4. All Properties in Repetitive Loss Area 111

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VAN-111-1	3	Crawlspace	D9A	Elevate, Directional Drainage, Wet/Dry Flood Proof
VAN-111-2	1	Slab	D8A	Elevate, Directional Drainage, Wet/Dry Flood Proof

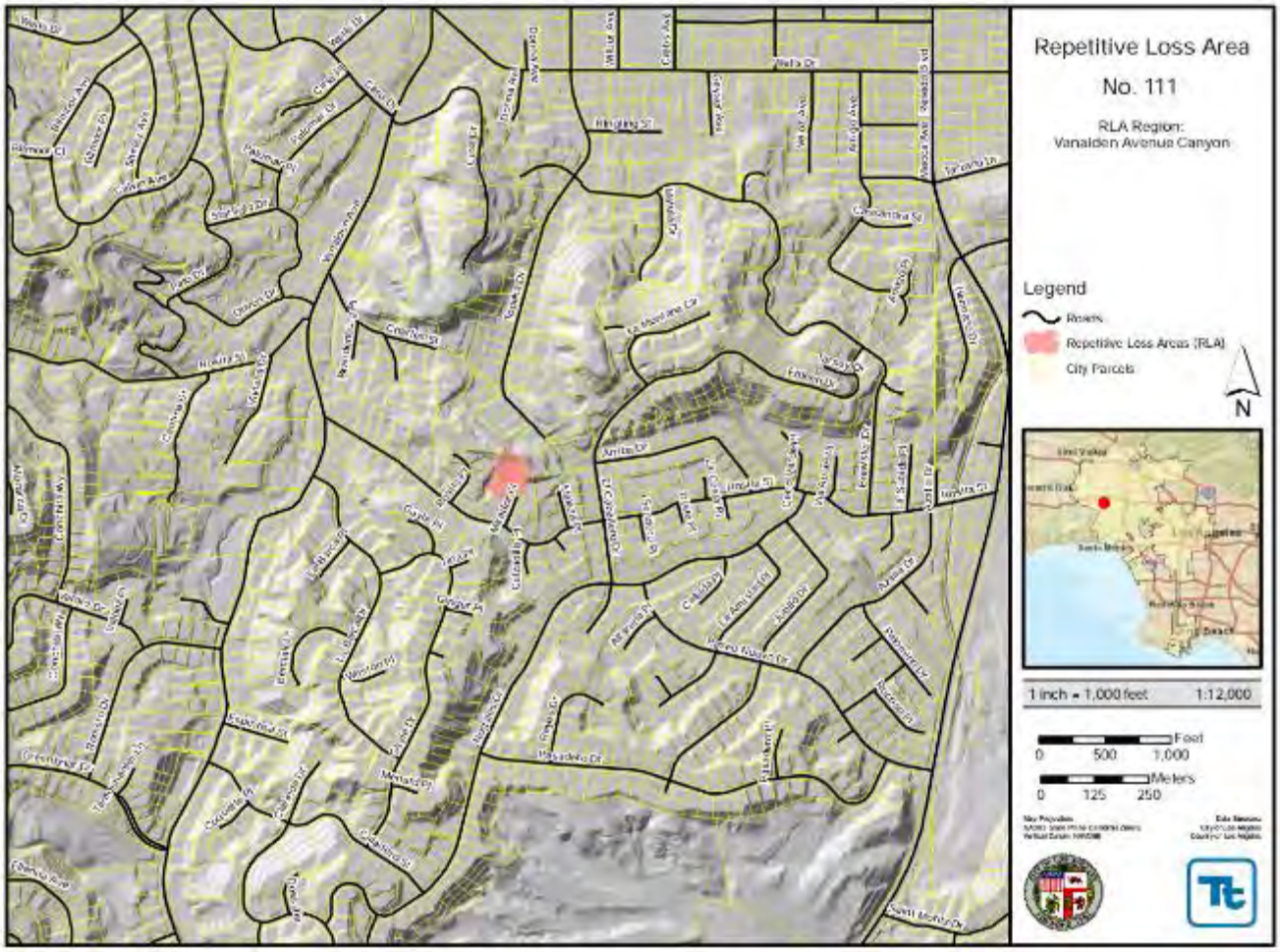

Figure 27-1. Repetitive Loss Area No. 111

28. VERDUGO FOOTHILLS

28.1 PROBLEM STATEMENT

The Verdugo Foothills repetitive loss region is comprised of Repetitive Loss Areas 112-116. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 28.2 through Section 28.6. Maps are not included for single-building repetitive loss areas due to privacy concerns.

28.2 REPETITIVE LOSS AREA NO. 112

28.2.1 Identified Repetitive Loss Properties

Table 28-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 28-1. Repetitive Loss Properties in Repetitive Loss Area 112

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
37406	112	X	01/81, 02/80	$21,581	No

28.2.2 Properties Included in Repetitive Loss Area 112

One property with three structures has been identified in this repetitive loss area. 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 Repetitive Loss Area 112

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VER-112-1	3	Slab	DX	Elevate, Directional Drainage, Dry Flood Proof

28.3 REPETITIVE LOSS AREA NO. 113

28.3.1 Identified Repetitive Loss Properties

Table 28-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 28-3. Repetitive Loss Properties in Repetitive Loss Area 113

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
48057	113	X	02/98, 02/92, 03/83	$3,234	No

28.3.2 Properties Included in Repetitive Loss Area 113

Four properties with a total of four structures have been identified in this repetitive loss area. Table 28-4 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 28-4. All Properties in Repetitive Loss Area 113

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VER-113-1	1	Crawlspace	C65C	Elevate, Directional Drainage, Barriers, Wet/Dry Flood Proof
VER-113-2	1	Crawlspace	DX	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-113-3	1	Basement	D55D	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-113-4	1	Crawlspace	D65A	Elevate, Directional Drainage, Wet/Dry Flood Proof

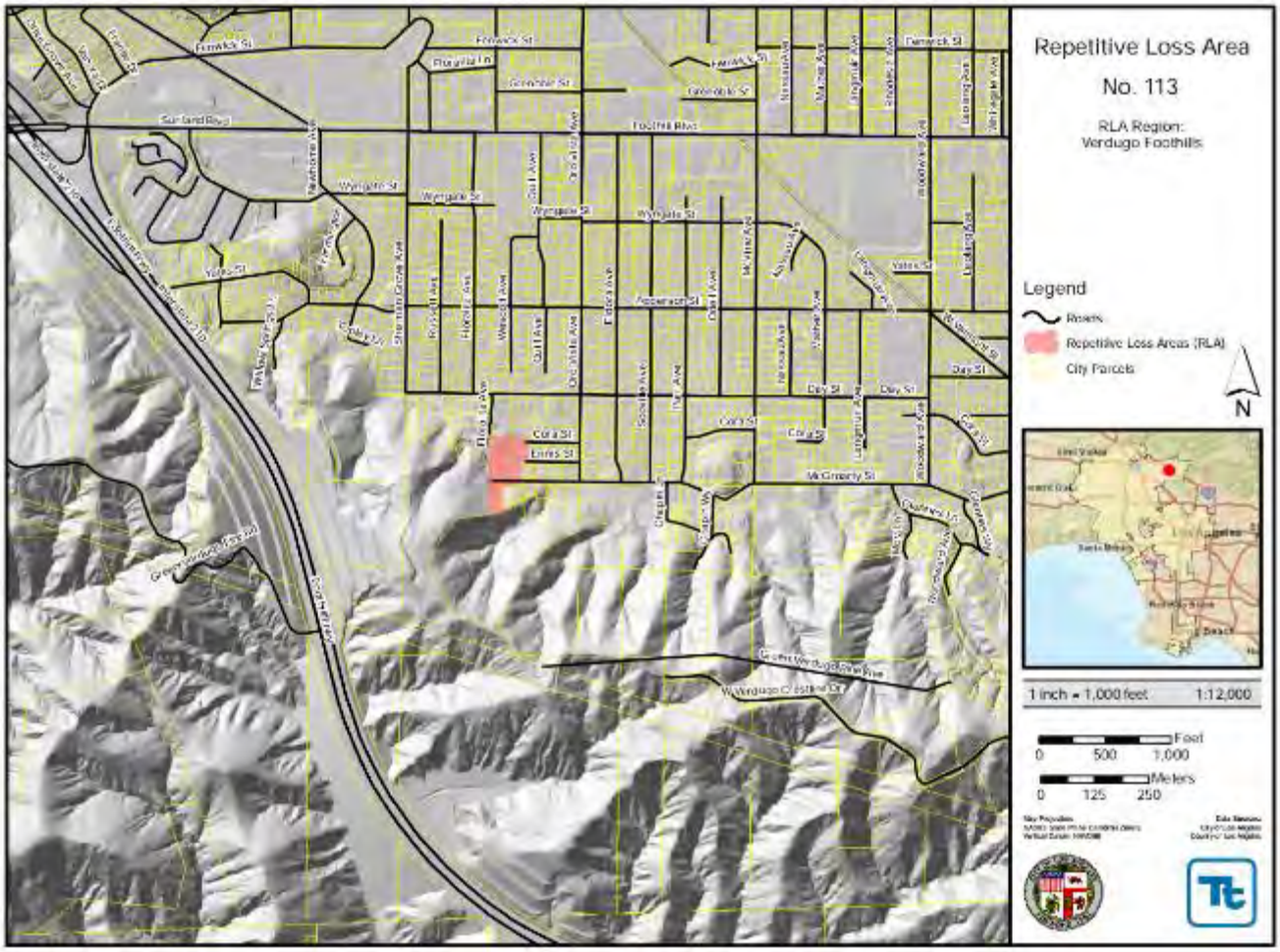

Figure 28-1. Repetitive Loss Area No. 113

28.4 REPETITIVE LOSS AREA NO. 114

28.4.1 Identified Repetitive Loss Properties

Table 28-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 28-5. Repetitive Loss Properties in Repetitive Loss Area 114

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138780	114	X	2/98, 1/05	$7,353	No

28.4.2 Properties Included in Repetitive Loss Area 114

One property with one structure has been identified in this repetitive loss area. Table 28-6 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 28-6. All Properties in Repetitive Loss Area 114

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VER-114-1	1	Slab	D6D	Elevated, Directional Drainage, Wet/Dry Flood Proof

28.5 REPETITIVE LOSS AREA NO. 115

28.5.1 Identified Repetitive Loss Properties

Table 28-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 28-7. Repetitive Loss Properties in Repetitive Loss Area 115

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138175	115	X	02/05, 01/05	$13,884	No

28.5.2 Properties Included in Repetitive Loss Area 115

Two properties with a total of three structures have been identified in this repetitive loss area. Table 28-8 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 28-8. All Properties in Repetitive Loss Area 115

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VER-115-1	2	Crawlspace	D65C	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-115-2	1	Crawlspace	D7A	Elevate, Directional Drainage, Wet/Dry Flood Proof

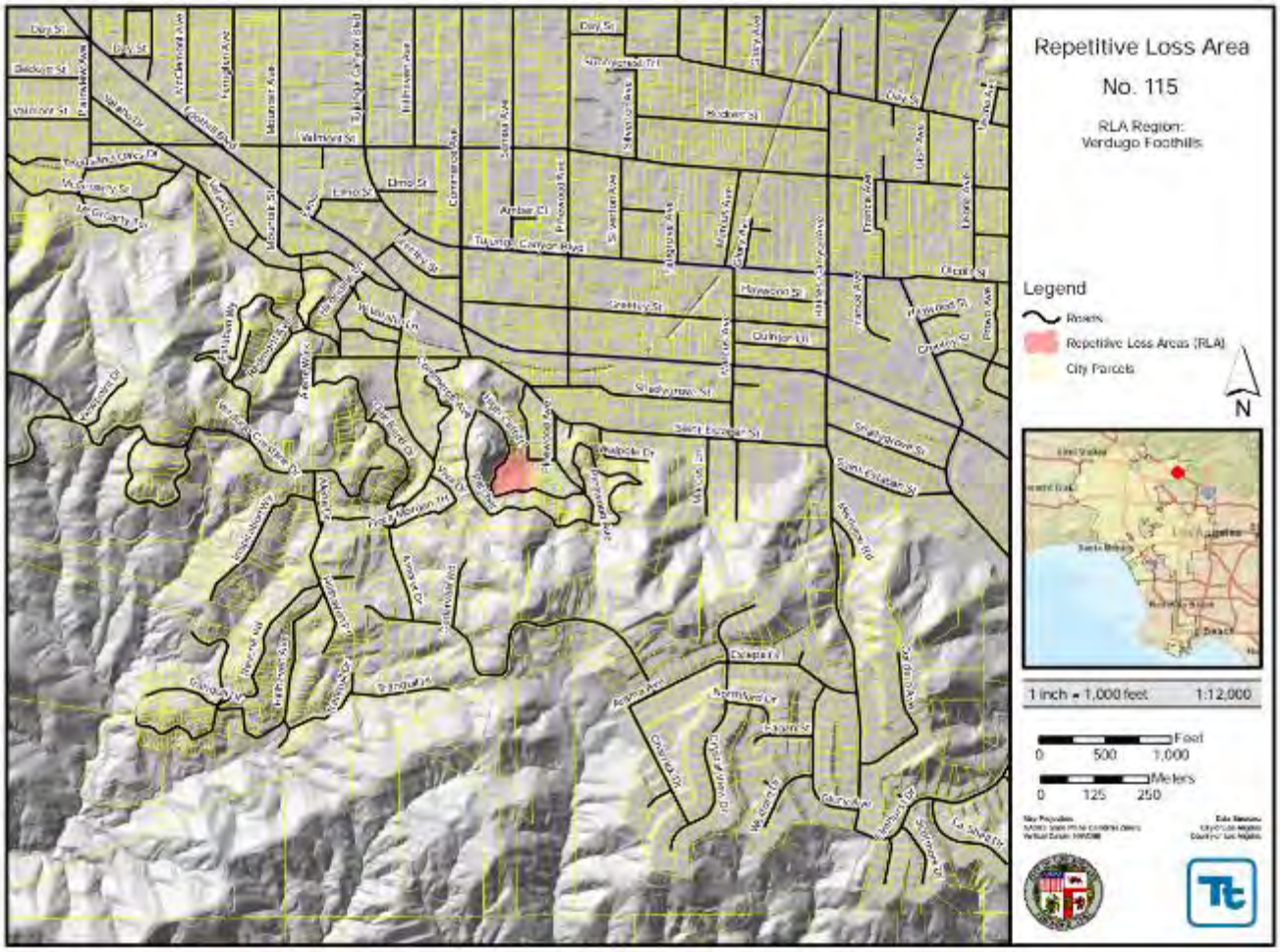

Figure 28-2. Repetitive Loss Area No. 115

28.6 REPETITIVE LOSS AREA NO. 116

28.6.1 Identified Repetitive Loss Properties

Table 28-9 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 28-9. Repetitive Loss Properties in Repetitive Loss Area 116

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137532	116	X	01/05, 02/98	$22,543	No

28.6.2 Properties Included in Repetitive Loss Area 116

Five properties with a total of eight structures have been identified in this repetitive loss area. Table 28-10 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 28-10. All Properties in Repetitive Loss Area 116

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
VER-116-1	1	Crawlspace	D7A	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-116-2	2	Crawlspace	D85B	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-116-3	2	Crawlspace	D7A	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-116-4	1	Crawlspace	D65B	Elevate, Directional Drainage, Wet/Dry Flood Proof
VER-116-5	2	Basement	D55A	Elevate, Directional Drainage, Wet/Dry Flood Proof
Total	8			

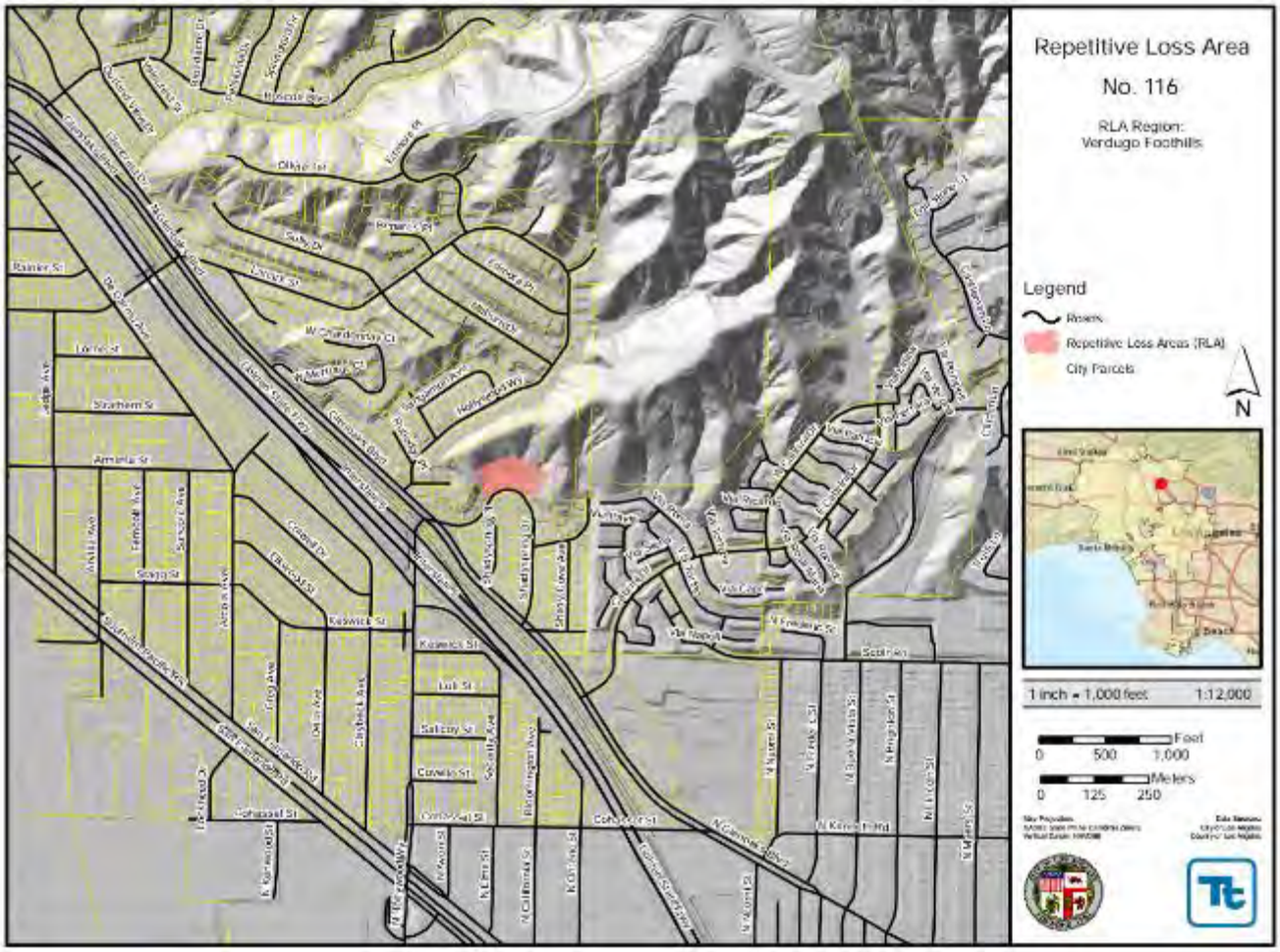

Figure 28-3. Repetitive Loss Area No. 116

29. WONDERLAND AVENUE CANYON

29.1 PROBLEM STATEMENT

The Wonderland Avenue Canyon repetitive loss region is comprised of Repetitive Loss Areas 117-120. In each of these repetitive loss areas, property damage from flooding is caused by stormwater runoff coming down the steep terrain of the canyon. None of the properties in these areas are in the FEMA-identified Special Flood Hazard Area (SFHA). As such, property owners may not have flood insurance on their properties. A list of repetitive loss properties, a description of the properties in the repetitive loss area, and a map of the repetitive loss area are provided in Section 29.2 through Section 29.5. Maps are not included for single-building repetitive loss areas due to privacy concerns.

29.2 REPETITIVE LOSS AREA NO. 117

29.2.1 Identified Repetitive Loss Properties

Table 29-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 29-1. Repetitive Loss Properties in Repetitive Loss Area 117

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
878	117	X	01/95, 02/93, 01/93, 02/92	$10,344	No

29.2.2 Properties Included in Repetitive Loss Area 117

Two properties with a total of two structures have been identified in this repetitive loss area. Table 29-2 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 29-2. All Properties in Repetitive Loss Area 117

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
WAC-117-1	1	Slab	D8D	Elevate, Dry Flood Proof, Directional Drainage
WAC-117-2	1	Slab	D75D	Elevate, Dry Flood Proof, Directional Drainage

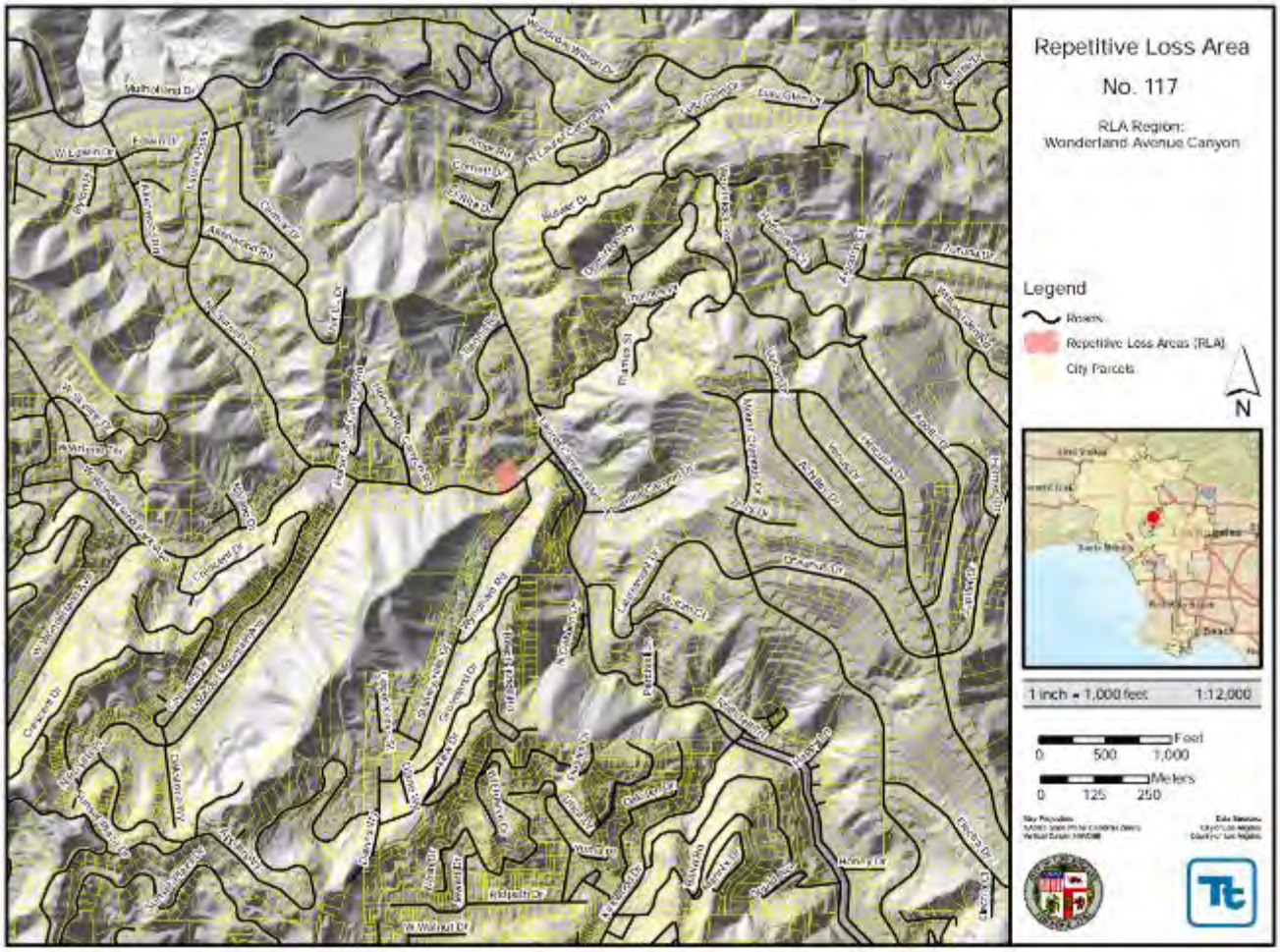

Figure 29-1. Repetitive Loss Area No. 117

29.3 REPETITIVE LOSS AREA NO. 118

29.3.1 Identified Repetitive Loss Properties

Table 29-3 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 29-3. Repetitive Loss Properties in Repetitive Loss Area 118

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28454	118	X	02/80, 02/78	$6,622	No

29.3.2 Properties Included in Repetitive Loss Area 118

Three properties with a total of three structures been identified in this repetitive loss area. Table 29-4 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 29-4. All Properties in Repetitive Loss Area 118

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
WAC-118-1	1	Crawlspace	D8D	Elevate, Wet/Dry Flood Proof, Directional Drainage
WAC-118-2	1	Slab	D75C	Elevate, Dry Flood Proof, Directional Drainage
WAC-118-3	1	Slab	D75C	Elevate, Dry Flood Proof, Directional Drainage

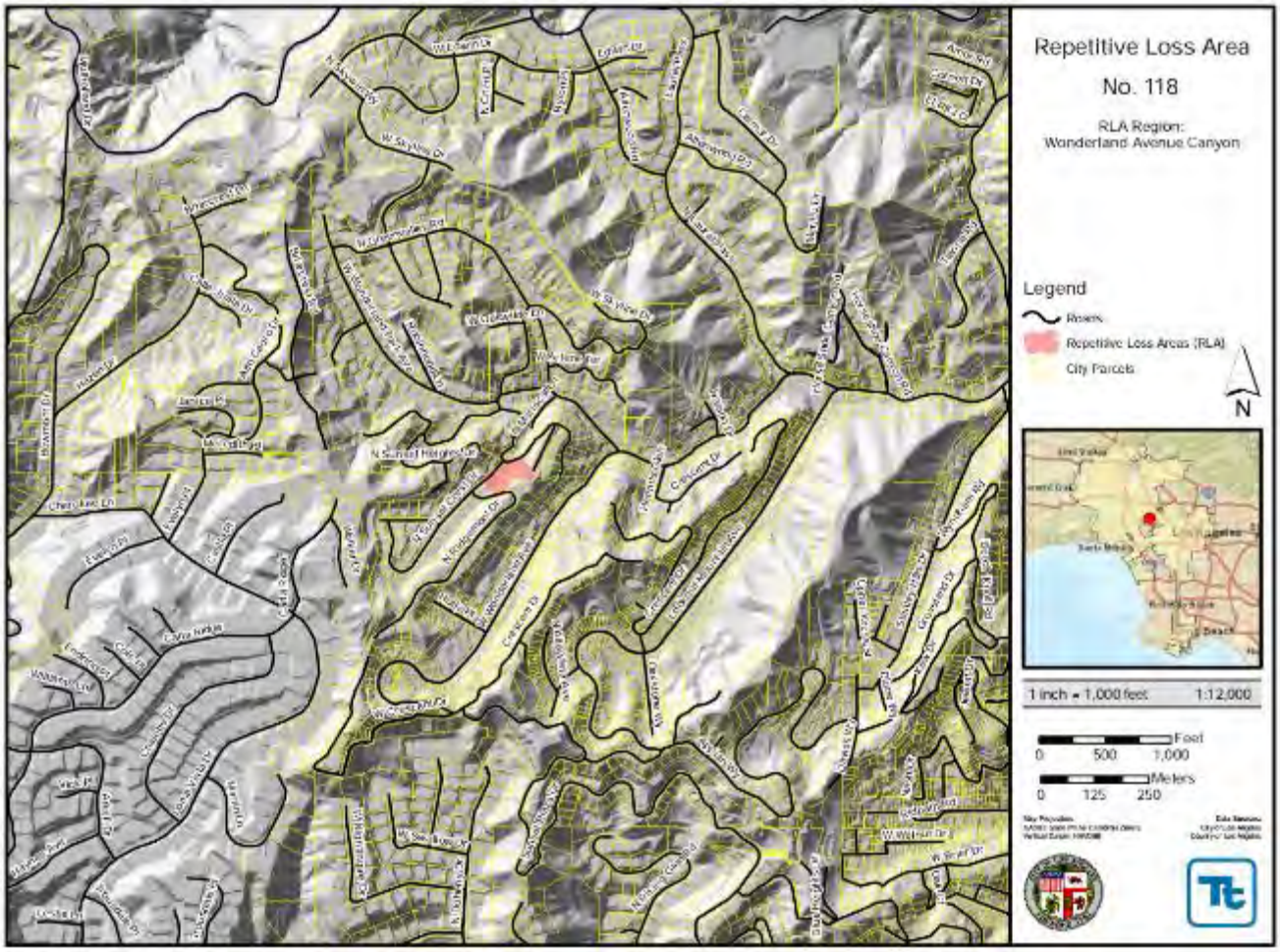

Figure 29-2. Repetitive Loss Area No. 118

29.4 REPETITIVE LOSS AREA NO. 119

29.4.1 Identified Repetitive Loss Properties

Table 29-5 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 29-5. Repetitive Loss Properties in Repetitive Loss Area 119

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
41841	119	X	03/83, 02/80	$1,312	No

29.4.2 Properties Included in Repetitive Loss Area 119

Two properties with a total of three structures have been identified in this repetitive loss area. Table 29-6 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 29-6. All Properties in Repetitive Loss Area 119

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
WAC-119-1	1	Crawlspace	D6C	Elevate, Wet/Dry Flood Proof, Directional Drainage
WAC-119-2	2	Basement	D5C	Elevate, Wet/Dry Flood Proof, Directional Drainage

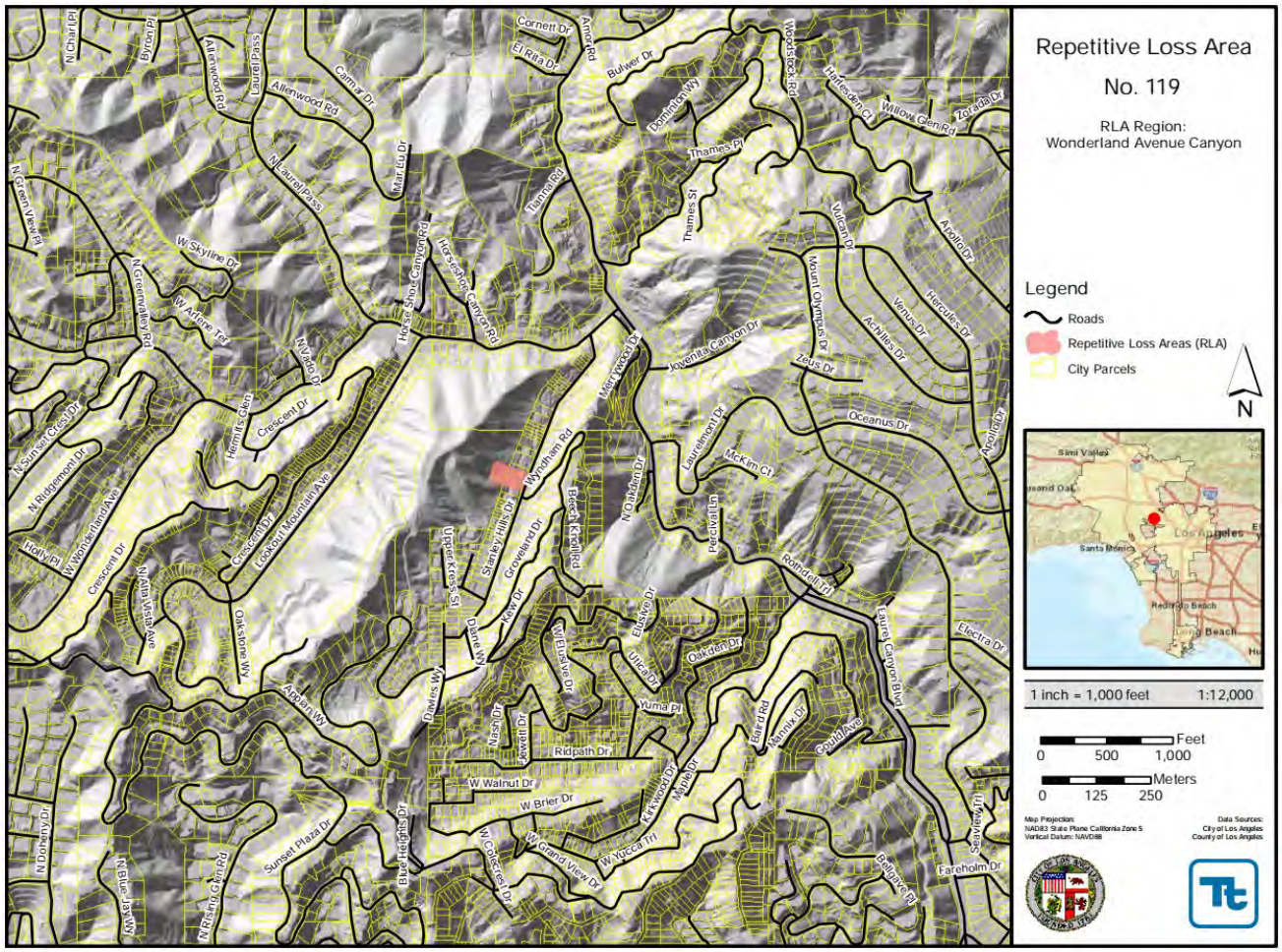

Figure 29-3. Repetitive Loss Area No. 119

29.5 REPETITIVE LOSS AREA NO. 120

29.5.1 Identified Repetitive Loss Properties

Table 29-7 lists the FEMA-designated repetitive loss properties within this repetitive loss area.

Table 29-7. Repetitive Loss Properties in Repetitive Loss Area 120

FEMA RL #	RL Map #	Flood Zone	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137531	120	X	01/05, 02/98	$5,698	No

29.5.2 Properties Included in Repetitive Loss Area 120

One property with one structure has been identified in this repetitive loss area. Table 29-8 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 29-8. All Properties in Repetitive Loss Area 120

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
WAC-120-1	1	Slab	D8	Elevate, Dry Flood Proof, Directional Drainage

PART 3—REPETITIVE LOSS AREA ACTION PLAN

30. Repetitive Loss Area Action Plan

30.1 MITIGATION ACTIONS

This *City of Los Angeles Repetitive Loss Area Analysis* was created in conjunction with the development of the *City of Los Angeles 2020 Floodplain Management Plan*. The two processes were created simultaneously, and while each will be maintained separately by the City, they are both functional annexes of each other. The floodplain management plan identified and prioritized an action plan that will have direct relevance to this RLAA. Actions from the FMP action plan that apply to the RLAA are listed in Table 30-1. 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:
  - **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.
- 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 **RLA numbers that would be affected** by the action item

Table 30-1. Action Plan—Flood Mitigation Actions

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-7—Continue to collect and analyze data regarding water volumes and pumping capabilities in water storage facilities provided by the Los Angeles Water Systems Data Acquisition Center to ensure those facilities are functioning properly to minimize potential hazards.				
DWP	DWP	Low. Work performed by existing staff	Ongoing	All
P-12—Continue to provide and participate in community education and outreach programs and events in the City (such as Earth Day, Public Works Week and preparedness fairs), prioritizing vulnerable populations.				
EMD, LASAN BOE, DCP, HD, FD, PD, DBS, DWP	General Fund	Low. Work performed by existing staff	Ongoing	All
P-13—Maintain the City's Emergency Management Department and ReadyLA websites and other City social media sites to provide emergency preparedness information to the general public and media.				
EMD	General Fund	Low. Work performed by existing staff	Ongoing	All
P-14—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events, prioritizing vulnerable populations				
BOE, EMD	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-15—Maintain the City's Emergency Operations Master Plan and Procedures including, but not limited to, periodic plan updates and training and exercises.				
EMD	General Fund	Low. Work performed by existing staff	Ongoing	All
P-16—Make sand and 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.				
FD, BOE, STREETS LA, EMD,	General Fund; Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-17—Maintain and improve the drainage complaint database to help identify flood risks.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-18—Maintain and improve a technically based prioritization methodology for use in developing the stormwater capital improvement program.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-19—Maintain regular contact with surrounding cities, the Los Angeles County Department of Public Works, and state and federal agencies regarding floodplain management and the National Flood Insurance Program.				
BOE, CAO, EMD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All
P-20—Network with other agencies and participate in organizations such as the Association of State Floodplain Managers, California Floodplain Management Association and the National Association of Flood and Stormwater Management Agencies to remain current in the field of floodplain management.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-21—Provide training and necessary support to foster Certified Floodplain Managers within the Department of Public Works and other Departments with floodplain management responsibilities.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-22—Conduct an annual National Flood Insurance Program seminar for City agencies responsible for applying and enforcing floodplain management regulations.				
BOE, DBS, DCP, HD	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-23—Based on the annual National Flood Insurance Program seminar, update operational procedures and training materials for staff who apply and enforce floodplain management regulations and provide annual training.				
DBS, DCP, HD, BOE	General Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-24—Maintain Geographic Information System mapping and modeling capability to support the stormwater facilities condition assessment program.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-25—Continue to maintain precise survey benchmarks throughout the City.				
BOE	General Fund	Low. Work performed by existing staff	Ongoing	All
P-26—Develop and maintain a citywide list of priority maintenance-related flood problem sites.				
LASAN, BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-27—Based on the citywide list of priority maintenance-related flood problem sites (see P-26), conduct necessary inspection and maintenance at priority maintenance-related flood problem sites prior to the wet season and after significant storms.				
LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-28—Provide public education about keeping the stormwater system free of debris, the blockage of flow paths and reporting violations.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-29—Post "No Dumping" signs at points of entry to the stormwater system.				
LASAN, LACDPW	Stormwater Pollution Abatement Fund (City); Benefit Assessment for Flood Control (County)	Low. Work performed by existing staff	Ongoing	All
P-30—Maintain a map for potential landslide and mudflow areas (including post-fire impact areas).				
BOE, LASAN, DBS, DCP, LACDPW	General Fund, Stormwater Pollution Abatement Fund, FCBAF (post-fire mapping only)	Low. Work performed by existing staff	Ongoing	All
P-31—Update the established policy for identifying substantial improvement projects that is consistent with FEMA requirements as needed.				
BOE, DBS	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-32—Verify, through the plan check process and post development review, that new development complies with the regulations in the City's Ordinance for the Management of Flood Hazards (Ordinance No. 172,081), including freeboard requirements on new construction and substantial improvements.				
BOE, DBS, DCP, HD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-34—Provide information to the Flood Hazard Mitigation Coordinator on July 1 of each year for preparation of the Annual Floodplain Management Plan Evaluation Report. Describe the progress made for each mitigation action and any floodplain management regulatory actions and compliance actions conducted during the reporting period, including the number of permits approved in designated flood hazard areas, the number of waivers applied for, and the number of waivers approved. Following the completion of the Plan Evaluation Report, the Steering Committee will meet at least one time during the year to finalize the report for posting and presentation to the City Council.				
BOE, CAO, Steering Committee	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All
P-36—Continue to refine the use of the Plan Check and Inspection System to track high-risk properties and ensure that drainage is adequately addressed through the plan check process.				
BOE, LASAN, DBS	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-37—Incorporate floodplain management information into the Zoning Information and Map Access System. Ongoing updates will be needed based on updated floodplain management data.				
BOE, DBS, DCP	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All
P-38—Transfer electronic data annually to the Flood Hazard Mitigation Coordinator regarding structures damaged due to flooding caused by catastrophic events.				
DBS	General Fund	Low. Work performed by existing staff	Ongoing	All
P-40—Continue to notify insurance agencies and realtors of the requirement that all lessors or renters give written notice to all prospective and interested parties—including but not limited to, purchasers, lessee and renters—prior to finalization of a transaction when the subject land and/or structures are located within FEMA-designated flood zones. The notice shall comply with the latest version of CRS manual.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-41—Provide flood zone information to all residents. Provide notifications when flood insurance is required. Provide notifications when FEMA-designated flood zone changes are made.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-42—Develop and distribute flood protection information and materials to property owners and developers in high-risk areas including FEMA mapped floodplains and areas outside of mapped floodplains.				
BOE, DBS, DCP, EMD, Library	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All
P-43—Maintain a list of critical facilities in the city as documented in the City's Local Hazard Mitigation Plan. Provide flood protection information to operators of critical facilities in FEMA-designated flood zones. Encourage the implementation of flood protection measures at such facilities.				
BOE, EMD	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-45—Continue to investigate repetitive loss properties as they are identified by FEMA. Annually notify repetitive loss property owners about local flood hazards and proper protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current repetitive loss property questionnaire to new repetitive loss properties.				
BOE, LASAN, BDS	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-46—Identify high risk areas in the City. Provide annual investigation and notification to property owners of high-risk areas about local flood hazards and proper protection activities. Provide technical advice regarding flood protection and flood preparedness. Distribute a current flood hazard questionnaire to new owners in high risk areas.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-47—In the Plan Check and Inspection System database, flag repetitive loss properties and high-risk areas for review and approval of building permit applications by the Flood Hazard Mitigation Coordinator. Ongoing updates will be needed based on updated floodplain management data.				
BOE, DBS	Stormwater Pollution Abatement Fund; General Fund	Low. Work performed by existing staff	Ongoing	All
P-48—Request that FEMA modify the repetitive loss property list based on mitigation projects implemented by owners or other responsible parties.				
BOE	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-49—Identify possible sources of funding (increased cost of compliance funds, mitigation grant funds, and others), and provide this information to repetitive loss property owners.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-50—Establish standards and/or incentives for the use of structural and nonstructural techniques that mitigate flood hazards and manage stormwater pollution.				
BOE, LASAN	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-51—Plan and design stormwater projects so that water quality is protected, and flood risks are reduced on site and off site.				
BOE, LASAN, DBS	Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-54—Update a City-wide Watercourse Permit Manual.				
BOE	General Fund, Possible grants	Low. Work performed by existing staff	Ongoing	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-55—Update the City's floodplain management website to promote awareness of the National Flood Insurance Program.				
BOE, EMD	General Fund, Stormwater Pollution Abatement Fund	Low. Work performed by existing staff	Ongoing	All
P-56—Develop a program for regular condition assessment of stormwater facilities to identify the physical and hydraulic condition of the system and to support infrastructure management needs.				
BOE, LASAN	Stormwater Pollution Abatement Fund	High	Long Term	All
P-58— Evaluate current development regulations, including the grading ordinance and zoning ordinances (floodplain management ordinance, proposed wildlife protection ordinance), to determine whether the standards provide sufficient protection for adjacent (downstream or down-slope) development. Evaluate the effects of remedial grading and revise practices to minimize downstream impacts such as soil erosion and drainage. Coordinate updated regulations for hillsides that address the size and intensity of structures to manage flood hazard in hillsides and maintain native habitat to minimize erosion and increase slope stability.				
DCP, DBS, BOE, LASAN	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	All
P-59—Update the Map of Hillside Areas (BOE Basic Grid Map A- 13372) to more accurately reflect areas subject to hillside regulations based on latest data and regulations (CF 09-1390 and related documents).				
DCP, DBS, BOE, LASAN	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	All
P-61—Research and continue to improve municipal code regulations regarding soil stability and erosion abatement.				
DBS, DCP, BOE	Stormwater Pollution Abatement Fund; General Fund	Low	Long Term	All
P-63—Develop a model educational program for hillside properties in general and Mandeville Canyon in particular. The target audience should be, at minimum, residents and real estate agents.				
BOE, DBS	Stormwater Pollution Abatement Fund, Grants	High	Long Term	All
P-64—Develop an annual inspection program of watercourse obstructions and revetments in Mandeville Canyon.				
BOE, LASAN, Streets Los Angeles, CAO, City Attorney; Council Office District 11	General Fund, Grants	High	Long Term	35-45
P-65—EMD coordinates access to Federal Empower data that identifies residents of the City who may have disabilities or other medical conditions, access or functional needs that increase their vulnerability to disasters. This information can be used by field level incident commanders or the City's Emergency Operations Center in order to ensure timely and efficient evacuation of vulnerable populations in an event of fire, flood, or tsunamis.				
EMD, FD, PD, BOE, DOA, DOD	General Funds; Possible grants	High	Long Term	All

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-66—Continue to develop and maintain evacuation plans for areas potentially affected by a catastrophic dam failure, as identified in the Dam Inundation Map of the General Plan and forward these evacuation plans to appropriate agencies for coordination (police, sheriff, Los Angeles County, etc.).				
EMD, FD, PD, DWP	General Funds; Possible grants	High	Long Term	29, 30, 31, 33, 35, 36, 37, 38, 51, 52, 54, 56, 60, 61, 62, 64, 65, 66, 67, 69, 74, 75, 123, 136
P-67—Maintain self-registry for vulnerable populations with access and functional needs and strive to identify sources of public safety hazards caused by a catastrophic dam failure and develop evacuation/response plans.				
EMD, PD, DWP, DOA, DOD	General Funds; Possible grants	High	Long Term	29, 30, 31, 33, 35, 36, 37, 38, 51, 52, 54, 56, 60, 61, 62, 64, 65, 66, 67, 69, 74, 75, 123, 136
P-68—Conduct regular coordination meetings with the Los Angeles County Department of Public Works to communicate the City's list of priority stormwater projects, discuss watershed management programs, and develop countywide standards.				
BOE, LASAN, LACDPW	Stormwater Pollution Abatement Fund; Benefit Assessment for Flood Control (County)	Low	Long Term	All
P-69—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.				
BOE, LASAN, DBS, DCP, DGS	General Fund, Stormwater Pollution Abatement Fund; Grants	Low -Work performed by existing staff	Long Term	All
P-71—Institute a program to capture perishable data (e.g., high water marks, damages, functional downtime) after flood events in the City, especially where flooding occurs in places that have not been identified a hazard areas on existing FEMA or City maps.				
BOE, LASAN	General Fund, FEMA Pollution Abatement Fund	Medium	Long term	All
P-72—Continue to maintain/ enhance the city's classification under the Community rating System (CRS) as a means to mitigate the impacts from flood insurance reform.				
BOE, DBS, DCP, CAO, LASAN, EMD	General Fund	Low	On-going	All
P-73—Where feasible, cost effective and supported both publicly and politically, restore the natural and beneficial floodplain functions of appropriate floodplains (floodplains that have been identified through a master plan or study certified by a qualified agency) in the City.				
BOE, LASAN, DBS, DCP, DGS	General Fund, Stormwater Pollution Abatement Fund	Low -Work performed by existing staff	Long Term	2, 29, 30, 31, 35, 52, 61, 76, 77, 117, 137, 143
P-74—Using the best available data and science, consider probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the City's comprehensive floodplain management program. This would include but is not limited to codes, ordinances, plans, studies, public information programs and city directives.				
BOE, LASAN, DCP, DGS, DBS	General Fund	Medium	Long term	All
P-77—The City currently has five approved Enhanced Watershed Management Plans: Ballona Creek, Dominguez Channel, Marina Del Rey, Santa Monica Bay, and Upper Los Angeles River. These plans were approved in 2016 by the Los Angeles Regional Water Quality Control Board. The plans are considered adaptive management plans and must be reassessed and submitted for approval to the Water Quality Control Board every 5 years to ensure the City is working toward meeting its water quality compliance mandates.				
LASAN, BOE	Safe Clean Water Program Fund, General Fund/Stormwater Pollution Abatement Fund, Possible Grants	Low	Short term	All

Lead Department[a]	Possible Funding Sources	Estimated Project Cost	Time Line	RLAs Affected
P-78—Coordinate floodplain management program recommendations and objectives with the Enhanced Watershed Management Plans.				
BOE, LASAN	Safe Clean Water Program Fund, General Fund/Stormwater Pollution Abatement Fund, Possible Grants	Medium	Long term	All
P-79—Include an identifier for RLAA properties in the DBS permitting process so that property owners can be made aware of the potential flood risk when applying for construction permits.				
DCP, BOE, DBS	General Fund	Low	Short term	All

a. Where multiple departments are listed, the underlined department will be the lead agency for overseeing implementation of the action.

30.2 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 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. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of each action:

- 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).
  - **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.
  - **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.
- 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.

For many of the strategies identified in this action plan, the City of Los Angeles 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, the City reserves the right to define “benefits” according to parameters that meet floodplain management goals and objectives.

30.3 ACTION PLAN PRIORITIZATION

Table 30-2 lists the priority of each action item that applies to the RLAA. These priorities were 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 action plan was prioritized according to the benefit/cost analysis, funding availability and the immediacy of the need for each project, 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 a 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 30-2. Prioritization of Mitigation Initiatives

Initiative	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant Eligible?	Can Project be Funded Under Existing Programs/ Budgets?	Priority (High, Med., Low)
P-7	High	Low	Yes	No	Yes	High
P-12	Low	Low	Yes	No	Yes	High
P-13	Low	Low	Yes	No	Yes	High
P-14	Low	Low	Yes	No	Yes	High
P-15	Medium	Low	Yes	No	Yes	High
P-16	High	Low	Yes	No	Yes	High
P-17	Medium	Low	Yes	No	Yes	High
P-18	Medium	Low	Yes	No	Yes	High
P-19	Low	Low	Yes	No	Yes	High
P-20	Low	Low	Yes	No	Yes	High
P-21	Medium	Low	Yes	No	Yes	High
P-22	Medium	Low	Yes	No	Yes	High
P-23	Medium	Low	Yes	No	Yes	High
P-24	Medium	Low	Yes	No	Yes	High
P-25	High	Low	Yes	No	Yes	High
P-26	Medium	Low	Yes	No	Yes	High
P-27	High	Low	Yes	No	Yes	High
P-28	Medium	Low	Yes	No	Yes	High
P-29	Low	Low	Yes	No	Yes	High
P-30	Medium	Low	Yes	No	Yes	High
P-31	Medium	Low	Yes	No	Yes	High
P-32	High	Low	Yes	No	Yes	High
P-34	Low	Low	Yes	No	Yes	High
P-36	Low	Low	Yes	No	Yes	High
P-37	Low	Low	Yes	No	Yes	High
P-38	Medium	Low	Yes	No	Yes	High
P-40	Medium	Low	Yes	No	Yes	High
P-41	Medium	Low	Yes	No	Yes	High
P-42	Medium	Low	Yes	No	Yes	High

Initiative	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant Eligible?	Can Project be Funded Under Existing Programs/ Budgets?	Priority (High, Med., Low)
P-43	Low	Low	Yes	No	Yes	High
P-45	Medium	Low	Yes	No	Yes	High
P-46	High	Low	Yes	No	Yes	High
P-47	Low	Low	Yes	No	Yes	High
P-48	Medium	Low	Yes	No	Yes	High
P-49	High	Low	Yes	No	Yes	High
P-50	High	Low	Yes	No	Yes	High
P-51	High	Low	Yes	No	Yes	High
P-54	Medium	Low	Yes	Yes	Yes	High
P-55	Low	Low	Yes	No	Yes	High
P-56	High	High	Yes	No	Maybe	Medium
P-58	High	Low	Yes	No	Yes	High
P-59	High	Low	Yes	No	Maybe	Medium
P-61	Medium	Low	Yes	No	Maybe	Medium
P-63	Medium	Low	Yes	No	Maybe	Medium
P-64	Medium	High	No	No	Maybe	Low
P-65	High	High	Yes	Yes	Maybe	Low
P-66	High	High	Yes	Yes	Maybe	Low
P-67	Medium	High	No	Yes	Maybe	Low
P-68	High	High	Yes	Yes	Maybe	Low
P-69	Medium	Low	Yes	No	Maybe	Medium
P-71	High	Medium	Yes	No	Yes	Medium
P-72	Medium	Medium	Yes	Yes	Maybe	Medium
P-73	Medium	Low	Yes	No	Yes	High
P-74	High	Low	Yes	No	Yes	High
P-77	Medium	Medium	Yes	Yes	Maybe	Medium
P-78	Low	Low	Yes	No	Yes	High
P-79	Medium	Low	Yes	No	Yes	High

30.4 ANNUAL EVALUATION REPORT

The City of Los Angeles 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.

31. PLAN ADOPTION

This chapter documents formal adoption of the *City of Los Angeles Repetitive Loss Area Analysis* by the Los Angeles City Council. The City formally adopted the RLAA on DATE. A copy of the resolution is provided on the following pages.

Insert Adoption Resolution

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TERMINOLOGY

ACRONYMS

APC—City of Los Angeles Area Planning Commission

BOE—Bureau of Engineering, Department of Public Works

CAO—Chief Administrative Office

CEQA—California Environmental Quality Act

CFR—Code of Federal Regulations

CRS—Community Rating System

DBS—Department of Building and Safety

DCP—Department of City Planning

DGS—Department of General Services

DOA—Department of Airports

DRP—Department of Recreation and Parks

DSOD —California Division of Safety of Dams

DWP—Department of Water and Power

DWR—(California) Department of Water Resources

EMD—Emergency Management Division

ESA—Endangered Species Act

EWMP—Enhanced Watershed Management Plans

FD—Fire Department

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

FIRM—Flood Insurance Rate Map

FMP2015—2015 City of Los Angeles Floodplain Management Plan

FMP2020—2020 City of Los Angeles Floodplain Management Plan

GIS—Geographic Information System

Hazus—MH—Hazards, United States-Multi Hazard

HD—Harbor Department

IPCC—Intergovernmental Panel on Climate Change

LACDA—Los Angeles County Drainage Area (Study)

LACDPW—Los Angeles County Department of Public Works

LASAN—Los Angeles Sanitation and Environmental

LID—Low impact development

LOMA—Letter of Map Amendment

LOMC—Letter of Map Change

LOMR—Letter of Map Revision

LARRMP—LA River Revitalization Master Plan

NFIP—National Flood Insurance Program

NIMS—National Incident Management System

NOAA—National Oceanic and Atmospheric Administration

NWS—National Weather Service

PD—Police Department.

SEA—Significant Ecological Area

SEMS—Standardized Emergency Management System

SFHA—Special Flood Hazard Area

USGCRP—U.S. Global Change Research Program

DEFINITIONS

100-Year Flood: The flood that has a 1 percent chance of being equaled or exceeded in any given year. The 100-year flood does not necessarily occur once every 100 years. It is possible for a 100-year flood to occur more than once in a relatively short period of time.

Acre-Foot: The amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Base Flood: Another term for the 100-year flood—the flood having a 1 percent chance of being equaled or exceeded in any given year. The base flood is used as a reference flood level to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.

Benefit/Cost Analysis: A systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness. For the purposes of benefit-cost analysis of proposed mitigation actions, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Capability Assessment: A description and analysis of a community's current capacity to address threats associated with flooding. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified.

Community Rating System (CRS): A voluntary program that provides flood insurance premium discounts to property owners in communities that exceed the minimum requirements of the National Flood Insurance Program and complete activities that reduce flood hazard risk.

Critical Facility: 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.

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Economically Disadvantaged Populations: Households with household incomes below a federally defined minimum.

Exposure: The number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Federal Disaster Declaration: Declarations for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A federal disaster declaration puts into motion long-term federal recovery programs to help disaster victims, businesses, and public entities.

Flash Flood: A flood that occurs with little or no warning when water levels rise at an extremely fast rate.

Flood Insurance Rate Map (FIRM): The official map on which the Federal Emergency Management Agency delineates special flood hazard area for a given location.

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the special flood hazard area.

Floodway: Areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Freeboard: The margin of safety added to the base flood elevation in the design of structures intended to mitigate flooding.

Frequency: How often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard.

Goal: A general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a floodplain management plan is measured by the degree to which its goals have been met (that is, by the benefits in terms of actual floodplain management).

Geographic Information System (GIS): A computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program: A FEMA program that provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (Hazus) Loss Estimation Program: A GIS-based program used to support the development of risk assessments. The Hazus software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards. Hazus is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards.

Hydraulics: The branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: The analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: The measure of the effects of a hazard.

Inventory: A list of assets identified in a study region that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: A short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Preparedness: Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability of Occurrence: A statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: The process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Significant Ecological Area: An area mapped in the *Los Angeles County Special Management Areas Policy Map* that contains irreplaceable biological resources, representing the biodiversity of the county. Lands in the SEAs generally have undisturbed or lightly disturbed habitat.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in river situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact floodplain management.

Vulnerability: An asset's susceptibility to damage during a hazard event. Vulnerability depends on an asset's construction, contents, and the economic value of its functions.

Watershed: An area that drains down-gradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Zoning Ordinance: An ordinance that designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

City of Los Angeles 2020 Repetitive Loss Area Analysis

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:
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DAMAGE FUNCTIONS FOR SINGLE FAMILY RESIDENTIAL STRUCTURES WITH BASEMENTS

Structure Depth-Damage

Table 1 Structure 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 Structure 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 Structure 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 Content 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 Content 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 Content 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 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 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 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 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 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 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%

City of Los Angeles 2020 Repetitive Loss Area Analysis

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 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

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. City 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.

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.

City of Los Angeles 2020 Floodplain Management Plan

Appendix G. Example Progress Report

Example Progress Report

City of Los Angeles, California

Floodplain Management Plan

Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: The City of Los Angeles developed a floodplain management plan (FMP2020) to reduce risk from flooding by identifying resources, information, and strategies for risk reduction. To prepare the FMP2020, the City 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. Stafford Act. The FMP2020 can be viewed on-line at:

insert web address

Summary Overview of the Plan's Progress: The performance period for the FMP2020 began on ____, 2020, with the final approval of the plan by FEMA. The initial performance period will be 5 years, with an anticipated update to the plan to occur before _____, 2020. As of this reporting period, the performance period is considered to be __% complete. The FMP2020 has targeted 79 floodplain management 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.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the FMP2020. The objective is to ensure that there is a continuing and responsive planning process that will keep the FMP2020 dynamic and responsive to the needs and capabilities of the City and stakeholders. This report discusses the following:

- Flood events that have occurred within the last year
- Changes in risk exposure within the City of Los Angeles
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Floodplain Management Plan Steering Committee: The Floodplain Management Plan Steering Committee, made up of stakeholders within the City of Los Angeles, reviewed and approved this progress report at its annual meeting held on _____, 201_. It was determined through the FMP2020's development process that a steering committee would remain in service to oversee maintenance of the FMP2020. 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

Flood Events: During the reporting period, there were __ flood events in the City of Los Angeles that had a measurable impact on people or property. A summary of these events is as follows:

- _____
- _____

Changes in Risk Exposure: *(Insert brief overview of any flood event in the City of Los Angeles that changed the probability of occurrence of flooding as presented in the FMP2020)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

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 FMP2020 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)	Time Line	Priority	Status (X, O,✓)	Comment
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
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Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				

Action Taken? (Yes or No)	Time Line	Priority	Status (X, O,✓)	Comment
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
Action #__—_____[description]				
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

Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the City of Los Angeles that would have a profound impact on the implementation of the FMP2020. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

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 FMP2020:

- _____
- _____
- _____
- _____
- _____
- _____

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 City of Los Angeles governing board and to local media outlets and the report is posted on the City's floodplain management plan website. Any questions or comments regarding the contents of this report should be directed to:*

Insert Contact Info Here

To Be Provided in Later Draft