2020
URBAN WATER MANAGEMENT PLAN
CRESCENTA VALLEY WATER DISTRICT







MAY 2021
PUBLIC DRAFT

2020

URBAN WATER MANAGEMENT PLAN

Crescenta Valley Water District

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MAY 2021 PUBLIC DRAFT

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TABLE OF CONTENTS

Executive Summary & Lay Description

Section		Page
	Introduction	ES-1
	Service Area and Facilities	ES-1
	Water Demand	ES-2
	Water Sources and Supplies	ES-2
	Future Water Supply Projects	ES-2
	Water Service Reliability	ES-3
	Challenges Ahead & Strategies for Managing Reliability Risks	ES-4

Section 1: Introduction

Section		Page
1.1	Urban Water Management Plan Purpose & Summary	1-1
1.2	Past Updates to the UWMP Act	1-2
1.3	Updates to the UWMP Act for 2020 UWMPs	1-2
1.4	2020 UWMP Scope & Format	1-3
1.5	Agency Overview	1-5
1.6	Service Area and Facilities	1-7

Section 2: Water Demand

Section		Page
2.1	Overview	2-1
2.2	Factors Affecting Demand	2-1
2.3	Water Use within CVWD's Service Area	2-5
2.4	Water Conservation Act	2-7
2.5	Water Use Reduction Plan	2-15
2.6	Demand Projections	2-17

Section 3: Water Sources & Supply Reliability

Section		Page
3.1	Overview	3-1
3.2	Imported Water	3-1
3.3	Groundwater	3-7
3.4	Water Quality	3-9
3.5	Current Water Supply	3-12
3.6	Projected Climate Change Impacts to Supplies	3-14
3.7	Water Supply Projections	3-20
3.8	Supply vs Demand	3-21
3.9	CVWD's Supply Reliability	3-26
3.10	Energy Intensity	3-36

Section 4: Conservation Measures

Section		Page
4.1	Overview	4-1
4.2	CVWD Conservation Programs	4-2

Section 5: Water Shortage Contingency Plan

Section		Page
5.1	Overview	5-1
5.2	Water Supply Reliability Analysis	5-1
5.3	Annual Water Supply and Demand Assessment Procedures	5-4
5.4	Shortage Stages and Shortage Response Actions	5-7
5.5	Communication Protocols	5-27
5.6	Compliance and Enforcement	5-30
5.7	Legal Authorities	5-32
5.8	Financial Consequences of WSCP Implementation	5-32
5.9	Monitoring and Reporting	5-33
5.10	Special Water Feature Distinction	5-34
5.11	WSCP Adoption and Refinement Procedures	5-34

Section 6: Recycled Water

Section		Page
6.1	Overview	6-1
6.2	Wastewater Description & Disposal	6-1
6.3	Current Recycled Water Uses	6-3
6.4	Potential Recycled Water Uses	6-3
6.5	Optimization Plan	6-3

Section 7: Future Water Supply Projects & Programs

Section		Page
7.1	Overview	7-1
7.2	MWD Regional Supply Projects & Programs	7-1
7.3	Water Management Tools	7-2
7.4	Transfer or Exchange Opportunities	7-2
7.5	Planned Water Supply Projects & Programs	7-2
7.6	Desalination Opportunities	7-3

Section 8: Plan Adoption Process

Section		Page
8.1	Overview	8-1
8.2	Details of Coordination Efforts	8-2
8.3	UWMP Submittal	8-3

Appendices

Appendix	Description
Appendix A	ULARA Judgment
Appendix B	Rockhaven Well Operation & Water Sale Agreement
Appendix C	CVWD Water Conservation Program
Appendix D	LA All-Hazards Mitigation Plan
Appendix E	CVWD Board Resolution Adopting 2020 UWMP
Appendix F	Two-Week & One-Week Notification of Public Hearing
Appendix G	60-Day Notification of Public Hearing
Appendix H	WUE Tool 2020 Population
Appendix I	DWR Data Tables & UWMP Checklist

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ACRONYMS

Act	Urban Water Management Planning Act
AF	acre-feet
AFY	acre-feet per year
Basin	Verdugo Groundwater Basin
BDCP	Bay Delta Conservation Plan
BMP	Best Management Practice
Board	Metropolitan Water District of Southern California's Board of Directors
cfs	cubic feet per second
CII	Commercial/Industrial/Institutional
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Crescenta Valley Water District
CWC	California Water Code
DDW	State Water Resources Control Board Division of Drinking Water
DMM	Demand Management Measure
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ETo	Evapotranspiration
FMWD	Foothill Municipal Water District
GPCD	gallons per capita per day
gpf	gallons per flush
GW	Groundwater
GWP	Glendale Water and Power
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
HR	Hydrologic Region
IRP	Integrated Resource Plan
IWA	International Water Association
JWPCP	Joint Water Pollution Control Plant
LACSD	Sanitation Districts of Los Angeles County
LADWP	Los Angeles Department of Water and Power

LAGWRP	Los Angeles/Glendale Water Reclamation Plant
LCID	La Cañada Irrigation District
LRWSP	Local, Reliable Water Supply Program
MAF	million acre-feet
MCL	Maximum Contaminant Level
MGD	million gallons per day
MOU	Memorandum of Understanding
MTBE	Methyl tertiary butyl ether
MWD	Metropolitan Water District of Southern California
MWELO	Model Water Efficient Landscape Ordinance
NDMA	N-nitrosodimethylamine
PCE	Tetrachloroethylene
PPCPs	Pharmaceuticals and Personal Care Products
PHETs	Premium HETs
QSA	Quantification Settlement Agreement
RHNA	Regional Housing Needs Assessment
SBx7-7	Senate Bill x7-7
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SDP	Seawater Desalination Program
SMSS	Soil Moisture Sensor System
SWP	State Water Project
TDS	Total Dissolved Solid
ULARA	Upper Los Angeles River Area
ULFT	Ultra-Low-Flow Toilet
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WARN	Water Agency Response Network
WBIC	Weather-Base Irrigation Controller
WRP	Water Reclamation Plant
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management Plan

EXECUTIVE SUMMARY & LAY DESCRIPTION

INTRODUCTION

This report serves as the 2020 update of the Crescenta Valley Water District's (CVWD) Urban Water Management Plan (UWMP). This UWMP has been prepared consistent with the requirements under Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act) and its amendments. The Act requires that "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt, in accordance with prescribed requirements, an urban water management plan." These plans must be filed with the California Department of Water Resources (DWR) every five years describing and evaluating reasonable and practical efficient water uses, reclamation, and conservation activities. 2020 UWMP updates are to be adopted by July 1, 2021.

The Act has been amended on several occasions since its initial passage in 1983. New requirements of the Act due to SBx7-7 state that per capita water use within an urban water supplier's service area must decrease by 20 percent by the year 2020 in order to receive grants or loans administered by DWR or other state agencies. The legislation sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020. Each urban retail water supplier developed water use targets by July 1, 2016. Effective 2021, urban retail water suppliers who do not meet the 2020 water conservation requirements established by this bill are not eligible for state water grants or loans.

Section 1.4.3 offers of summary of each section of this 2020 UWMP.

SERVICE AREA AND FACILITIES

CVWD provides water to a population of approximately 32,462 throughout its service area. CVWD receives its water from two main sources, the Verdugo Groundwater Basin (Basin), and imported water from Metropolitan Water District of Southern California (MWD) through the Foothill Municipal Water District (FMWD). CVWD provides potable drinking water to its customers via 12 local groundwater wells, and imported water supply through 3 MWD connections and an emergency inter-tie system with the City of Glendale.

WATER DEMAND

The total water demand for the 32,462 people served by CVWD is over 4,200 acre-feet of potable water for the 2020 calendar year.

CVWD has selected to comply with **Method 3**, 95 percent of the State Hydrologic Region Target, of the SBx7-7 compliance options; however, the minimum required target applies and CVWD's 2015 interim water use target was 151 GPCD, and the 2020 final water use target is **142 GPCD**. A description of the compliance options is discussed in **Section 2.4**.

In 2015, CVWD had a per capita water use of 100.5 GPCD. In 2020, CVWD has a per capita water use of 116 GPCD. Despite the COVID-19 pandemic requiring majority of individuals to work from home, CVWD was able to achieve their 2020 Target Goals by having a GPCD of 116 (2020 Target was 142).

WATER SOURCES AND SUPPLIES

On average over the last five years, 48 percent of CVWD's source water is local ground water supply in the Basin. The majority of CVWD's ground water wells are located along the Verdugo Wash, south of Honolulu Avenue. The remaining 52 percent of CVWD's source water is imported water supplied by FMWD, which is a member agency to MWD. The sources of imported water supplies include the Colorado River and the State Water Project.

FUTURE WATER SUPPLY PROJECTS

CVWD is working towards the development of the Crescenta Valley County Park Stormwater Recharge Multiuse Project. This Project will allow CVWD to increase groundwater storage in the Basin by the installation and maintenance of underground infiltration galleries underneath portions of the existing park. This will be accomplished by utilizing the existing Los Angeles County Flood Control channels (Verdugo Wash and Dunsmuir Channel), and surface flow within the Crescenta Valley County Park to divert storm water during the rainy season into underground infiltration basins within the recreational area. The project will potentially increase the local ground water supply by an annual average of 500 acre-feet per year, thus enhancing CVWD's groundwater resource and reducing dependence on imported supplies. Also, through the process of capture, treatment, and reuse of storm water and dry weather flow, the project could potentially reduce the pollutant load from contaminating the Los Angeles River.

As funding permits, CVWD plans to rehabilitate its older groundwater wells with new technologies over the 10-year period that started in 2020. The existing wells are between 70 to 90 years old and have reached the end of their useful life. CVWD's current program is to perform at

least two well rehabilitations a year, which include cleaning the well casing with chemical treatment and installation of a liner to extend the life of the well.

In Fall 2020, CVWD began the rehabilitation of the Rosemont Reservoir. The 500,000-gallon reservoir rehabilitation project is midway through its construction phase, with most of its heavy construction completed. Construction is currently in Phase II of the rehabilitative process, including sandblasting, stripping, and adding primer coats to both the inside and outside of the tank. The project is estimated to be completed by March 2021. The reservoir structure has not been rehabilitated in over 20 years, and though the tank is starting to show signs of aging, its structural integrity has not been compromised over the years. This reservoir project is part of CVWD's Reservoir Rehabilitation Program for the next 12-years where CVWD plans to rehabilitated one reservoir per year.

WATER SERVICE RELIABILITY

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years.

Groundwater supplies within the Raymond Basin have remained stable throughout the recent drought during 2012 – 2016. As a result, groundwater production rights within the basin will continue to remains the same into the future until otherwise mandated for reduction by the Raymond Basin Management Board.

The completion of MWD's 2020 Integrated Water Resources Plan will be completed after the submission of CVWD's 2020 UWMP. Information on MWD's 2015 Integrated Water Resources Plan is still relevant to this day. The plan describes the core water resource strategy, which will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2025 through 2045. Furthermore, MWD's 2020 UWMP finds that MWD is able to meet full service demands of its member agencies with existing supplies from 2025 through 2045 during normal years, single dry year, and multiple dry years.

CVWD is therefore capable of meeting the water demands of its customers in normal, single dry, and multiple dry years between 2025 and 2045, as illustrated in **Table 3.13** to **Table 3.19**. CVWD has also conducted a Drought Risk Assessment as part of a new requirement for the 2020 UWMP which mandates water purveyors to assess their water demand and supplies within the next five years under drought situations. Based on the assessment, CVWD is able to meet their demands under drought situations from 2021 – 2025 without the need of the Water Shortage Contingency Plan's water supply augmentation or demand reductions as shown **Table 5.4** in **Section 5**; however, CVWD continues to promote water saving measures to its consumers to ensure reliability

of its supplies.

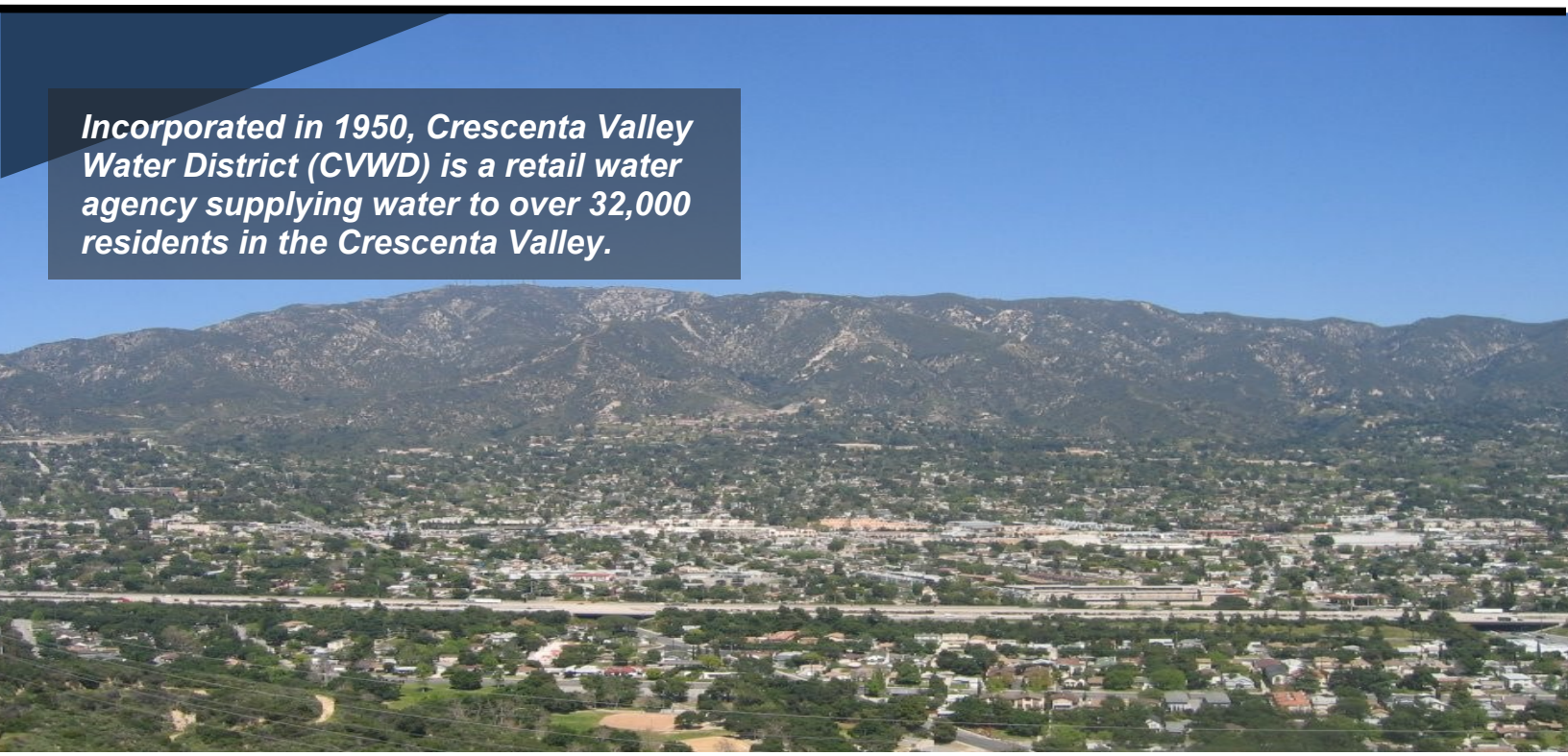
CHALLENGES AHEAD & STRATEGIES FOR MANAGING RELIABILITY RISKS

CVWD faces challenges in the near future regarding water supply include:

- Over the last decade, drastic changes in annual hydrologic conditions statewide have negatively affected water supplies available from the State Water Project (SWP) and the Colorado River Aqueduct (CRA).
- The declining ecosystem of the Bay-Delta has resulted in a reduction in water supply deliveries to State Water Contractors, including MWD.

CVWD's strategies for managing these reliability risks include:

- Continuing a progressive and effective water conservation program.
- Utilizing supplemental water through transfers and exchanges.
- Replacing deteriorating water infrastructure through a proactive capital improvement program, which will reduce water main leaks and conserve water.
- Implementing shortage response actions, as needed, under the Water Shortage Contingency Plan.
- Reactivating ground water wells impacted by water quality contaminants with the addition of treatment systems.



SECTION 1: INTRODUCTION

2020 URBAN WATER MANAGEMENT PLAN



SECTION 1 INTRODUCTION

1.1 UWMP PURPOSE & SUMMARY

This is the 2020 Urban Water Management Plan (UWMP) for Crescenta Valley Water District (CVWD). This plan has been prepared in compliance with the Urban Water Management Planning Act (Act), which has been codified as California Water Code (CWC) sections 10610 through 10657.

As part of the Act, the legislature declared that waters of the state are a limited and renewable resource subject to ever increasing demands; that the conservation and efficient use of urban water supplies are of statewide concern; that successful implementation of plans is best accomplished at the local level; that conservation and efficient use of water shall be actively pursued to protect both the people of the state and their water resources; that conservation and efficient use of urban water supplies shall be a guiding criterion in public decisions; and that urban water suppliers shall be required to develop water management plans to achieve conservation and efficient use.



Figure 1.1: UWMPs Comply with State Water Code

The UWMP Act requires "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually, to prepare and adopt, in accordance with prescribed requirements, an urban water management plan." These plans must be filed with the California Department of Water Resources (DWR) every five years and evaluate reasonable and practical efficient water uses, reclamation, and conservation activities (see generally Water Code § 10631).

1.2 PAST UPDATES TO THE UWMP ACT

The Act has been amended on several occasions since its initial passage in 1983. Of all the amendments, the most significant came in 2009 as a result of the requirements of Senate Bill 7 / Seventh Extraordinary Session. This is better known as the Water Conservation Act of 2009 (SBx7-7). The requirements of this bill state that per capita water use within an urban water supplier's service area must decrease by 20 percent by the year 2020 (20x2020) in order to receive grants or loans administered by DWR or other state agencies. The legislation sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020. The state was required to make incremental progress towards this goal by reducing per capita water use by at least 10 percent by December 31, 2015. In addition, each urban retail water supplier was required to develop water use targets by July 1, 2016. Effective 2021, urban retail water suppliers who do not meet the 2020 water conservation requirements established by this bill are not eligible for state water grants or loans. SBx7-7 substantially expanded the role of the UWMPs by requiring all urban retail water suppliers to develop baseline daily per capita water use data, urban water use targets, and other technical information, and to report all of the information in their 2010 UWMPs.

1.3 UPDATES TO THE UWMP ACT FOR 2020 UWMPS

There have not been any significant changes affecting the 2020 UWMPs on the level of SBx7-7; however, there are numerous minor to major updates to the UWMP Act affecting the 2020 UWMPs as follows:

- **Water Loss:** Quantify distribution system water loss for each of the five years preceding the plan update (CWC § 10631 (d) (3) (A), SB 1414, 2019)
- **Drought Risk Assessment:** Assess water supply reliability over a 5-year period examining water supplies, water uses, and the reasonable predicted water supply reliability for five consecutive dry years (CWC § 10635 (b), SB 606, 2018)
- **Reporting of Energy Intensity:** Provide information that the water supplier can readily obtain on the energy used to process water (CWC § 10631.2 (a), SB 606, 2018)
- **Lay Description:** Include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks (CWC § 10630.5, SB 606, 2018)
- **Climate Change Impacts and Considerations:** Provide details on the impacts of climate change and consider them into projections (CWC § 10630, SB 606, 2018)

- **Water Shortage Contingency Plan (WSCP):** The water shortage contingency analysis required in previous UWMPs by former law has been replaced by a WSCP mandate with new elements, which include new six standard water shortage levels (CWC § 10632, SB 606, 2018, AB 1414, 2019)
- **Seismic Risk Assessment and Mitigation Plan:** As part of the WSCP, water suppliers are required to assess seismic risks to their water system facilities and measures to mitigate those risks (CWC § 10632.5, SB 664, 2015)

Of the above, the inclusion of the WSCP (including the seismic risk assessment and mitigation plan as part of the WSCP) as a separate document with revised elements is the most significant update affecting the 2020 UWMPs. AB 1414, SB 606, and SB 664, which amended the WSCP, mark a continued focus on water shortage preparedness and pre-planned strategies for mitigating catastrophic service disruptions.

1.4 2020 UWMP SCOPE & FORMAT

1.4.1 SCOPE & TOPICS OF DISCUSSION

This UWMP provides DWR with information on the present and future water resources and demands and provides an assessment of the water resource needs of CVWD. Specifically, this document will provide water supply planning for a 25-year planning period in 5-year increments and effectively revises CVWD's 2015 UWMP. This plan will identify water supplies for existing and future demands, quantify water demands during normal year, single-dry year, and multiple-dry years, and identify supply reliability under the three hydrologic conditions. CVWD's 2020 UWMP update revises the 2015 UWMP. This document has been prepared in compliance with the requirements of the Act as amended in 2009, and includes the following topics:

- *Water Service Area and Facilities*
- *Water Sources and Supplies*
- *Water Use by Customer Type*
- *Energy Intensity*
- *Climate Change Impacts*
- *Demand Management Measures*
- *Water Supply Reliability*
- *Planned Water Supply Projects and Programs*
- *Water Shortage Contingency Plan*
- *Recycled Water*

With the passage of SBx7-7 in 2009, Demand Management Measures (DMMs) have become a critical component of an agency's UWMP.

The topics listed on the previous page are consistent with the 2015 UWMP with the additions of Climate Change Impacts and Energy Intensity. Furthermore, updates also include narratives related to the above topics reflecting current (2020) conditions. In addition, the incorporation of visual format changes, expansions of existing text, and addition of new sub-categories and/or new data enhance this 2020 UWMP and provide more benefit for CVWD.

1.4.2 SBX7-7 CONSERVATION UPDATES

As required in the 2015 UWMP, each urban retail water supplier must include in its 2020 UWMP the following information from its target-setting process:

- *Baseline daily per capita water use*
- *2020 Urban water use target*
- *2015 Interim water use target*
- *Compliance method being used along with calculation method and support data*
- *Updates on interim (2015) target*

Since the above information was already contained in the 2015 UWMP, an agency has the option of re-stating this information if it is the same from the 2015 UWMP or revising it if different for the 2020 UWMP.

Wholesale water suppliers, including CVWD's imported water supplier, Foothill Municipal Water District (FMWD), are required to include an assessment of present and proposed future measures, programs, and policies that would help CVWD achieve the 20x2020 goal.



Figure 1.2: SBx7-7 Aims to Protect Water Sources

1.4.3 FORMAT OF THE REPORT

The sections in this Plan correspond to the UWMP Act (Article 2, Contents of Plans, Sections 10631, 10632, and 10633). The sequence used for the required information, however, differs slightly in order to present information in a manner reflecting the unique characteristics of CVWD. The sections are shown on the following page.

Section 1 - Introduction	This section describes the UWMP Act, CVWD's planning and coordination process, the history of CVWD's water supply system, and a description of its service area.
Section 2 – Water Demands	This section describes past, current, and projected future water demands within CVWD's service area, as well as factors that affect demand, including climate and population demographics. This chapter also discusses the requirements of the Water Conservation Act of 2009 (SBx7-7). This section also looks at climate change impacts to water demands and projections.
Section 3 – Water Sources & Supplies	This section describes CVWD's water supplies, including imported water from MWD, and how CVWD handles those supplies. This section also discusses the quality of CVWD's water sources, including a discussion on the treatment and testing of water.
Section 4 – Demand Management Measures	This section addresses CVWD's compliance with the current Best Management Practices (BMPs), otherwise known as Demand Management Measures (DMMs).
Section 5 – Water Shortage Contingency Plan	This section describes CVWD's contingency planning in the event of a water supply interruption, such as a drought or catastrophe. This section also discusses CVWD's Board adopted Conservation Plan (adopted in 2009) and MWD's latest version of the Water Surplus and Drought Management Plan (WSDM).
Section 6 – Recycled Water	This chapter describes past, current, and projected recycled water use, along with a description of wastewater collection and treatment facilities.
Section 7 – Future Water Supply Projects & Programs	This section discusses planned and potential future water supplies and programs, including new supply sources, transfers and exchanges, and the feasibility of such supplies and programs.
Section 8 – Plan Adoption Process	This Section describes CVWD's planning and coordination process for the 2020 UWMP, including public and outside agency participation, and Board adoption.
Appendices	The appendices contain references, supplemental information, and specific documents relating to CVWD, used to prepare this 2020 UWMP.

1.5 AGENCY OVERVIEW

The Crescenta Valley Water District was formed as the Crescenta Valley County Water District on December 14, 1950 by the vote of local residents. Organized under the provisions of Division 12 of the CWC, CVWD operates as a political subdivision of the state. The term "County" was officially deleted from CVWD's name in 1996.

In the early 1950's, the newly-formed CVWD purchased the assets and consolidated the infrastructure of several small private water companies then in existence. By 1953, with rapid growth in the Crescenta Valley and surrounding foothill communities, it became

apparent that the local groundwater supply was not going to be sufficient to meet the increasing demand. Residents from La Crescenta to Altadena voted to form the Foothill Municipal Water District (FMWD) to purchase and distribute imported water from the Metropolitan Water District of Southern California (MWD). By 1955, CVWD was augmenting its local well water with MWD water from the Colorado River. In the 1960's, MWD increased it supply by also contracting for Northern California water with the completion of the State Water Project.

The Verdugo Basin is one of four groundwater subbasins within the Upper Los Angeles River Area (ULARA), with the San Fernando Basin being the largest. The ground water rights of CVWD are defined by the Judgement in Superior Court Case No. 650079, entitled "The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et. al., Defendants" and the final Judgment was signed on January 26, 1979. The judgement also established a court-appointed position of Watermaster, which oversees parties' extraction and parties' rights to native groundwater, imported return water, and stored waters in the ULARA groundwater basins.

The Judgement states that Glendale and CVWD have appropriative and prescriptive rights to extract 3,856 and 3,294 acre-feet of groundwater per year, respectively, from Verdugo Basin and there are no provisions in the Judgment to allow for stored water credits in the Verdugo Basin.

CVWD has a 5-member Board of Directors who are elected at-large and participate in the management of CVWD. The current members of the Board of Directors are listed below with their Committees:

- **Sharon Raghavachary – President**
  Chair of Engineering Committee and Finance Committee
- **James Bodnar – Vice President**
  Chair of Employee Relations Committee
- **Kerry Erickson – Board Director**
  Chair of Community Relations & Water Conservation Committee & Technology Committee
- **Ken Putnam – Board Director**
  Chair of Policy Committee
- **Judy Tejeda – Board Director**
  Chair of Emergency Planning Committee

1.5.1 CVWD VALUES

CVWD is dedicated to providing high quality water and wastewater services in partnership with the family of Southern California water agencies. CVWD values:

- *Excellent Customer Service*
- *Fiscal Responsibility*
- *Dedicated Employees*
- *Reliable Water and Sewer Facilities*
- *Community Involvement*
- *Water Conservation*
- *Technology and Innovation*
- *Environmental Sensitivity*

1.6 SERVICE AREA AND FACILITIES

1.6.1 SERVICE AREA DESCRIPTION

CVWD's service area is located in the Crescenta Valley area of Los Angeles County in the foothills of the San Gabriel Mountains, between the San Fernando and San Gabriel valleys. CVWD provides water distribution and sewage collection within its four-square mile service area boundaries to the unincorporated communities of La Crescenta, Montrose, and Verdugo City as well as a small portion of the City of Glendale and City of La Cañada-Flintridge. The service area ranges in elevation from approximately 1,200 feet to almost 3,000 feet above sea level due to its location next to the San Gabriel Mountains and sloping terrain. **Figure 1.3** on the following page shows CVWD's service boundaries.

CVWD currently provides water to over 8,200 accounts representing a population of 32,462. Customer growth is low as the Crescenta Valley area is nearly built-out. Residential growth is occurring through increased housing density in the multiple-unit zoned areas (primarily Montrose) as well as limited in-fill housing developments on random parcels in La Crescenta.

1.6.2 CVWD'S WATER FACILITIES

CVWD's water sources are 12 local groundwater wells, with an average depth of 200 feet, one mountain tunnel (gravity fed), and imported water supply through three separate FMWD connections and emergency inter-tie system with the City of Glendale. On a long-term basis, approximately 48 percent of CVWD's annual water demand is met by the local groundwater supply and 52 percent by imported water. This ratio does change depending on the water supply conditions, weather, and demand. CVWD operates 11 separate water pressure zones served by 14 pumping stations and 17 storage reservoirs totaling 17.5 million gallons.

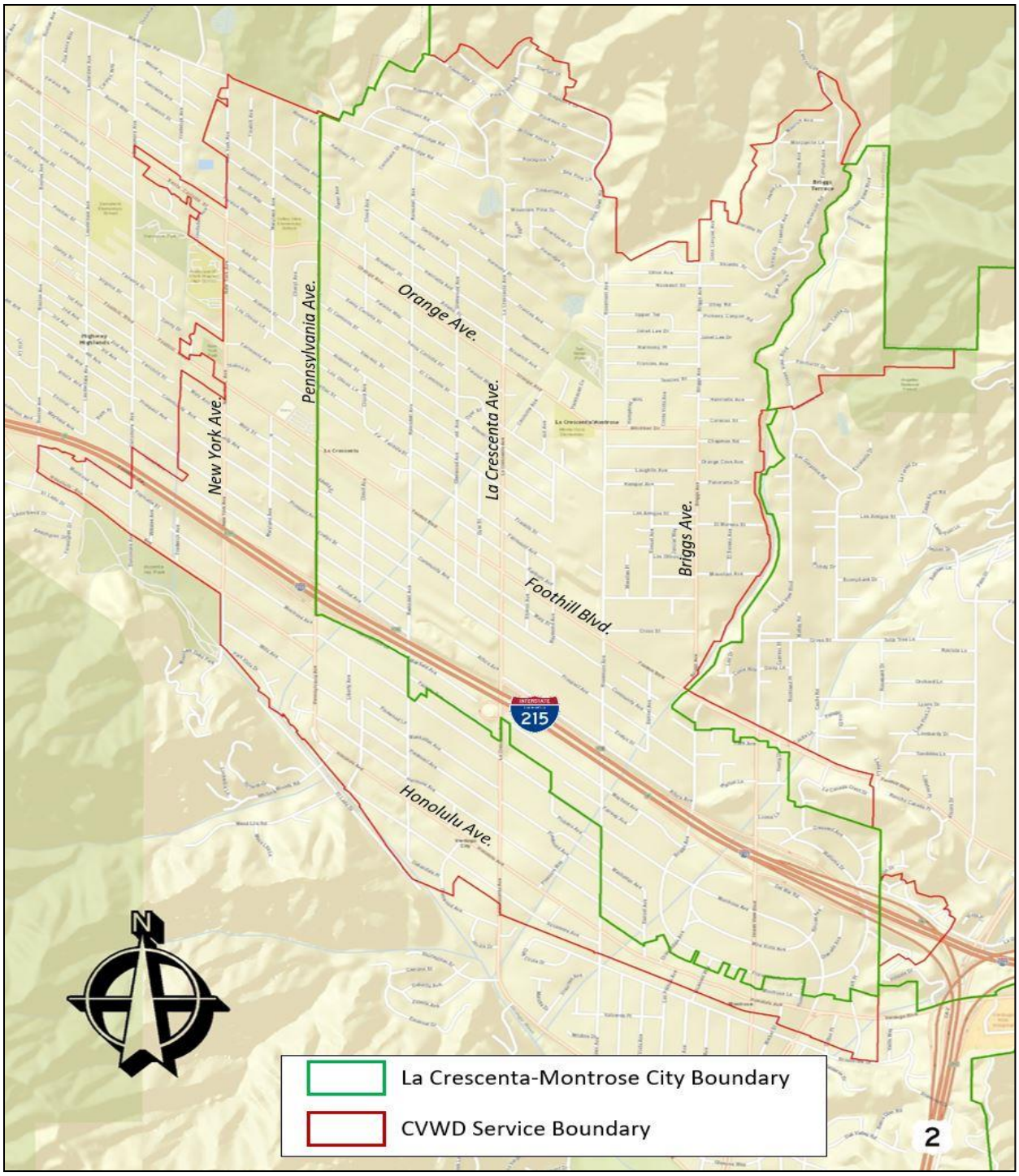


Figure 1.3: CVWD's Service Boundaries



Approximately 79 percent of CVWD's water demand is residential; only 6 percent of the demand is attributed to the Commercial/Industrial/Institutional category.

SECTION 2: WATER DEMANDS

2020 URBAN WATER MANAGEMENT PLAN



SECTION 2 WATER DEMAND

2.1 OVERVIEW

Water use within CVWD's service area includes residential potable use, landscape irrigation use, commercial and institutional uses, and of course water losses. Water use is variable and depends on a number of factors which include seasonal climate changes, demographic shifts, changes in land use or redevelopment, and of course legislation. Since CVWD's service area is largely residential, changes in residential plumbing fixtures and customer usage habits can significantly affect water usage. CVWD is able to meet its demands with a blend of groundwater and imported water.

This section explores the water usage trends within CVWD's service area and quantifies total usage per customer class. In addition, the provisions of SBx7-7 are explored in detail.

2.2 FACTORS AFFECTING DEMAND

Water consumption is influenced by many factors including climate characteristics of the hydrologic region, demographics (including social and economic demographics), land use characteristics, and economics. The key factors affecting water demand in CVWD's service area are discussed in the following sub-sections.

2.2.1 CLIMATE

CVWD has a Mediterranean climate, with a "foothill" characteristic. Summers are warm to hot, and dry while winters are cool and have an annual historical average precipitation of approximately 22.9 inches. Another feature of this foothill Mediterranean climate is the frequency of high-velocity, low-humidity, northeasterly winds in the fall and early winter. Therefore, CVWD is highly prone to wildfire danger during these periods. Adequate storage of reservoir water supply is deemed critical by the local fire jurisdictions. **Figure 2.1** shows the historical average rainfall for CVWD from 1963 to 2020.

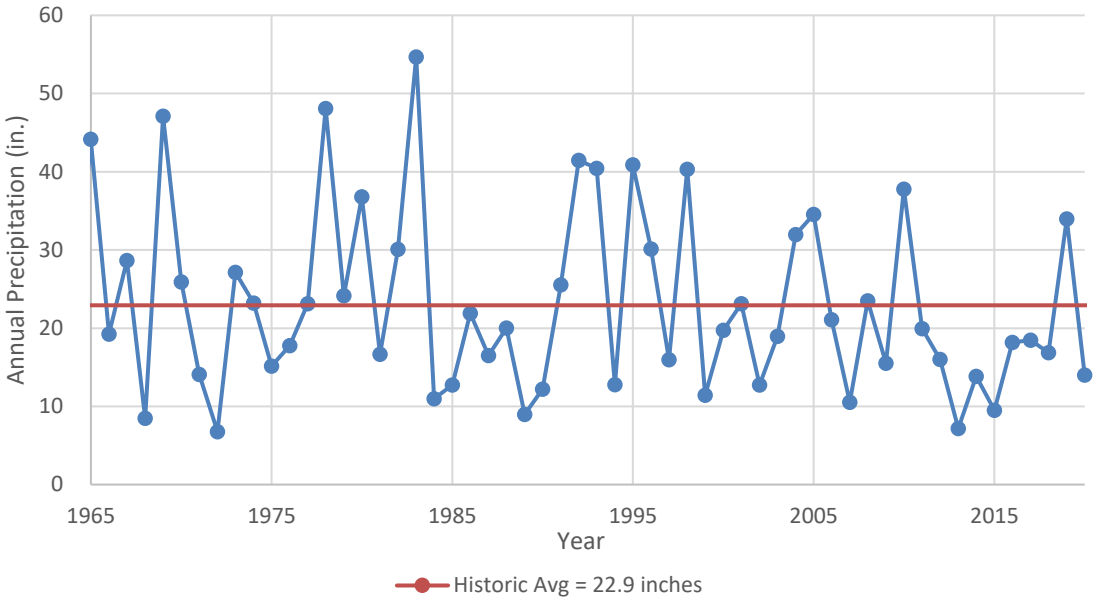


Figure 2.1: Historic Rainfall for CVWD

The sources of CVWD's imported water supplies, the State Water Project (SWP) and Colorado River Aqueduct (CRA), are influenced by weather conditions in Northern California and along the Colorado River Basin region. Both regions have recently been suffering from multi-year drought conditions and record low rainfalls which directly impact demands and supplies to CVWD and Southern California.

Climate fluctuations not only can increase or decrease demand, but can also directly affect CVWD's ratio of groundwater to imported water, since reduced precipitation and snowfall means less groundwater replenishment. When groundwater supplies are reduced, CVWD purchases more imported water.



Figure 2.2: Snowfall on San Gabriel Mountains

CLIMATE CHANGE

The rise of anthropogenic activities producing carbon dioxide in the world has changed the earth's climate by emitting greenhouse gasses responsible for global warming. This has resulted in extreme weather events occurring more frequently. The severity and frequency of climate change impacts on temperature and precipitation patterns can be difficult to forecast due to dramatic shifts in weather patterns as a result of increased concentrations

of carbon dioxide in the atmosphere. While the precise timing, severity, and regional impacts of these temperature and precipitation changes are uncertain, climate researchers have identified several important issues of concern for water planners in California. The climate change impacts of concern are as follows:

Temperature Increases	• More winter precipitation falling as rain rather than snow, leading to reduced snowpack water storage, reduced long term soil humidity, reduced groundwater and downstream flows, and reduced imported water deliveries • Higher irrigation demands as temperatures alter evapotranspiration rates, and growing seasons become longer • Exacerbated water quality issues associated with dissolved oxygen levels, increased algal blooms, and increased concentrations of salinity and other constituents • Impacted habitats for temperature-sensitive fish and other life forms, and increased susceptibility of aquatic habitats to eutrophication
Precipitation Pattern Changes	• Increased flooding (both coastal and inland) caused by more intense storms • Changes to growth and life cycle patterns caused by shifting weather patterns • Threats to soil permeability, adding to increased flood threat and decreased water availability • Reduced water supply caused by the inability to capture precipitation from more intense storms, and a projected progressive reduction in average annual runoff (though some models suggest that there may be some offset from tropical moisture patterns increasingly moving northward) • Increased turbidity caused by more extreme storm events, leading to increased water treatment needs and impacts to habitat • Increased wildfires with less frequent, but more intense rainfall, and possibly differently timed rainfall through the year, potentially resulting in vegetation cover changes • Reduction in hydropower generation potential
Sea Level Rise	• Inundation and erosion of coastal areas (coastal bluffs in particular), including coastal infrastructure • Saline intrusion of coastal aquifers • Increased risk of storm surges and coastal flooding and erosion during and after storms • Changes in near-shore protective biogeography such as loss of sand, tide pools, wetlands, and kelp beds

Although the extent of these changes is uncertain, CVWD is already planning ahead to ensure long lasting reliability of its source for their customers.

2.2.2 DEMOGRAPHICS

The population within CVWD's service area is expected to increase by 8 percent in the next 25 years, or 0.3 percent annually. **Table 2.1** shows the current and projected population for the next 25 years.

Table 2.1: Population – Current and Projected (DWR Table 3-1 Retail)

Year	2020	2025	2030	2035	2040	2045
Service Area Population	32,462	32,974	33,494	34,022	34,558	35,103

The service area populations for CVWD was determined using the DWR Population Tool ("WUE"), which uses the service boundaries, US Census data, and number of residential service connections. The tool calculates population by using past US Census data and service connections to obtain persons per connection. Using the persons per connection and current count on service connections would provide the current service population. Future service population can be projected based on the average growth factor.

There is no industry in CVWD's service area and there are less than 5 percent commercial or institutional accounts. CVWD does not anticipate any significant increases in employment for the area based on the land availability and the zoning. Densification will occur as single-family lots are converted to multi-family dwellings where it is allowed by zoning classification and the governing agency.

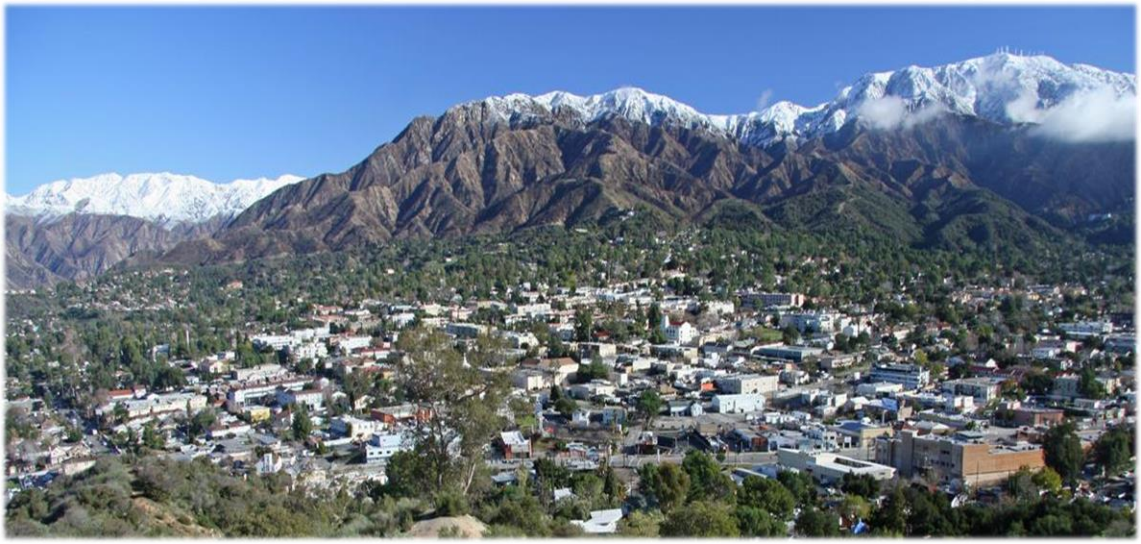


Figure 2.3: Land Use within CVWD's Service Area

2.2.3 LAND USE

Land use in the service area is primarily residential with two commercial/business corridors along Foothill Boulevard and Honolulu Avenue. Of the residential service, some of the area south of Foothill Boulevard continues to be converted over time to multi-family units as zoning permits. There are no industrial or agricultural water users within CVWD, and institutional users are limited to schools, churches, parks, and freeway landscaping.

CVWD currently provides water service to over 8,000 accounts and wastewater collection service to over 6,000 accounts. CVWD's service area is for the most part built-out with densification accomplished through single-family lot splits and conversion of single-family to multi-family dwelling units.

2.2.4 LEGISLATION

The passage of SBx7-7, discussed in **Section 2.4**, has increased efforts to reduce the use of potable supplies in the future. As a retailer, CVWD has provided an assessment of its present and proposed future measures, programs, and policies to help its service area achieve the water use reductions.

Substantial water reductions can be gained by proper landscape design, installation, and maintenance. To improve water savings in this sector, DWR has updated the State Model Water Efficient Landscape Ordinance (MWELO) for cities and counties per Governor Brown's Executive Order B-29-15. MWELO promotes efficient landscapes in new developments and retrofitted landscapes.

The revised MWELO increases water use efficiency standards for new and retrofitted landscapes through more efficient irrigation systems, greywater usage, onsite storm water capture, and by limiting the portion of landscapes which can be covered in turf. It also required reporting by cities and counties on the implementation and enforcement of local ordinances, with required annual implementation reports due by January 31 for the previous year.

2.3 WATER USE WITHIN CVWD'S SERVICE AREA

The knowledge of an agency's water consumption by type of use or by customer class is key to developing that agency's water use profile which identifies when, where, and how much water is used, and by whom within the agency's service area. A comprehensive water

use profile is critical to the assessment of impacts of prior water conservation efforts as well as to the development of future conservation programs.

This section provides an overview of CVWD's water consumption by customer class from 2016 to 2020. The customer classes are categorized as follows: single-family residential, multi-family residential, commercial/industrial/institutional (CII), and dedicated landscape, and fire services. Non-revenue water is discussed later in this section.

2.3.1 HISTORIC WATER DEMAND

Water demands within the CVWD's service area over the past six years were met by groundwater from the Verdugo Groundwater Basin (Basin) and imported water from FMWD. Annual water use since 2015 has ranged from about 3,647 AF to 4,174 AF (average 3,843 acre-feet per year (AFY)) as shown below in **Table 2.2**. As indicated by the table, annual water use fluctuates each year.

Table 2.2: Six-Year Historic Total Water Demand (AF)

Year	2015	2016	2017	2018	2019	2020
Demand	3,647	3,775	3,917	3,884	3,7774	4,216

2.3.2 WATER USE STATISTICS

CVWD maintains records of water consumption and bills its customers on a bi-monthly basis for water and sewer service. Approximately 80 percent of CVWD's water demand is residential. CII sectors account for approximately under 7 percent of CVWD's potable water supply. The remaining portion of CVWD's demand pertains to fire service and irrigation purposes. CVWD does not provide any sales to agriculture, nor other agencies, saline water intrusion barriers, groundwater recharge, or conjunctive use. Unaccounted for water consists of water losses due to leakage or inaccurate water meters. Water loss calculation was done in accordance with CWC 10631(e)(3)(B). The total number of service connections and water consumption is shown in **Tables 2.3** and **2.4**, respectively.

Table 2.3: 2015 & 2020 Service Accounts by Sector

Sector	2015	2020
Single-Family Residential	6,777	6,955
Multi-Family Residential	695	688
Commercial/Institutional	408	413
Landscape Irrigation	68	81
Fire	102	107
Total Connections:	**8,050**	**8,244**

Table 2.4: 2020 Water Demand by Sector (AF) (DWR Table 4-1 Retail)

Use Type	2020 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Single Family		Drinking Water	2,490
Multi-Family		Drinking Water	836
Commercial	w/ Institutional	Drinking Water	279
Landscape		Drinking Water	234
Losses		Drinking Water	376
		TOTAL	4,216

2.4 WATER CONSERVATION ACT

2.4.1 SBX7-7 BACKGROUND

Due to the limited amount of water allowed to be pumped in the San Joaquin Delta, the CA Legislature drafted the Water Conservation Act of 2009 (SBx7-7) to protect statewide water sources. The legislation called for a 20 percent reduction in water use in California by the year 2020. The legislation amended the Water Code to call for 2015 and 2020 water use targets in the 2010 UWMPs, updates or revisions to these targets in the 2015 and 2020 UWMPs, and allows DWR to enforce compliance to the new water use standards. In essence, the bill requires each urban retail water supplier to develop urban water use targets to help meet the 20 percent goal by 2020 and an interim 10 percent goal by 2015.

The bill establishes methods for urban retail water suppliers to determine their targets to help achieve statewide water reduction targets, which may or may not be a strict 20 percent level. The retail water supplier must select one of the four target-setting methods as described in **Section 2.4.3**. The retail agency may also choose to comply with SBx7-7 as an individual or as a region in collaboration with other water suppliers. Under the regional compliance option, the retail water supplier is mandated to report the water use target for its individual service area. The bill also includes reporting requirements in the 2010, 2015, and 2020 UWMPs. Beginning in 2016, failure to comply with interim and final targets makes a retail agency ineligible for grants and loans from the state needed to attain water self-sufficiency by 2020; however, if an agency which is not in compliance documents a plan and obtains funding approval to come into compliance, it could then become eligible for grants or loans.

Wholesale water suppliers, including FMWD, are not required to determine baseline daily per capita water use, urban water use target, interim urban water use target, or compliance daily per capita water use. Instead, wholesale water suppliers are required to include in their UWMPs discussions of programs they intend to implement to support the retail water suppliers, such as CVWD, in attaining their reduction goals and targets.



Figure 2.4: CVWD's Water Conservation Efforts Include Drought Tolerant Landscape

2.4.2 SBX7-7 PROVISIONS

In addition to an overall statewide 20 percent water use reduction, the objective of SBx7-7 is to reduce water use within each hydrologic region in accordance with the agricultural and urban water needs of each region. Currently, DWR recognizes 10 separate hydrologic regions in California as shown in **Figure 2.5.** Each hydrologic region has been established for planning purposes and corresponds to the State's major drainage areas. CVWD is located in the South Coast Hydrologic Region (HR), which includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. The South Coast HR is shown in **Figure 2.6**.

Per capita water use, measured in gallons per capita per day (GPCD), in the South Coast HR varies between different water agencies, depending on the geographic and economic conditions of the agency's service area. The South Coast HR has an overall baseline per capita water use of 180 GPCD and DWR has established a regional target of 149 GPCD for the region as a compliance target to satisfy SBx7-7 legislation.



Figure 2.5: California's 2020 Water Conservation Goals



Figure 2.6: South Coast Hydrologic Region

2.4.3 SBX7-7 COMPLIANCE OPTIONS

DWR has established four compliance methods for urban retail water suppliers to choose from. Each supplier is required to adopt one of the four methods to comply with SBx7-7 requirements. The four options are shown in **Table 2.5** to the right.

These options were established in order to avoid placing any undue hardship on water agencies that have already been implementing water conservation measures. The basic procedure for determining the applicable water reduction target is illustrated by **Figure 2.7**. If an agency's 10-year baseline is slightly higher than the Hydrologic Region's target, that agency still must achieve a five percent reduction from its 5-year baseline. If an agency has a per capita water use of 100 GPCD or less, that agency will not have to adhere to any reduction targets as that agency is already considered water efficient.

Table 2.5: DWR Compliance Methods

Methods	Description
Method 1	A strict 20 percent reduction from the baseline by 2020 and 10 percent by 2015
Method 2	A budget-based approach by requiring an agency to achieve a performance standard based on three metrics: ○ Residential indoor water use of 55 GPCD ○ Landscape water use commiserate with a Model Landscape Ordinance ○ 10 percent reduction in baseline CII water
Method 3	Requires achievement of 95 percent of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan
Method 4	Requires the subtraction of Total Savings from the Base GPCD: ○ Total Savings includes indoor residential savings, meter savings, CII savings, and landscape and water loss savings

2.4.4 CVWD'S COMPLIANCE OPTION SELECTION

To satisfy the provisions of SBx7-7, CVWD previously established a per capita water use target for the year 2020 as well as an interim target (2015). DWR provided guidelines for determining these targets in its *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* (released 2010; revised 2011 and 2016) and also in the 2015 and 2020 UWMP Guidebooks. The *Methodologies* guidebook made provisions that allowed a water supplier to meet the target requirements by achieving any one of a number

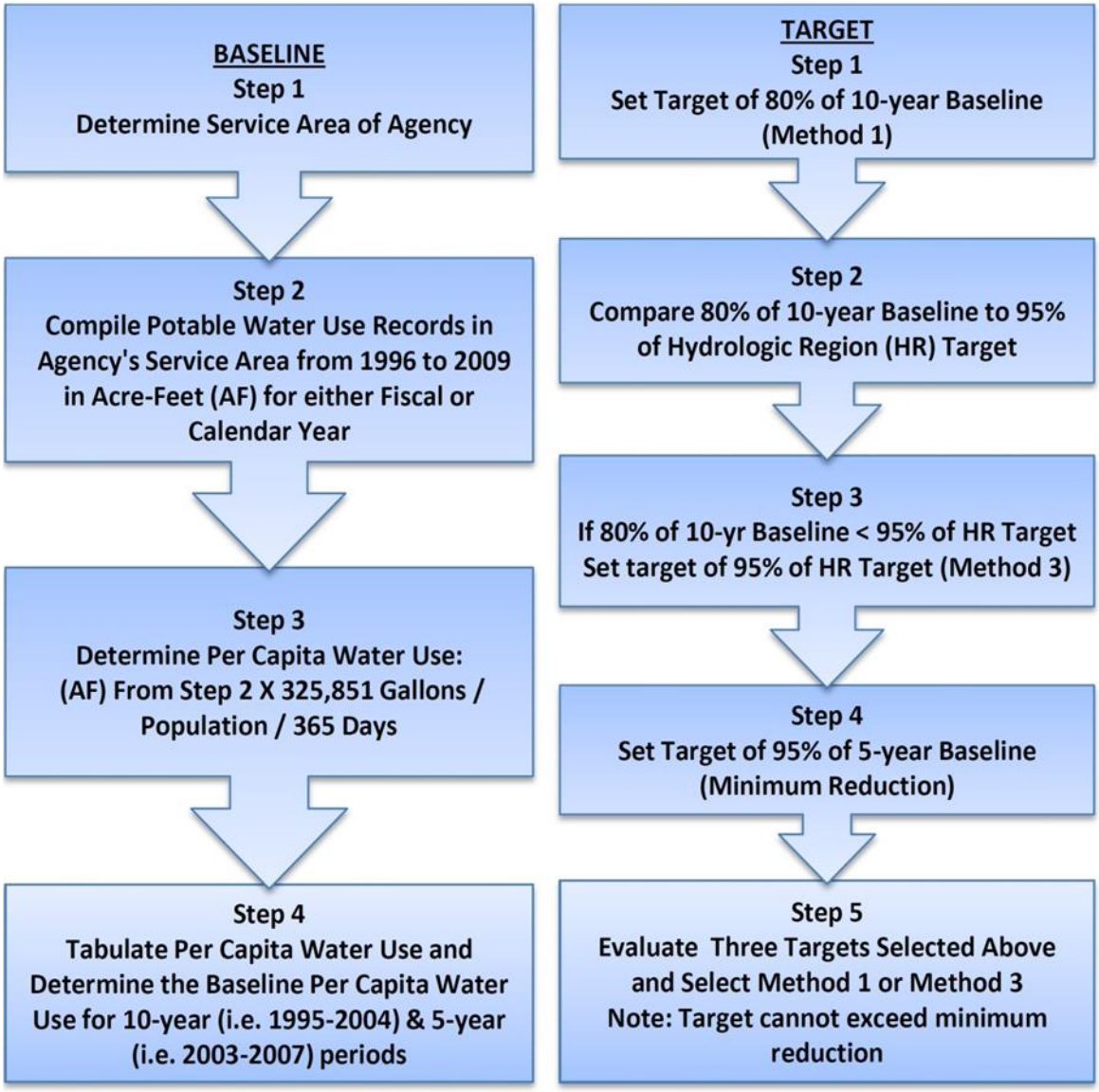


Figure 2.7: Procedures for Determining Baseline & Targets

of target requirements, provided that the water supplier's per capita water use is low enough relative to the region within which it supplies water. The basic options included a minimum reduction requirement of 5 percent (Water Code § 10620), a 5 percent reduction from the Regional (South Coast HR) target (Water Code § 10608.20 (b) (3)), or a strict 20 percent reduction.

While each retail agency was required to choose a compliance option in 2010, DWR allowed for the agency to change its compliance option in 2015, and again in 2020. This will allow CVWD to determine its water use targets for Compliance Options 2 and 4 since CVWD anticipates more data to be available for target calculation in the future.

The first step to calculating an agency's water use target is to determine its base daily-per-capita water use (baseline water use). This baseline water use is essentially the agency's gross water use divided by its service area population, reported in GPCD. Gross water use is defined as volume into the distribution system while deducting any recycled water for direct use during a 10-year period. The baseline water use is calculated as a continuous 10-year average during a period which ends no earlier than December 31, 2004 and no later than December 31, 2010. Agencies for which recycled water made up 10 percent or more of 2008 retail water delivery can use up to a 15-year average for the calculation. The base period must end no earlier than December 31, 2007, and no later than December 31, 2010.

2.4.5 BASELINE WATER USE

Since CVWD does not use recycled water, a 10-year instead of a 15-year rolling average was calculated. CVWD's baseline water use is **160.1 GPCD**, which was obtained from the 10-year period January 1, 1996 to December 31, 2005.

Table 2.6 provides the base period ranges used to calculate the baseline water use for CVWD as well as the service area population and annual water use data from the base daily per capita water use. The data was used to calculate the continuous 10-year and 5-year average baseline. Moreover, regardless of the compliance method adopted by CVWD, it will need to meet the minimum water use target of 5 percent reduction from a five-year baseline as calculated. Values for 1996 to 2007 are from the 2010 UWMP.

Table 2.6: Past GPCD Water Use

Calendar Year	Service Area Population	Gross Water use (AF)	Daily Per Capita Water use (GPCD)
1996	30,390	5,277	155.0
1997	30,475	5,497	161.0
1998	30,560	5,076	148.3
1999	30,645	5,608	163.4
2000	30,731	5,717	166.0
2001	30,817	5,635	163.0
2002	30,903	5,792	167.0
2003	30,989	5,724	164.7
2004	31,075	5,726	165.2
2005	31,162	5,327	152.6
2006	31,249	5,463	156.8
2007	31,336	5,525	155.2
10-Year Average (1996-2005) Base Daily per Capita Water Use:			**160.1**
5-Year Average (2003-2007) Base Daily per Capita Water Use:			**159.1**

2.4.6 SBX7-7 WATER USE TARGETS

In its 2010 UWMP, CVWD selected compliance **Option 3**. Under Compliance Option 3, CVWD chose to achieve 95 percent of the State's hydrologic region target of 141.6 GPCD by 2020; however, the minimum required calendar year target calculated from the five-year base daily GPCD found in **Table 2.7** comes to 151.1 GPCD in 2020. Therefore, under Option 3, CVWD's 2015 interim water use target is 151 GPCD, and the 2020 final water use target is **142 GPCD** as summarized in **Table 2.7**.

Table 2.7: Preferred Compliance Option & Water Use Targets

Option 3	Baseline	2015 Target	2020 Target
95% of State Hydrologic Region Targets	160	151	142

Table 2.8 below shows the CVWD's GPCD since 2015. As shown, CVWD's 2015 GPCD was **100.5** which is well below their 2015 and 2020 Targets. Furthermore, CVWD met their 2020 Target by achieving a GPCD of **115.9**.

Table 2.8: CVWD's Recent GPCD (2015 - 2020)

Calendar Year	Service Area Population	Gross Water use (AF)	Daily Per Capita Water use (GPCD)
2015	32,385	3,647	100.5
2016	32,400	3,775	104.0
2017	32,416	3,917	107.9
2018	32,431	3,884	106.9
2019	32,447	3,774	103.8
2020	32,462	4,216	115.9

2.4.7 WATER DEMAND IMPACTS FROM COVID-19 PANDEMIC & 2020 SBx7-7 COMPLIANCE

DWR recognizes that extraordinary events may have an impact towards water demands. On March 4, 2020, Governor Newsom proclaimed a state of emergency for the entire state due to the spread of COVID-19. Following Governor Newsom's statement, Los Angeles County also declared a state of emergency the same day. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. As a result, on March 19, 2020, an Executive Order and Public Health Order directed all Californians to stay home except to go to an essential job or to shop for essential needs. This also required most Californians to work remotely from home.

This event resulted in a significant increase to water demands for various water agencies, including CVWD. As shown in Table 2.7, the gross water use in 2020 is significantly higher than the past years averages. In 2020, the water usage was 4,216 AF and the average from 2015 to 2019 was 3,800 AF.

DWR allows water purveyors to make adjustments to their 2020 Gross Water Use in the event of usual events considered as Extraordinary Events, Economic Adjustment, or Weather Normalization; however, according to Section 5.5.1.4 of 2020 UWMP Guidebook, adjustments for COVID-19 are not allowed. This impact resulted in no issues for CVWD to achieve their 2020 targets as shown in **Table 2.9**.

Table 2.9: CVWD 2020 Compliance (DWR Table 5-2 Retail)

2020 GPCD			2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD	2020 TOTAL Adjustments	Adjusted 2020 GPCD		
116	*0*	*0*	*142*	*Yes*

2.5 WATER USE REDUCTION PLAN

2.5.1 ON-GOING WATER CONSERVATION EFFORTS

In order to remain below the SBx7-7 targets, CVWD will continue to implement the water use efficiency measures described in **Section 4** of this UWMP and continue to participate in water use efficiency programs offered by MWD rebate programs for its retail agencies. Because residential homes are the largest water use sector in the region, the focus of water conservation efforts will continue to be residential rebate programs and public outreach programs. Single family residential homes and some large landscapes are common in the CVWD area.

In addition to the SBx7-7 provisions, agencies also sought to manage the provisions of Governor Brown's Executive Order B-29-2015. Governor Brown granted this Executive Order in April 2015 that mandated a statewide 25 percent reduction in water use through February 28, 2016, as compared to the amount used in 2013. This executive order helped to further the goals of SBx7-7. Even after the strict 25 percent reduction was lifted, Californians continued to save water, with cumulative water use savings of about 22 percent between June 2015 and January 2017. As Governor Brown ended the drought state



Figure 2.8: SBx7-7 Seeks to Preserve the Waters of the Bay-Delta

of emergency in most of California in April 2017 with Executive Order B-40-17, state agencies released a long-term plan that advanced measures to better prepare the state for future droughts and make conservation a California way of life.

Through financial incentive programs and various public outreach campaigns and events, CVWD has met its SBx7-7 target as shown previously on **Table 2.9**.

2.5.2 FUTURE MWD PROGRAMS

OVERVIEW

In 2016, MWD, in collaboration with its member agencies, released the 2015 Update to the Integrated Water Resources Plan (IRP). The inaugural IRP was adopted in 1996, with previous updates in 2004 and 2010. The 2015 Update continues to assess and address how MWD plans to adapt to the changing conditions facing Southern California. The goals of the 2015 IRP include:

- **Maintain Colorado River Aqueduct Supplies:** Develop programs to ensure that a minimum of 900,000 AF is available when needed, with access to 1.2 million acre-feet (MAF) in dry years.

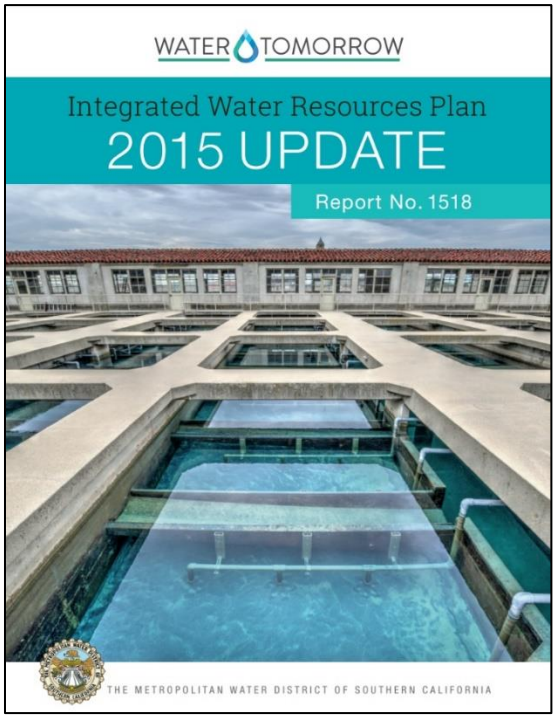


Figure 2.9: MWD's 2015 Integrated Water Resources Plan

- **Stabilize State Water Project Supplies:** Manage SWP supplies in compliance with regulatory restrictions in the near-term for an average of 980,000 AF of SWP supplies. Pursue a successful outcome in the Delta Conveyance Plan and California EcoRestore efforts for long-term average supplies of about 1.2 MAF.
- **Achieve Additional Conservation Savings:** Pursue further water conservation savings of 485,000 AF annually by 2040 through increased emphasis on outdoor water-use efficiency using incentives, outreach/education and other programs.
- **Develop Additional Local Water Supplies:** Develop 230,000 AF of additional local supplies produced by existing and future projects. The region would reach a target of 2.4 MAF by 2040, a key to providing water supply reliability into the future.
- **Maximize the Effectiveness of Storage & Transfer:** Develop a comprehensive strategy to pursue transfers and exchanges to hedge against shorter-term water demands and supplies imbalances until long-term solutions are in place.
- **Encourage Innovation:** Facilitate innovation in recycled water, desalination, stormwater capture and groundwater cleanup through a growing portfolio of initiatives, technologies and new ideas.

MWD is in the process of updating its IRP once again but that process will not be completed until after this UWMP is submitted.

2.6 DEMAND PROJECTIONS

2.6.1 25 YEAR PROJECTIONS

One of the main objectives of this UWMP is to provide CVWD's future water demand outlook. **Tables 2.10** and **2.11** project future demands based on water sector over the next 25 years. Demand projections were determined using 107.7 GPCD, based on the past five-year average and projection population growth. Per capita consumption rates should be expected to remain under 107.7 GPCD and trend further below that rate to continue water conservation efforts to combat climate change. It is important to note that CVWD does not utilize recycled water within its service boundaries. This is further discussed in **Section 6**.

Table 2.10: CVWD's Demand Projections by Sector (AF) (DWR Table 4-2 Retail)

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family		2,350	2,387	2,425	2,463	2,502
Multi-Family		789	802	814	827	840
Commercial	w/ Institutional	263	267	271	276	280
Landscape		221	225	228	232	235
Losses		355	361	366	372	378
TOTAL		**3,979**	**4,041**	**4,105**	**4,170**	**4,236**

Table 2.11: CVWD Total Water Demands (AF) (DWR Table 4-3 Retail)

	2020	2025	2030	2035	2040	2045
Potable Water, Raw, Other Non-potable	4,216	3,979	4,041	4,105	4,170	4,236
Recycled Water Demand	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage						
TOTAL WATER USE	4,216	3,979	4,041	4,105	4,170	4,236

2.6.2 LOW-INCOME HOUSEHOLD PROJECTIONS

One significant change to the UWMP Act since 2005 is the requirement for retail water suppliers to develop water use projections for "low-income" households at the single-family and multi-family level. These projections assist retail suppliers with compliance with Section 65589.7 of the Government Code, which requires suppliers to grant a priority for the provision of service to low-income households. Consistent with this Code section, a low-income household is defined as a household earning 80 percent or less of the area's median income.

The 2010 UWMP utilized the Regional Housing Needs Assessment (RHNA) or Regional Housing Needs Plan information to obtain a percentage of low-income households within an area. The information was developed by the Local Council of Governments, in

coordination with the California Department of Housing and Community Development. The RHNA plan lists every city within the Southern California region and provides percentages of very low- and low-income households. The area CVWD main serves is La Crescenta-Montrose, an unincorporated area and a census-designated place.

Existing and projected housing needs for Los Angeles County were incorporated into the most recent RHNA Subcommittee's report titled 6th Cycle Final RHNA Allocation Plan of the Southern California Association of Governments (SCAG). This plan covers the planning period from October 2021 to October 2029. Based on the RHNA plan, the percentage of very low- and low-income households combined was 43.7 percent within unincorporated areas. This value is not a valid representation and will not be used.

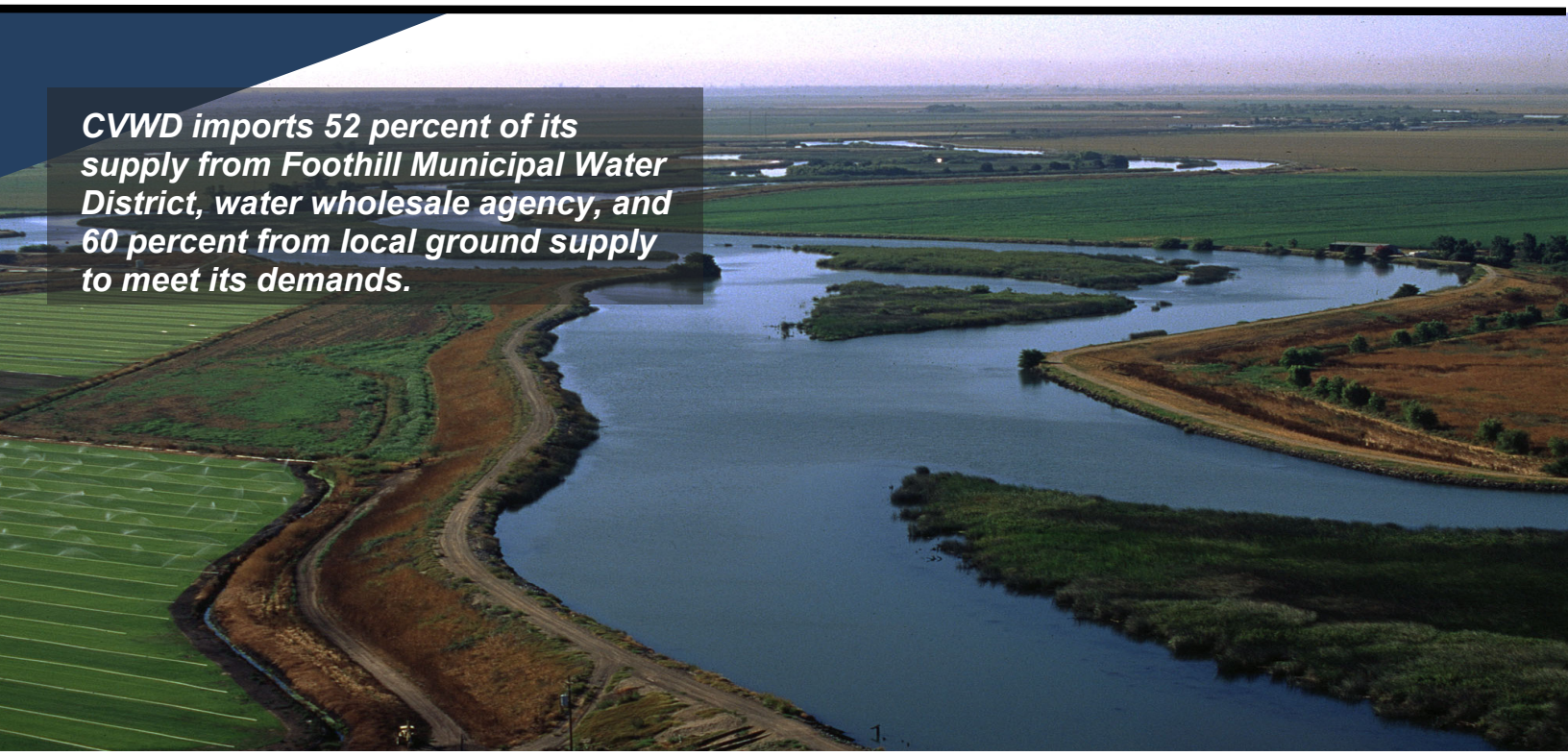
Instead, a percentage was obtained from records from the US Census Bureau. It provides information regarding the breakdown of households per income range and the percentages for each range. Based on their latest records (2019), approximately 6.7 percent of households is considered in poverty.

Therefore, from inference, it is estimated that approximately 6.7 percent of the projected water demands within the CVWD service area will be for housing needed for low-income households. **Table 2.12** provides the projected water needs for low-income household. The projected water demands shown here represent 6.7 percent of the projected residential water demand.

Table 2.12: Projected Water Demands for Low-Income Households

Water use Sector		2025	2030	2035	2040	2045
Single Family	Normal Demand	2,350	2,387	2,425	2,463	2,502
	Low-Income Demand	157	160	162	165	168
Multi-Family	Normal Demand	789	802	814	827	840
	Low-Income Demand	53	54	55	55	56
Total	Normal Demand	3,139	3,189	3,239	3,290	3,342
	Low-Income Demand	210	214	217	220	224

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SECTION 3: WATER SOURCES & SUPPLY RELIABILITY

2020 URBAN WATER MANAGEMENT PLAN



SECTION 3 WATER SOURCES & SUPPLY RELIABILITY

3.1 OVERVIEW

CVWD's water supplies consist of groundwater produced from the Verdugo Basin and imported water purchased from FMWD. Approximately 52 percent of CVWD's water consists of groundwater, while the remaining 48 percent consists of imported water. The majority of CVWD's ground water wells are located along the Verdugo Wash, south of Honolulu Avenue. Local groundwater is disinfected with chlorine before blending with MWD's surface water. The sources of imported water supplies include the Colorado River Aqueduct (CRA) and the State Water Project (SWP). The most dominant feature of CVWD's water supply operations is the intensive pumping required for delivering water to the residents in the communities located in the foothills of the San Gabriel Mountains. In some cases, this water must be lifted over 1,000 feet in order to deliver it to the elevations of some water users in the service area. This section discusses water supply, quality, and water reliability under all foreseeable hydrologic conditions from 2025 through 2045.

3.2 IMPORTED WATER

3.2.1 WATER SOURCES (MWD)

MWD has access to imported water from the Colorado River and the Sacramento-San Joaquin River Delta in Northern California. These two water systems provide Southern California with over 2 million acre-feet (MAF) of water annually for urban uses.

COLORADO RIVER

The Colorado River supplies California with 4.4 MAF annually for agricultural and urban uses with approximately 3.85 MAF used for agriculture in Imperial and Riverside Counties. The remaining unused portion (600,000 to 800,000 AF) is used for urban purposes in MWD's service area.



Figure 3.1: Parker Dam at Colorado River

BAY DELTA

In addition to the Colorado River, the Sacramento-San Joaquin River Delta has historically provided a significant amount of supply annually to Southern California. The Delta is located at the confluence of the Sacramento and San Joaquin Rivers east of the San Francisco Bay and is the West Coast's largest estuary. The Delta supplies Southern California with over 1 MAF of water annually which has been significantly reduced in recent years.

The use of water from the Sacramento-San Joaquin Delta continues to be a critical issue as it competes between uses for water supply and ecological habitat that jeopardizes the Delta's ability to meet either need and may threaten the estuary's ecosystem.

An ongoing planning effort to increase long-term supply reliability for both the State Water Project (SWP) and Central Valley Project (CVP) is taking place. This plan, formerly known as the Bay Delta Conservation Plan (BDCP), includes co-equal goals to improve water supply reliability and restore the Delta ecosystem. In April 2015, state and federal agencies announced a new sub-alternative, California WaterFix and California EcoRestore, which replaced the proposed BDCP as the state's preferred project. The new alternative reflects the state's proposal to separate the conveyance facility and habitat restoration measures into two separate efforts: California WaterFix and California EcoRestore. These two efforts are a

direct reflection of public comments and fulfill the requirement of the 2009 Delta Reform Act to meet co-equal goals. Preparation of the BDCP and now California WaterFix is through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties. Several "isolated conveyance system" alternatives considered in the plan would divert water from the north Delta to the south Delta where pumped water travels into the south-of-Delta stretches of the SWP and CVP. The new conveyance facilities would allow for greater flexibility in balancing the needs of the estuary with the reliability of water supplies. The plan also provides other benefits, such as reducing the risk of long-term outages from Delta levee failures.

However, plans for the California WaterFix did not fall through as it did not gain support from Governor Newsom. In his speech to the state addressed in February 2019, Newsom announced that he did not "support WaterFix as currently configured," but does "support a single tunnel". As a result, on April of 2019, Governor Newsom issued Executive Order N-10-19, which announced a new single tunnel project known as the Delta Conveyance Project (DCP). Later that year, DWR initiated planning and environmental review for the DCP to protect the reliability of SWP supplies from the effects of climate change and seismic events, among other risks. DWR's current schedule for the DCP environmental planning and permitting extends to the end of 2024. DCP will potentially be operational in 2040 following extensive planning, permitting, and construction.

AQUEDUCT SYSTEMS

In order to provide Southern California with imported water, MWD utilizes two separate aqueduct systems (one for each source of supply) to obtain its supplies. These two aqueduct systems convey water from each source into two separate reservoirs whereupon MWD pumps the water to one of its five treatment facilities. One of these aqueduct systems, known as the Colorado River Aqueduct (CRA), serves as MWD's primary water delivery system and first constructed shortly after MWD's incorporation in 1928. The CRA, which is owned and operated by MWD, spans 242 miles and conveys water from the Colorado River to Lake Mathews.

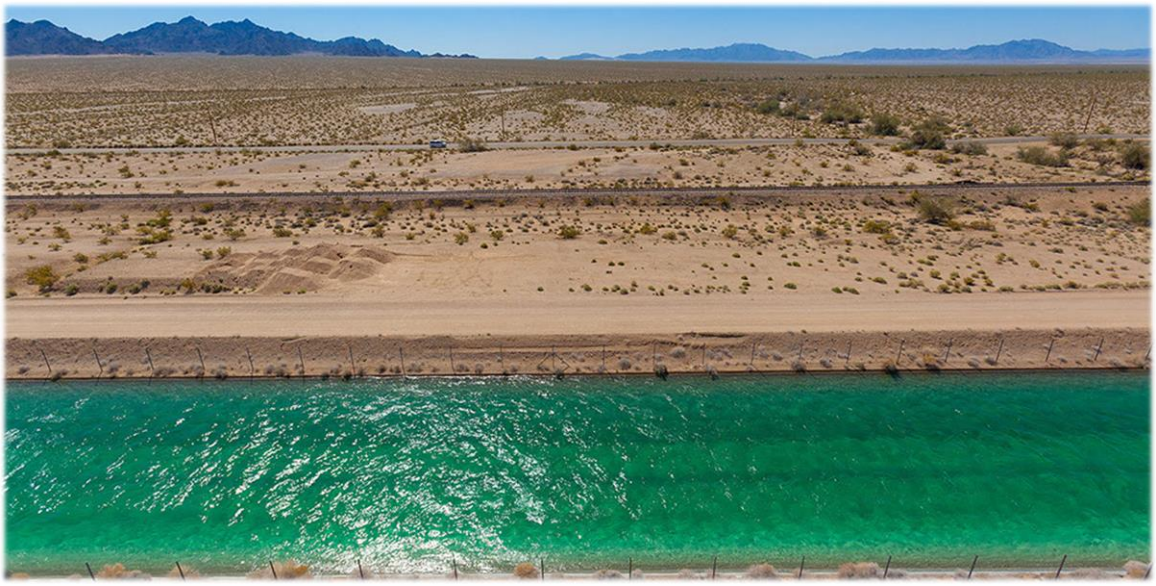


Figure 3.2: Colorado River Aqueduct

In addition to the CRA, MWD receives water from northern California via the California Aqueduct. Also known as the State Water Project (SWP), the California Aqueduct is 444 miles long and carries Delta water to Southern California and is operated by DWR.



Figure 3.3: California Aqueduct or "SWP"

The previously mentioned aqueducts supply Southern California with a significant amount of its water and are crucial to its sustainability. In addition to these two water systems, there are also several other aqueducts vital to the State. The major aqueducts in California are shown in **Figure 3.4**.



Figure 3.4: Aqueduct Systems in California

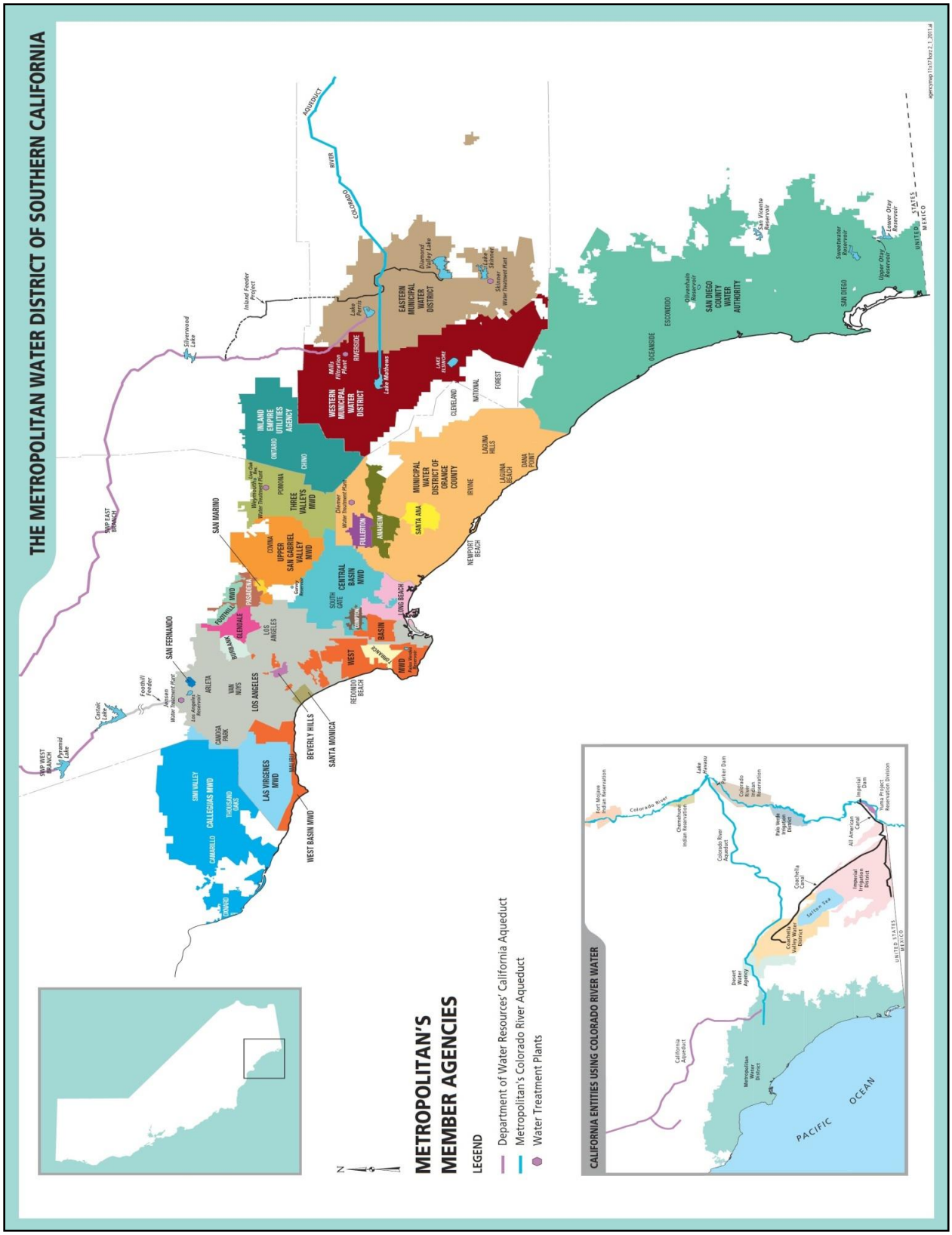


Figure 3.5: MWD Service Area Map

3.3 GROUNDWATER

CVWD owns and operates 12 production wells in the Verdugo Groundwater Basin (Basin). The Basin, shown in **Figure 3.6**, north and east of the Verdugo Mountains, consists of 4,400 acres and comprises 3.6 percent of the total valley fill. It is bounded on the north by the San Gabriel Mountains; on the northwest by a groundwater divide, which separates it from the San Fernando Basin; on the east by a groundwater divide separating it from the Monk Hill Subarea of the Raymond Basin; on the southeast by the San Rafael Hills; and on the south and southwest by the Verdugo Mountains.

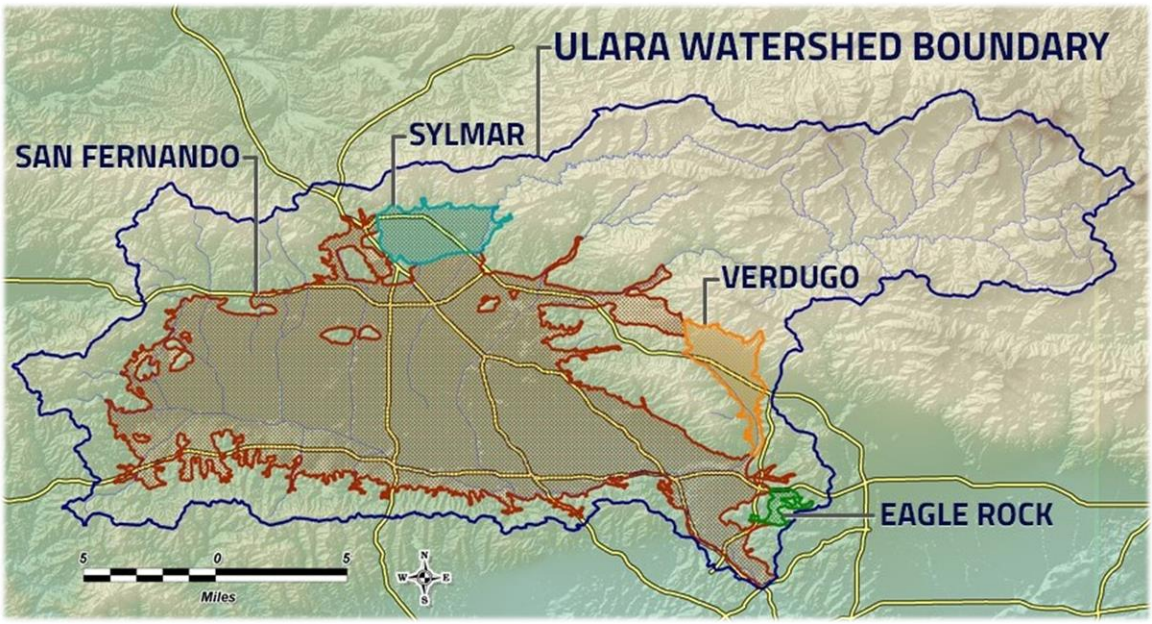


Figure 3.6: Local Groundwater Basins within the Upper Los Angeles River Area

The Basin is an adjudicated basin within the Upper Los Angeles River Area (ULARA). The Basin has an adjudicated "safe yield" of 7,150 AFY. CVWD shares groundwater rights in this basin with the City of Glendale. As the only two water-rights holders in the Basin, CVWD has an annual entitlement of 3,294 AFY and the City of Glendale has an annual entitlement of 3,856 AFY.

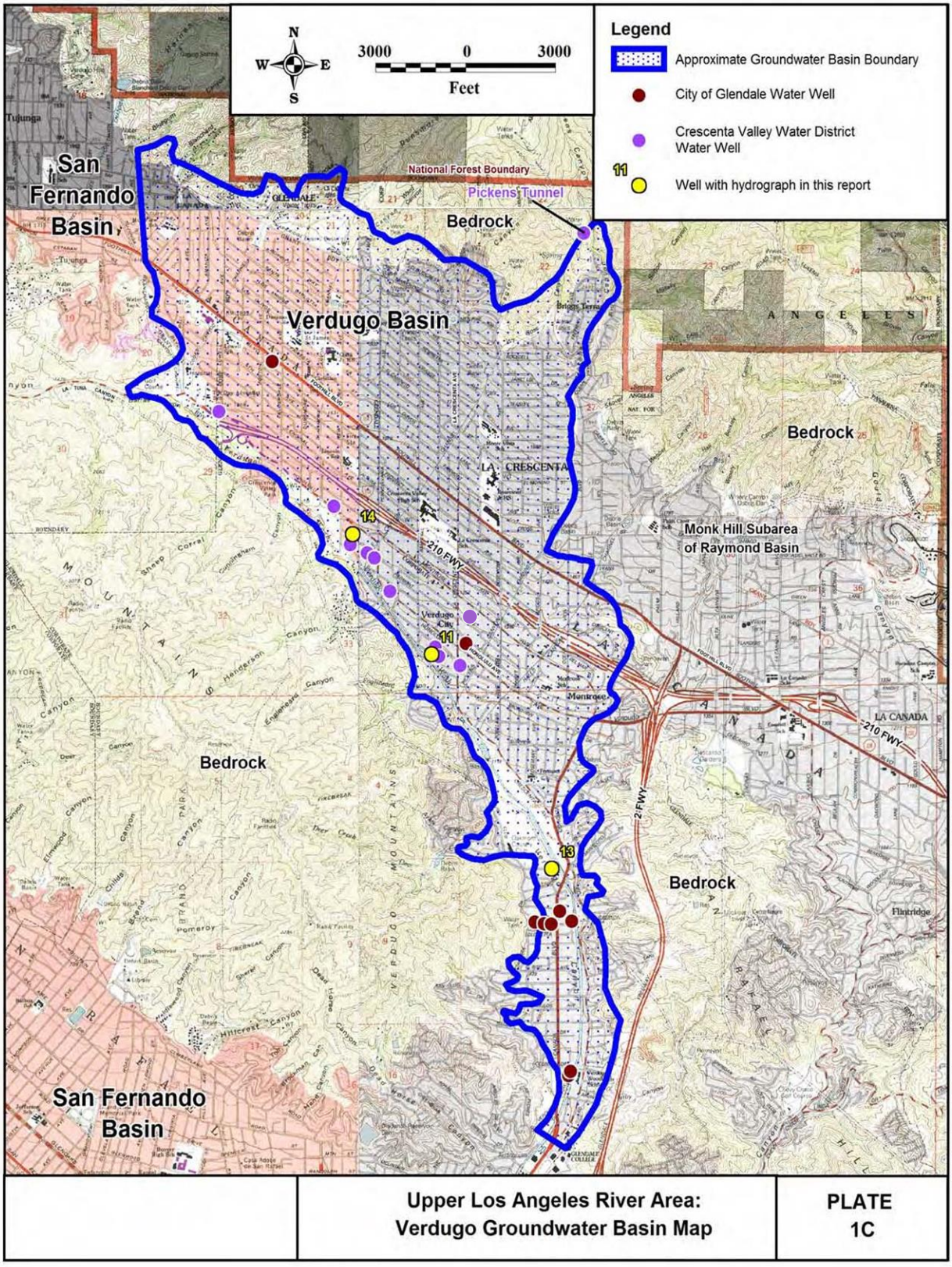


Figure 3.7: Verdugo Groundwater Basin

3.4 WATER QUALITY

In 1974, Congress passed the Safe Drinking Water Act in order to protect public health by regulating the nation's drinking water supply. As required by the Safe Drinking Water Act, CVWD provides annual Water Quality Reports to its customers.



Figure 3.8: Health Standards Project Drinking Water

To ensure quality of its water, CVWD considers risks to drinking water, including: turbidity, microbiological content, organic and inorganic chemical concentration, radionuclide content, and disinfection by-product concentration.

Adverse health effects from these contaminants include not only acute effects but also chronic effects, which may occur if contaminants are ingested at unsafe levels over many years.

The two main sources of CVWD's water supply are imported water from FMWD (MWD water) and groundwater from the Verdugo Basin. Since MWD draws the majority of its water from the CRA and the SWP, the quality of CVWD's imported water supply is closely related to the quality of these two sources.

3.4.1 IMPORTED WATER QUALITY

MWD is responsible for providing water of a high quality throughout its service area. The water delivered by MWD is tested both for currently regulated contaminants and for additional contaminants of concern. Over 300,000 water quality tests are conducted each year to regulate the safety of its water. MWD's supplies originate primarily from the CRA

and from the SWP. The two sources, proportional to each year's availability of the source, is then treated and delivered throughout MWD's service area.

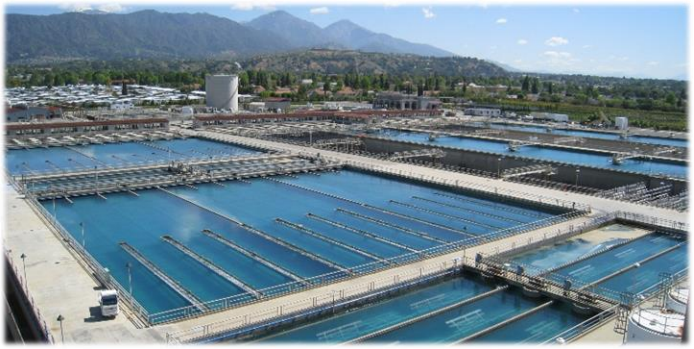


Figure 3.9: MWD's Weymouth Treatment Plant Provides a Safe Supply of Water

MWD's primary sources face individual water quality issues of concern. The CRA water source contains a higher level of total dissolved solids (TDS) and a lower level of organic material, while the SWP contains a lower TDS level while its level of organic materials is much higher, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic materials, MWD has been blending CRA water with SWP supplies as well as implementing updated treatment processes to decrease the disinfection byproducts. In addition, MWD engages in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of emerging contaminants, N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). MWD has assured its ability to overcome the above mentioned water quality concerns through its protection of source waters, implementation of renovated treatment processes, and blending of its two sources.



Figure 3.10: Native Rock adds to the Salinity of the Colorado River Water Supplies

While unforeseeable water quality issues could alter reliability, MWD's current strategies ensure the deliverability of high-quality water.

3.4.2 GROUNDWATER QUALITY

The water quality of the Basin is high in nitrates and selected wells show the presence of Volatile Organic Compounds (VOCs), particularly tetrachloroethylene (PCE), above the State Water Resources Control Board's Division of Drinking Water (DDW) maximum contaminant levels (MCLs). In addition, CVWD experienced Methyl tertiary butyl ether (MTBE) levels above the public health goal and removed a well from service in 2006. That well was placed back into service in May 2008; however, another well was taken out of service in September 2008 due to high levels of MTBE. That well was placed back into service in March 2011. While MTBE levels remain below detectable concentrations, CVWD continues to monitor all sources on a quarterly basis.

3.4.3 WATER QUALITY IMPACTS

As a result of MWD's efforts, MWD's 2020 UWMP indicates that none of the water quality challenges described below will impact the reliability of its supplies during the next 25 years. CVWD's water system is and has been in compliance with all DDW water quality standards. Groundwater quality does not impact water supply at this time due to CVWD's two (2) Nitrate treatment plant and the ability to blend waters below the MCL for PCE, and Nitrate.

Groundwater containing nitrate is either blended with imported water and/or treated at CVWD's Glenwood Nitrate Reclamation Facility and AroNite Nitrate removal Treatment Plant for Well 2 to meet drinking water standards. Blending with other well water or imported water is sufficient to supply water at less than the MCL for PCE as approved by DDW. MTBE is not present in any of CVWD's wells above the secondary DDW standard. MTBE levels are monitored quarterly throughout CVWD.

In the case that MTBE should reappear at levels above the secondary MCL, CVWD has plans to utilize MWD water to blend down MTBE levels or the groundwater well will be shutdown.

The installation of an ARoNite biological nitrate removal treatment facility to reactivate CVWD's Well No. 2 at the Ordunio Reservoir was put into service in June 2019. This treatment facility will increase CVWD's ability to pump its adjudicated rights within the Verdugo Basin, utilize a local water source and as a result reducing CVWD's dependence on imported water from MWD purchased through FMWD.

CVWD was approved in April 2020 for an amended permit to convert the existing disinfection systems from free chlorine to chloramine by adding chlorine and ammonia to the groundwater supply at four locations (Mills, Glenwood, Well 2 and Pickens Canyon

Tunnel) in order to form chloramine before it is blended with chloraminated MWD water. This popular disinfection method is now being used because of the buildup of byproducts from the chlorine treatment process. CVWD plans to convert to chloramines in the October 2021. At the same time, CVWD has converted the disinfection system at Pickens Canyon Tunnel from calcium hypochlorite to sodium hypochlorite.

3.5 CURRENT WATER SUPPLY

3.5.1 IMPORTED WATER PURCHASES

In 2020, CVWD relies on 2,141 AF of imported water wholesaled by MWD through FMWD to supplement local groundwater. Imported water represents approximately 52 percent of CVWD's total water supply. MWD's principal sources of water originate from two sources - the Colorado River via the Colorado Aqueduct and the Lake Oroville watershed in Northern California through the SWP. This water is treated at MWD's Weymouth Treatment Plant. Because of SWP's lower salinity level, MWD blends SWP water with CRA to reduce the salinity of the delivered water.

MWD's Upper Feeder is tapped by FMWD in the vicinity of Seco Street and Rosemont Avenue in the City of Pasadena. Water flows from MWD's system into FMWD's Arroyo Seco Gravity Main, which traverses in a northerly direction in the vicinity of Rosemont Avenue and terminates at FMWD's Main Pumping Plant located near Rosemont Avenue and Washington Boulevard in the City of Pasadena.

Table 3.1 shows the recent imported water from MWD via FMWD in the past six years from 2015 to 2020.

Table 3.1: Amount of Imported Water Between 2015 - 2020 (AF)

Wholesaler Source	2015	2016	2017	2018	2019	2020
FMWD	1,745	1,807	2,218	2,229	1,810	2,141
% of Total Water Supply	**49%**	**49%**	**57%**	**57%**	**48%**	**51%**

3.5.2 GROUNDWATER PRODUCTION

From 2015 to 2020, CVWD has pumped groundwater ranging from 1,892 to more than 2,065 AF. The Basin was adjudicated in a court decision in 1979 and is administered by the ULARA Watermaster. A copy of the ULARA judgment is included in this UWMP as **Appendix A**. CVWD's prescriptive rights in the Basin are 3,294 AFY. To date, the

neighboring City of Glendale, as the only other Basin rights holder, has not pumped its full adjudication (3,856 AFY) in the Basin.

It is CVWD's goal to maintain full groundwater pumping capabilities in the Basin to pump its adjudicated right of 3,294 AF every year. Since the 2005 UWMP, CVWD implemented a long-term capital improvement program to continue rehabilitating its original 12 wells. In addition, CVWD has installed a new well (Well 16), which came online in 2016 and re-active Well 2, which came back online in 2019.

CVWD has a contract to lease water rights from GWP. The agreement, contained in **Appendix B,** allows CVWD to pump and purchase groundwater through the operation of GWP's Rockhaven Well (Well 16) and its existing infrastructure. CVWD began purchasing groundwater pumped from GWP's well in March 2016. Well 16 increased CVWD pumping rights up to 500 AFY.

Table 3.2 shows CVWD's recent groundwater production from the Basin in the past six years from 2015 to 2020.

Table 3.2: Amount of Groundwater Pumped Between 2015 - 2020 (AF)

Basin Name(s)	2015	2016	2017	2018	2019	2020
Verdugo Basin	1,844	1,624	1,351	1,376	1,824	1,933
GWP Well #16	0	344	347	279	141	142
Total Groundwater	1,844	1,968	1,699	1,655	1,964	2,075
% of Total Water Supply	**51%**	**52%**	**43%**	**43%**	**52%**	**49%**

3.5.3 2020 SUMMARY OF CVWD WATER SUPPLIES

Table 3.3 shows CVWD's water supplies and max total right / safe yield in 2020. As shown, CVWD does not utilize 100 percent of their full supply capabilities to meet their demands.

Table 3.3: CVWD Water Supplies in 2020 (AF) (DWR Table 6-8 Retail)

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Purchased or Imported Water	from FMWD	2,141	Drinking Water	2,154
Groundwater (not desalinated)	CVWD Wells	1,933	Drinking Water	3,294
Groundwater (not desalinated)	Well #16 (GWP)	142	Drinking Water	500
Total		4,216		5,948

3.6 PROJECTED CLIMATE CHANGE IMPACTS TO SUPPLIES

Extensive research has been done on the future impacts due to climate change on the State of California. The state released its latest research on climate, called the California's Fourth Climate Change Assessment, detailing the potential impacts of climate change that affects California such as temperature, sea level rise, droughts, and wildfires. The assessment utilizes historic data and the latest computer models to analyze these potential impacts. Furthermore, the state provided public access to downscaled data, along with mapping and other visualization tools, found at Cal-Adapt. In respect to water resources, research shows that California has a highly variable climate and is susceptible to dry spells. Additionally, extended drought periods could become more pervasive in future decades. Utilizing the extended drought scenario tool on Cal-Adapt provided projections on impacts on CVWD caused by an early 21st century drought (2023–2042). These impacts include increased temperatures and decreases in precipitation, which are key components to take into consideration for water resources planning.

3.6.1 TEMPERATURE

Under an extended drought period scenario from 2023 to 2042, maximum and minimum temperatures are anticipated to increase as shown in **Figures 3.11** and **3.12**, respectively. As a result, average temperature increases range from 3.7°F to 4.7°F for minimum and maximum temperatures, respectively, as shown in **Table 3.4**.

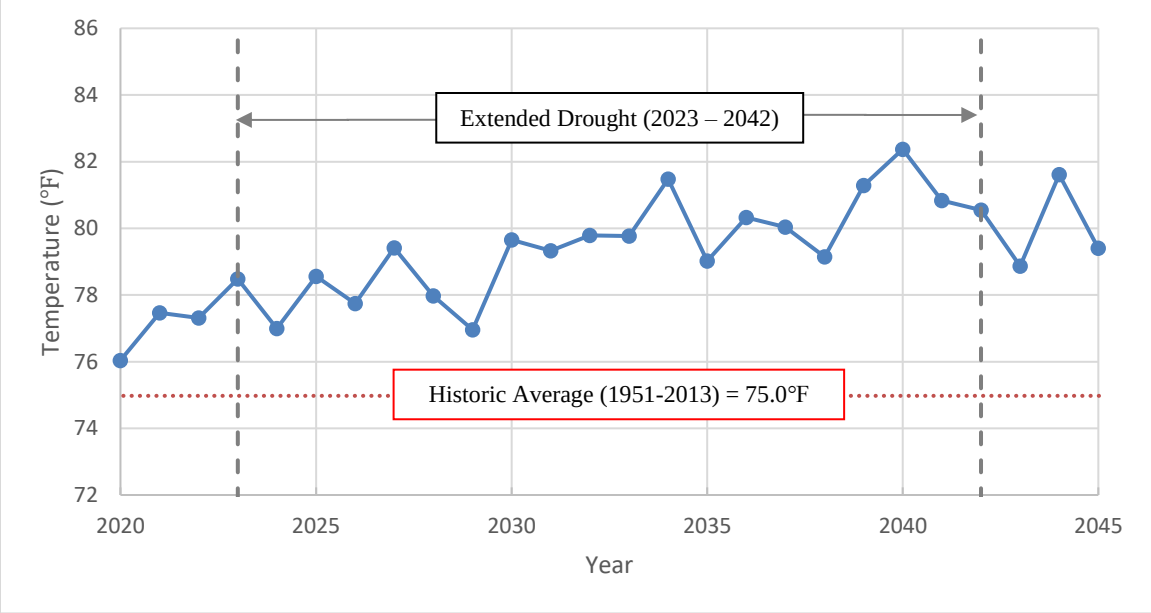


Figure 3.11: Extended Drought Scenario - Maximum Daily Average Temperatures

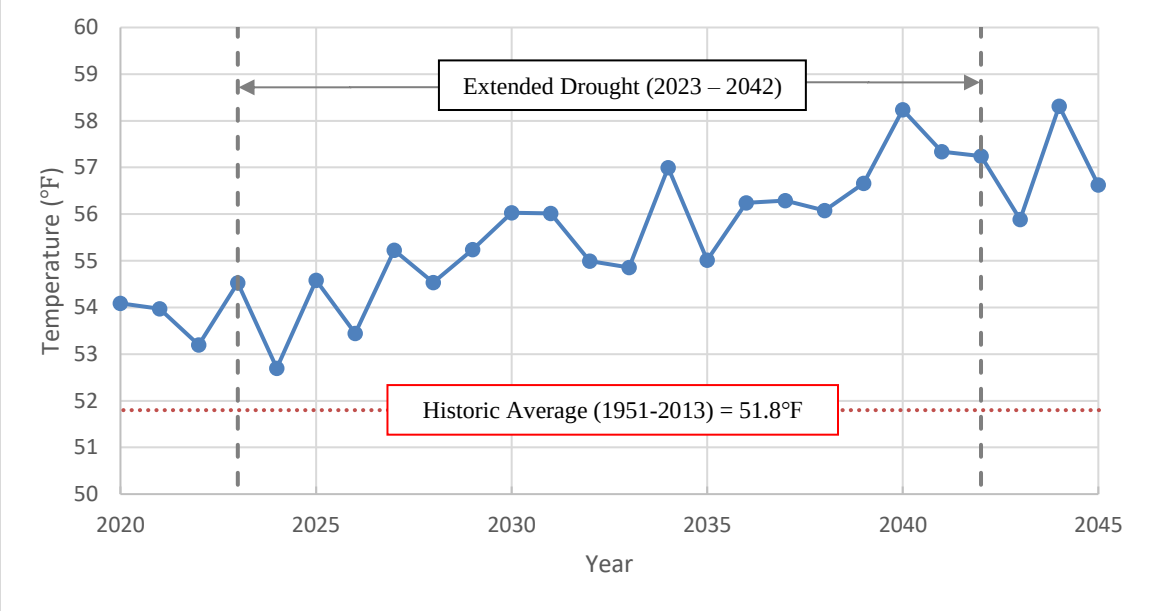


Figure 3.12: Extended Drought Scenario - Minimum Daily Average Temperatures

Table 3.4: Comparison Between Historic and Projected Min/Max Temperatures Under Extended Drought Scenario (2023 – 2042)

	Temperatures (°F)	
	Minimum	Maximum
Historic (1951-2013)	51.8	75.0
Projected (2023-2042)	55.5	79.2
Difference	+3.7	+4.2

3.6.2 PRECIPITATION & STORMWATER RUNOFF

Under an extended drought period scenario from 2023 to 2042, predicted precipitation shows multiple periods of below average annual precipitation as shown in **Figure 3.13**. This is also relating to reduced stormwater runoffs in a similar trend to precipitation as shown in **Figure 3.14**; however, the scenario projected several periods of significantly above average rainfall and runoff volume. **Table 3.5** compares the historical averages with the projected averages under the extended drought period scenario. Although it shows that there is an increase in runoff volume (ideal for stormwater collection), the average increase is driven by the isolated periods of intense storm events.

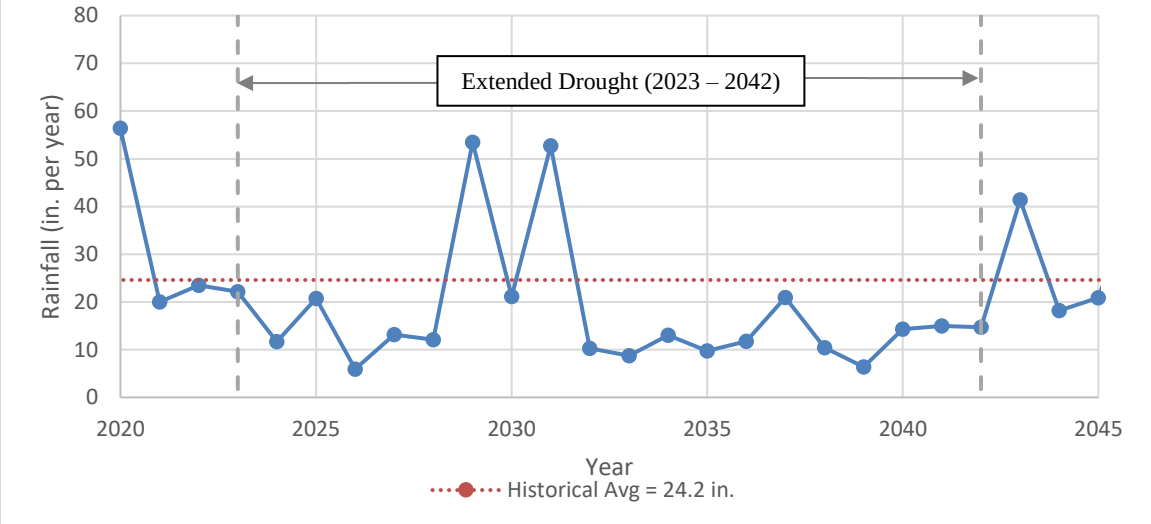


Figure 3.13: Extended Drought Scenario – Projected Annual Rainfall

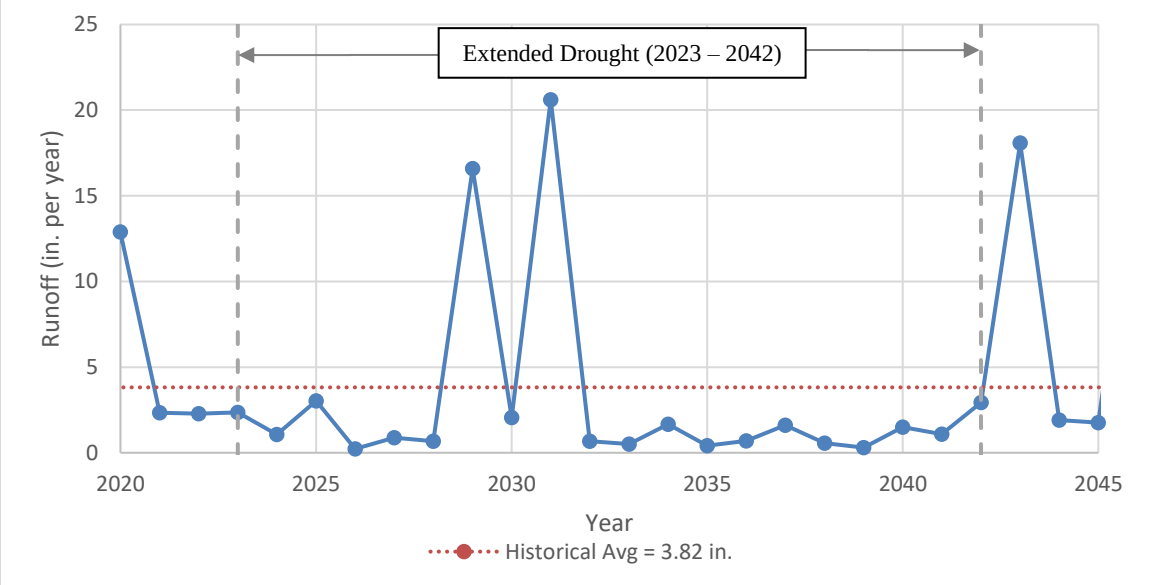


Figure 3.14: Extended Drought Scenario – Projected Annual Runoff

Table 3.5: Comparison Between Historic and Projected Rainfall & Runoff Under Extended Drought Scenario (2023 – 2042)

	Rainfall (in/yr)	Runoff (in/yr)
Historic (1951-2013)	24.2	3.82
Projected (2023-2042)	20.7	4.17
Difference	-3.5	+0.35

3.6.3 CLIMATE CHANGE IMPACTS TO CVWD'S WATER SUPPLIES

Climate data has been recorded in California since 1858. Since then, California has experienced several periods of severe drought: 1928-34, 1976-77, 1987-91, 2007-09, and most recently in 2012-15. California has also experienced several periods of less severe drought. The year 1977 is considered to be the driest year of record in the Four Rivers Basin by DWR. These rivers flow into the Delta and are the source of water for the SWP. Southern California sustained few adverse impacts from the 1976-77 drought, but the 1987-91 drought created considerably more concern.

The drought of 2007-09 resulted in significant impacts on the state's water supplies. SBx7-7 was signed into law by Governor Schwarzenegger that requires mandatory water conservation up to 20 percent by 2020. The recent drought in 2012-15 brought a significant hit to the state's water supplies. The drought strained reservoir levels all across the state. **Table 3.6** compares the reservoir levels in October 2013 during the drought and in present day (February 2021). As shown, the majority of the state's reservoirs were all below average levels. To this day, California is still in a recovery stage from the recent droughts.

Table 3.6: California Reservoirs Level During Drought (2013) and Current (2021)

Reservoir	Drought Period (Oct. 30, 2013)	Current Levels (Feb. 9, 2021)	Historic Average
Trinity Lake	50%	51%	72%
Lake Shasta	38%	48%	70%
Lake Oroville	43%	36%	54%
New Melones Lake	43%	65%	108%
San Luis Reservoir	21%	54%	67%
Millerton Lake	54%	30%	47%
Perris Lake	45%	93%	114%
Castaic Lake	85%	77%	92%
Pine Flat Reservoir	16%	23%	47%
Lake McClure	25%	38%	77%
Don Pedro Reservoir	50%	68%	98%
Folsom Lake	30%	30%	57%

In January of 2014, Governor Brown declared a state of emergency and directed state officials to take all necessary actions to prepare for water shortages. As the drought prolonged into 2015, to help cope with the drought mitigation, Governor Brown issued an Executive Order in April 2015 that mandated a statewide 25 percent reduction in potable water use from a baseline year of 2013.

The effects of the drought was observed in CVWD's supplies as shown in **Figure 3.15**. Since 2011, CVWD's reliance on groundwater has decreased from 3,126 AF at the peak in 2012 to 2,033 AF in 2020 (a decrease of 1,092 AF). This is due to the significantly decreased groundwater elevations caused by the recent droughts. **Figures 3.16**, **3.17**, and **3.18** shows the groundwater elevation levels from ULARA's Hydrograph Wells 11, 13, and 14, respectively, obtained from the recent ULARA Annual Report (FY 17-18). The location of the hydrograph wells are shown previously on **Figure 3.7**. As shows, groundwater elevations have been an all time low compared to historic averages. As for supplies from FMWD, volumes maintained average around 1,900 AF. Imported supplies maintained to supplement for the reduced groundwater volumes to meet CVWD's demands.

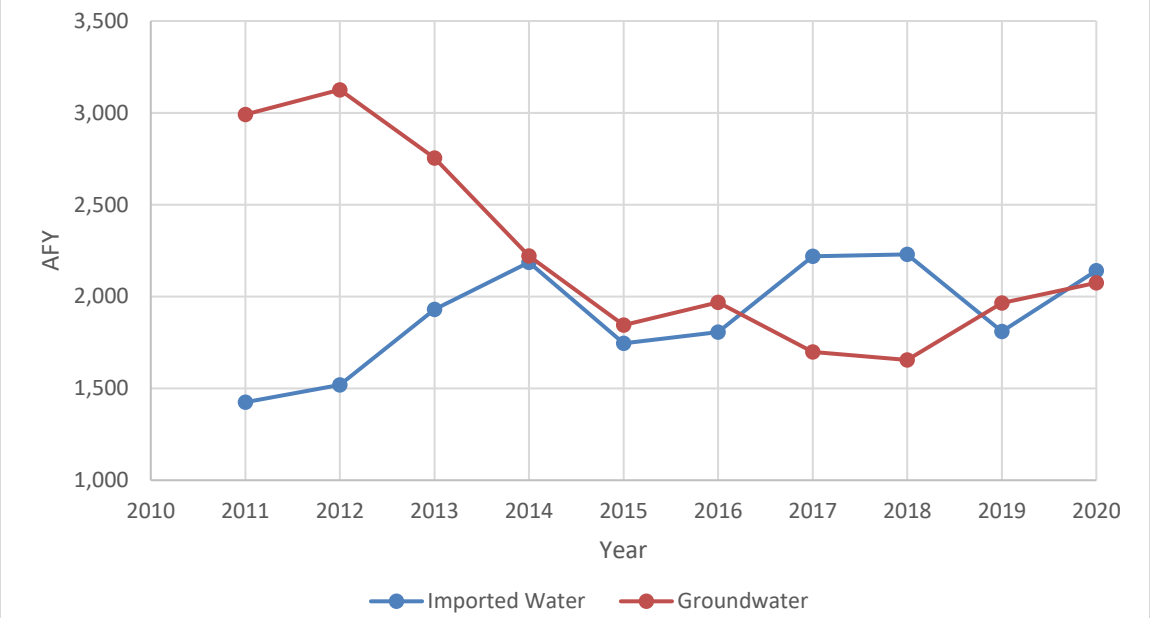


Figure 3.15: CVWD Imported and Groundwater Supplies (2011 - 2020)

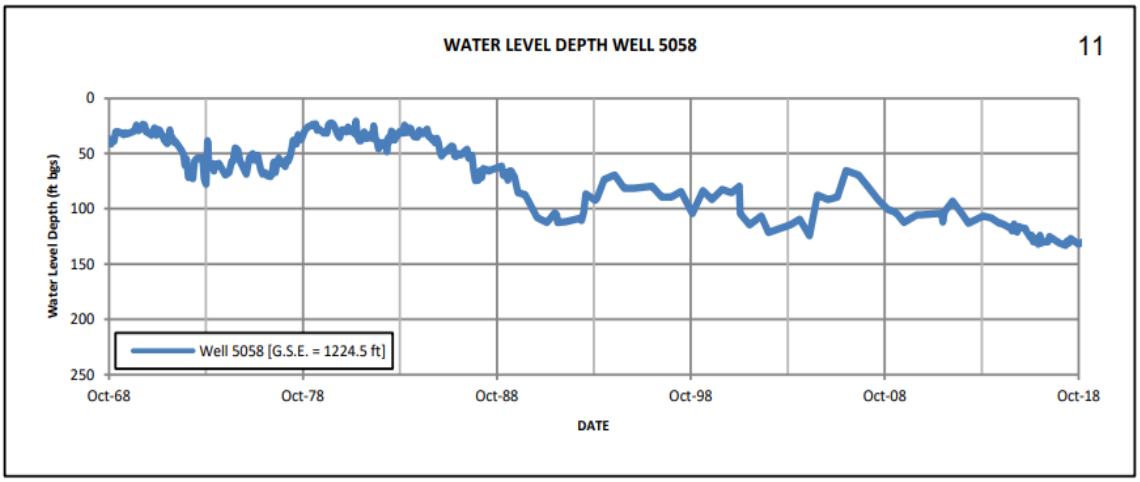


Figure 3.16: Hydrograph Well #11 Historic Groundwater Elevations

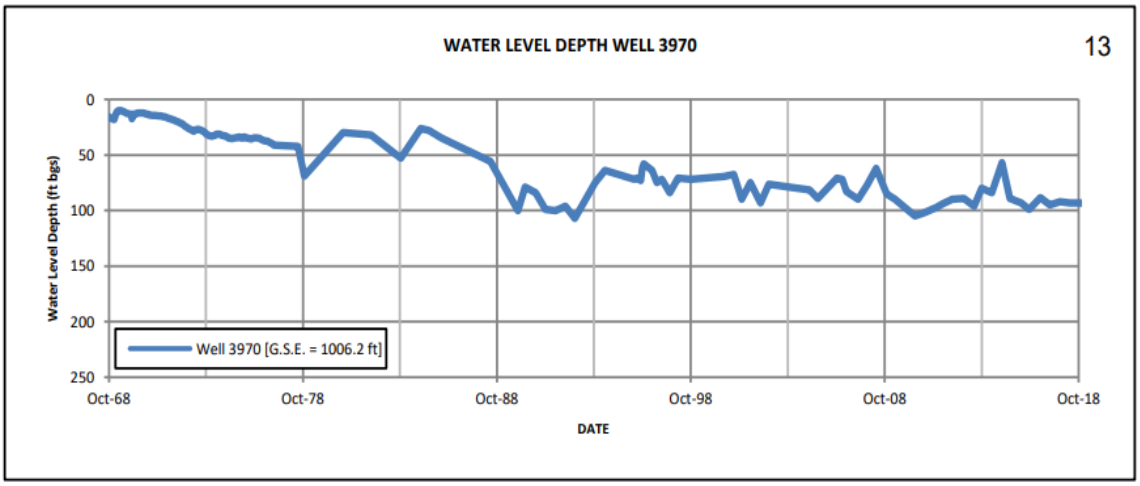


Figure 3.17: Hydrograph Well #13 Historic Groundwater Elevations

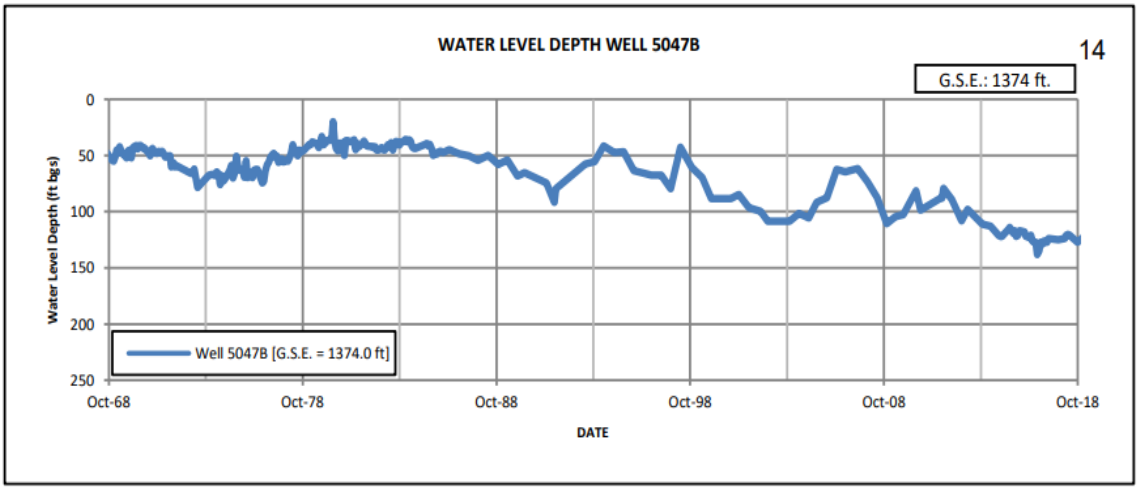


Figure 3.18: Hydrograph Well #14 Historic Groundwater Elevations

3.7 WATER SUPPLY PROJECTIONS

IMPORTED WATER SUPPLY PROJECTIONS

Based on MWD's supply projections that it will be able to meet full service demands under all three hydrologic scenarios, FMWD, CVWD's wholesale supplier concludes that it would also be able to meet the demands of its retail agencies under these conditions.

CWC section 10631(k) requires the wholesale agency to provide information to the urban retail water supplier for inclusion in its UWMP which identifies and quantifies the existing and planned sources of water available from the wholesale agency. **Table 3.7** indicates the wholesaler's water availability projections by source for the next 25 years as provided to CVWD by FMWD.

GROUNDWATER SUPPLY PROJECTIONS

Table 3.7 also shows the amount of groundwater projected to be pumped from the Basin by CVWD over the next 25 years. It also includes CVWD's projected amount of groundwater pumped from GWP's Rockhaven Well (Well #16). The projected amount of groundwater purchased from GWP over the next 25 years averages 300 AFY. In the past, various problems with CVWD's wells have hindered the amount that is able to be pumped. This is a contributing factor to CVWD's intention to embark on a well rehabilitation and development plan to increase reliance on local supplies over imported sources.

Table 3.7: Projected CVWD Water Supplies (AF) (2025 – 2045) (DWR Table 6-9 Retail)

Water Supply	Additional Detail on Water Supply	Projected Water Supplies				
		2025	2030	2035	2040	2045
Purchased or Imported Water	MWD via FMWD	2,154	2,154	2,154	2,154	2,154
Groundwater (not desalinated)	CVWD Wells	3,294	3,294	3,294	3,294	3,294
Groundwater (not desalinated)	Well #16 (GWP)	300	300	300	300	300
	Total	5,748	5,748	5,748	5,748	5,748

3.8 SUPPLY VS DEMAND

3.8.1 MWD'S (AND SUBSEQUENTLY FMWD'S) SUPPLY OUTLOOK

COLORADO RIVER SUPPLIES

MWD's Colorado River Allocation continues to be a critical issue.

Water supply from the CRA continues to be a critical issue for Southern California as MWD competes with several agricultural water agencies in California for unused water rights to the Colorado River. Although California's allocation has been established at 4.4 MAF annually, MWD's allotment stands at 550,000 AFY with additional amounts increasing MWD's allotment to 842,000 AFY if there is any unused water from the agricultural agencies.

MWD recognizes that competition from other states and other agencies within California has decreased the CRA's supply reliability. In 2003, the Quantification Settlement Agreement (QSA) facilitated the transfer of water from agricultural agencies to urban uses. This historic agreement provides California the means to implement transfers and supply programs, which will allow California to live within the State's 4.4 MAF basic annual apportionment of Colorado River water.

Lake Mead, located on the Colorado River, is the largest reservoir in the United States. In 2015, it reached its lowest level since the 1930s when the reservoir first filled. As of March 18, 2021, the water level in Lake Mead measured 1,085.7 feet above mean sea level, which is 39 percent of capacity and only 11 feet above the level (1,075 feet) that would trigger a first-ever shortage declaration on the Colorado River.

STATE WATER PROJECT SUPPLIES

The reliability of the SWP affects the MWD member agencies' ability to plan for future growth and supply. DWR develops and releases The State Water Project Delivery Capability Report (DCR) where it provides updates and supply estimations on the SWP delivery capabilities. The latest edition of the report (2019 DCR) incorporates current regulatory requirements for the SWP, and utilizes climate change models from CalSim-II to project supply impacts and estimations.

On an annual basis, each of the 29 SWP contractors, including MWD, request an amount of SWP water based on their anticipated yearly demand. In most cases, MWD's requested

supply is equivalent to its full Table A amount. After receiving the requests, DWR assesses the amount of water supply available based on precipitation, snow pack on Northern California watersheds, volume of water in storage, projected carry over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements. For example, according to the 2019 DCR, the total SWP annual delivery of water to contractors ranged from 2009 to 2018 as shown in **Figure 3.19**. Due to the uncertainty in water supply, contractors are not typically guaranteed their full Table A amount, but instead a percentage of that amount based on available supply.

Each December, DWR provides the contractors with their first estimate of allocation for the following year. As conditions develop throughout the year, DWR revises the allocations. Currently, the total contractor requested allocation for Table A water is 4.2 MAF. MWD initially requested 1.9 MAF, which is 45 percent of the total contractors' requests for Table A water. Due to the variability in supply for any given year, it is important to understand the reliability of the SWP to supply a specific amount of water each year to the contractors.

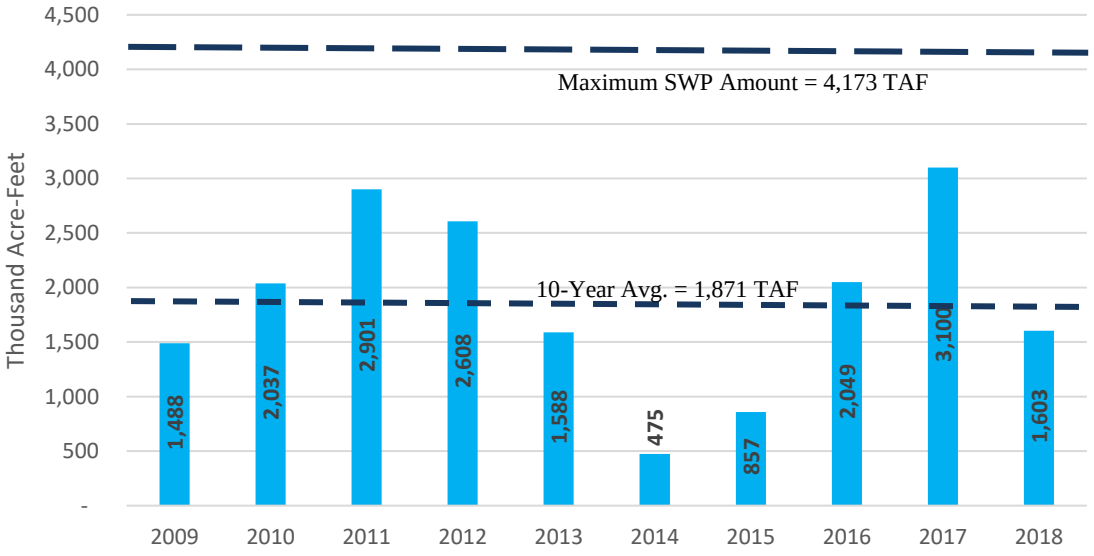


Figure 3.19: SWP Table A Deliveries (2009 - 2018)

With the state undergoing a second consecutive dry year, DWR has already taken the steps to prolong the SWP supplies. On March 2021, DWR decreased the allocation of 2021 SWP deliveries for the contractors from 422,848 AF to 210,266 AF. Based on the recent low amount of precipitation and runoff, and an assessment of overall water supply conditions, SWP supplies are projected to be 5 percent of most SWP contractor's 2021 requested Table A Amounts. This reduction decreased MWD's initial request from 1,911,500 AF to 95,575 AF.

STORAGE RESERVOIR SUPPLIES

Statewide, storage reservoir levels rise and fall due to seasonal climate changes, which induce increase in demand. During periods of drought, reservoir levels typically drop significantly and may limit the amount of supplies available. As a result, both DWR and MWD monitor reservoir levels regularly. Previously shown, **Table 3.6** compares the statewide reservoir levels during the recent drought period (2012-2015) with current levels (February 2021). **Figure 3.20** shows the MWD reservoir levels. As shown, the majority of the state's reservoirs were all at below average levels, and to this day, the state is still in a recovery stage from the recent droughts.

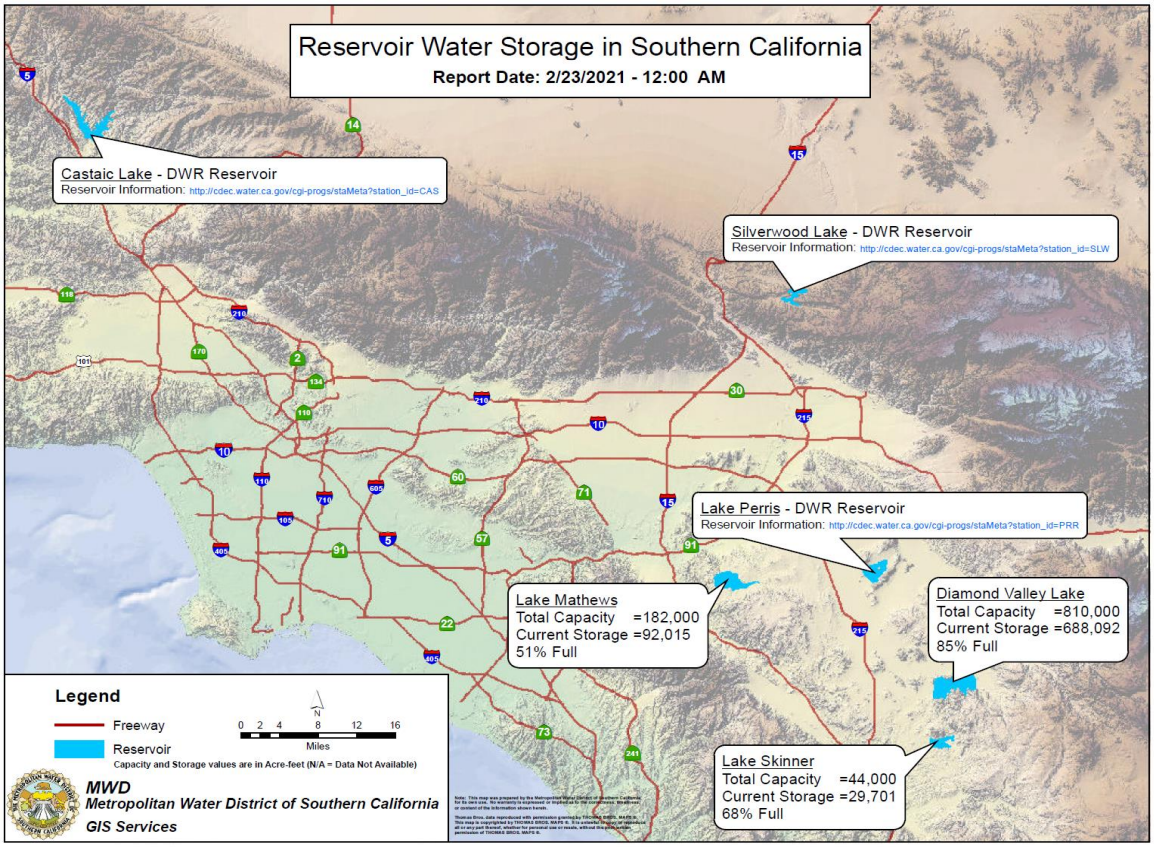


Figure 3.20: MWD Reservoir Levels (Feb. 2021)

3.8.2 MWD'S PROJECTED SUPPLY VS DEMAND COMPARISONS

MWD evaluated supply reliability by projecting supply and demand conditions for the single and multi-year drought cases based on conditions affecting the SWP (MWD's largest and most variable supply). For this supply source, the single driest-year was 1977, and the three-year dry period was 1990-1992. MWD's analysis illustrated in **Tables 3.8** and **3.9**, correspond to MWD's 2020 UWMP Tables 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6. These tables demonstrate that the region can provide reliable water supplies not only under normal conditions but also under both the single driest year and the multiple dry year hydrologies.

Table 3.8: MWD Regional Imported Water Supply Reliability Projections
Average and Single Dry Years (AF) for 2025 to 2045

	Row	Region Wide Projections	2025	2030	2035	2040	2045
Supply	A	Projected Supply: Average Year	3,932,000	3,962,000	3,960,000	3,598,000	3,622,000
	B	Projected Supply: Dry Year	2,727,000	2,791,000	2,789,000	2,551,000	2,572,000
	C = B/A	Projected Dry Yr. / Avg. Yr. Supply (%)	**69.4%**	**70.3%**	**70.4%**	**70.9%**	**71.0%**
Demand	D	Projected Average Year Demand	1,274,000	1,256,000	1,273,000	1,294,000	1,319,000
	E	Projected Dry Year Demand	1,402,000	1,387,000	1,408,000	1,431,000	1,457,000
	F=E/D	Projected Dry Year / Avg. Year (%)	**110.0%**	**110.4%**	**110.6%**	**110.6%**	**110.5%**
Surplus	G = A-D	Projected Surplus: Average Year	2,658,000	2,706,000	2,687,000	2,304,000	2,303,000
	H = B-E	Projected Surplus: Dry Year	1,325,000	1,404,000	1,381,000	1,120,000	1,115,000
Programs Under Dev.	I	Projected Capability of Programs (Average Year)	47,000	113,000	13,000	372,000	347,000
	J	Projected Capability of Programs (Dry Year)	0	0	0	0	0
Potential Surplus	K=A+I-D	Projected Surplus: Average Year	5,253,000	5,331,000	5,246,000	5,264,000	5,288,000
	L=B+J-E	Projected Surplus: Dry Year	4,129,000	4,178,000	4,197,000	3,982,000	4,029,000
Comparison	I = A/D	Projected Avg. Yr. Supply/Demand (%)	**308.6%**	**315.4%**	**311.1%**	**278.1%**	**274.6%**
	J = A/E	Projected Dry Yr. Supply/Demand (%)	**280.5%**	**285.7%**	**281.3%**	**251.4%**	**248.6%**

Table 3.9: MWD Regional Imported Water Supply Reliability Projections
Average and Multiple Dry Years (AF) 2025 to 2045

	Row	Region Wide Projections	2025	2030	2035	2040	2045
Supply	A	Projected Supply: Average Year	3,932,000	3,962,000	3,960,000	3,598,000	3,622,000
	B	Projected Supply: Multiple Dry Year	2,198,000	2,210,000	2,209,000	1,973,000	1,995,000
	C = B/A	Projected Dry Yr. / Avg. Yr. Supply (%)	**55.9%**	**55.8%**	**55.8%**	**54.8%**	**55.1%**
Demand	D	Projected Average Year Demand	1,274,000	1,256,000	1,273,000	1,294,000	1,319,000
	E	Projected Dry Year Demand	1,412,000	1,414,000	1,435,000	1,457,000	1,484,000
	F=E/D	Projected Dry Year / Avg. Year (%)	**110.8%**	**112.6%**	**112.7%**	**112.6%**	**112.5%**
Surplus	G = A-D	Projected Surplus: Average Year	2,658,000	2,706,000	2,687,000	2,304,000	2,303,000
	H = B-E	Projected Surplus: Multiple Dry Year	786,000	796,000	774,000	516,000	511,000
Programs Under Dev.	I	Projected Capability of Programs (Average Year)	47,000	113,000	13,000	372,000	347,000
	J	Projected Capability of Programs (Multiple Dry Year)	10,000	0	0	235,000	213,000
Potential Surplus	K=A+I-D	Projected Surplus: Average Year	5,253,000	5,331,000	5,246,000	5,264,000	5,288,000
	L=B+J-E	Projected Surplus: Multiple Dry Year	4,129,000	4,178,000	4,197,000	3,982,000	4,029,000
Comparison	I = A/D	Projected Avg. Yr. Supply/Demand (%)	**308.6%**	**315.4%**	**311.1%**	**278.1%**	**274.6%**
	J = A/E	Projected Dry Yr. Supply/Demand (%)	**278.5%**	**280.2%**	**276.0%**	**246.9%**	**244.1%**

3.9 CVWD'S SUPPLY RELIABILITY

3.9.1 OVERVIEW

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years. CVWD depends on a combination of imported and local supplies to meet its water demands and has taken numerous steps to ensure that it has adequate supplies.

3.9.2 IMPORTED WATER RELIABILITY

MWD is participating in the development of groundwater, groundwater recovery, recycled water systems, desalination opportunities, and collection of urban return flows to augment the reliability of the imported water system. There are various factors that may impact reliability of supplies, such as legal, environmental, water quality, and climatic, which are discussed below. The water supplies are projected to meet full-service demands; MWD's 2020 UWMP finds that MWD is able to meet with existing supplies full service demands of its member agencies in 2025 through 2045 during normal years, single dry year, and multiple dry years.

MWD's 2015 Integrated Water Resources Plan (IRP) update describes the core resource strategy used to meet full-service retail demands under all foreseeable hydrologic conditions from 2020 through 2040. The foundation of MWD's resource strategy for achieving regional water supply reliability consists of developing and implementing water resources programs and activities through its IRP preferred resource mix. This preferred resource mix includes conservation, local resources, such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements. FMWD is reliant on MWD for all of its imported water. With the addition of planned supplies under development, MWD's 2020 UWMP finds that MWD will be able to meet full-service demands from 2025 through 2045, even under a repeat of the worst drought. **Table 3.10** shows the reliability of the MWD's supply for single dry year and multiple dry year scenarios. MWD's single dry year is based on the drought in 1977. MWD's five-consecutive dry years is based on from 1988 to 1992, which represents as the driest five-

Table 3.10: MWD Supply Reliability
Single & Multiple Dry Years

		Base Year	Percent Available
Average Year		1922 - 2017	100%
Single Dry Year		1977	100%
Multiple Dry Years	Year 1	1988	100%
	Year 2	1989	100%
	Year 3	1990	100%
	Year 4	1991	100%
	Year 5	1992	100%

consecutive year historic sequence for MWD's water supply. In addition to meeting full-service demands from 2025 through 2045, MWD projects reserve and replenishment supplies to refill system storage.

3.9.3 FACTORS CONTRIBUTING TO CVWD'S IMPORTED WATER SUPPLY RELIABILITY

The Act requires a description of the reliability of the water supply and vulnerability to seasonal or climatic shortage. The following are some of the factors identified by MWD which may have an impact on the reliability of MWD supplies.

Environment - Endangered species protection needs in the Sacramento-San Joaquin River Delta have resulted in operational constraints to the SWP system. The Bay-Delta's declining ecosystem caused by agricultural runoff, operation of water pumps, and other factors has led to historical restrictions in SWP supply deliveries. SWP and CVP delivery restrictions due to the biological opinions have reduced SWP and CVP supplies by approximately 5.2 MAF since in 2008.

Legal - Listings of additional species under the Endangered Species Act and new regulatory requirements could further impact SWP operations by requiring additional export reductions, releases of additional water from storage, or other operational changes impacting water supply operations. Additionally, any challenges to the QSA in the court systems may have impacts on the Imperial Irrigation District and San Diego County Water Authority transfer. If there are negative impacts, San Diego could become more dependent on the Metropolitan supplies. One such challenge was settled in 2013 upholding the validity of the QSA.

Water Quality - Water imported from the CRA contains high levels of salts. The operational constraint is that this water needs to be blended with SWP supplies to meet the target salinity of 500 mg/L of TDS. Another water quality concern is related to the quagga mussel. Controlling the spread and impacts of quagga mussels within the CRA requires extensive maintenance and results in reduced operational flexibility.

Climate Change - Changing climate patterns are expected to shift precipitation patterns and affect water supply. Unpredictable weather patterns will make water supply planning even more challenging. The areas of concern for California include the reduction in Sierra Nevada snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of levee failure.

Legal, environmental, and water quality issues may have impacts on MWD supplies. It is believed, however, that climatic factors would have more of an impact than the others. Climatic conditions have been projected based on historical patterns; however, severe pattern changes may occur in the future. **Table 3.11** shows the factors that may affect inconsistency of supply. These and other factors are addressed in greater detail in MWD's 2020 UWMP.

Table 3.11: Factors Which May Affect Inconsistency of Supply

Name of Supply	Legal	Environmental	Water Quality	Climatic
State Water Project	✓	✓	✓	✓
Colorado River			✓	✓

3.9.4 CVWD'S PROJECTED SUPPLY VS DEMAND COMPARISONS

To project future supply and demand comparisons, it will be assumed that demand will increase annually based on population growth and a constant of 107.7 GPCD in accordance with SBx7-7 requirements. During times of drought, however, demand will increase at a time when supply will decrease. **Table 3.12** outlines the various base years and demand increases to project during single and multiple dry drought periods. **Tables 3.13** to **3.19**, shown on the following pages, provide an analysis of CVWD's supply and demand projections.

Table 3.12: CVWD Demand during Single & Multiple Dry Years

		Base Year	Percent Increases
Single Dry Year		2013-2015	111%
Multiple Dry Years	Year 1	2011	115%
	Year 2	2012	121%
	Year 3	2013	122%
	Year 4	2014	115%
	Year 5	2015	95%

Based on the data contained in **Tables 3.13** to **3.19**, CVWD can expect to meet future demands through 2045 for all climatologic classifications. Projected groundwater supply capacities are not expected to be significantly affected during times of low rainfall and over short-term dry periods of up to three years; however, during prolonged periods of drought, CVWD's imported water supply capacities may potentially be reduced significantly due to reductions in MWD's storage reservoirs resulting from increases in regional demand.

Table 3.13: CVWD's Water Supply Availability & Demand Projections - Normal Water Year (AF)

		2025	2030	2035	2040	2045
Water Service Area Population		32,974	33,494	34,022	34,558	35,103
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
Demand	**Total Normal Demand**	**3,979**	**4,041**	**4,105**	**4,170**	**4,236**
	% of 2015-2020 Avg. Demand (3,869)	103%	104%	106%	108%	109%
Supply/Demand Comparison	Supply/ Demand Difference	1,769	1,707	1,643	1,578	1,512
	Supply/Demand (%)	144%	142%	140%	138%	136%

Table is intended only to show CVWD has the capacity to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (SBx7-7) multiplied by population projections shown above.
2. Imported Water Supply represents supply available to CVWD, if needed, based on the CVWD's FMWD's Tier 1 Limit of 2,154 AFY.
3. Groundwater Supplies based on the CVWD's adjudicated rights of 3,294 AF and 300 AF from Glendale during a normal year.

**This Table not intended to be a projection of CVWD's actual groundwater production or FMWD planned purchases. Amounts are based on FMWD's Tier 1 Limit and their Total Pumping Rights.*

**This Table is not intended to be a projection of CVWD's actual demand. Demand of 107.7 GPCD is based on average water demands from 2015 - 2020. Actual demand may be above or below the 107.7 GPCD in accordance with water usage needs in the service area.*

Table 3.14: CVWD's Water Supply Availability & Demand Projections - Single Dry Year (AF)

		2025	2030	2035	2040	2045
Water Service Area Population		32,974	33,494	34,022	34,558	35,103
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,412**	**4,481**	**4,552**	**4,624**	**4,697**
	Normal Year Demand	3,979	4,041	4,105	4,170	4,236
	% of Normal Year	111%	111%	111%	111%	111%
Supply/Demand Comparison	Supply/Demand Difference	1,336	1,267	1,196	1,124	1,051
	Supply/Demand (%)	130%	128%	126%	124%	122%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by single dry year increase of 111%

2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

Table 3.15: CVWD's Water Supply Availability & Demand Projections - Multiple Dry Years (2021 – 2025) (AF)

		2021	2022	2023	2024	2025
Water Service Area Population		32,564	32,666	32,768	32,871	32,974
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,531**	**4,781**	**4,836**	**4,565**	**3,789**
	Normal Year Demand	3,929	3,942	3,954	3,966	3,979
	% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison	Supply/Demand Difference	1,217	967	912	1,183	1,959
	Supply/Demand (%)	126.8%	120.2%	118.9%	125.9%	151.7%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by multiple dry year increases of 115%, 121%, 122%, 115%, and 95%.
2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

Table 3.16: CVWD's Water Supply Availability & Demand Projections - Multiple Dry Years (2026 – 2030) (AF)

		2026	2027	2028	2029	2030
Water Service Area Population		33,077	33,181	33,285	33,389	33,494
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,603**	**4,857**	**4,912**	**4,637**	**3,849**
	Normal Year Demand	3,991	4,004	4,016	4,029	4,041
	% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison	Supply/Demand Difference	1,145	891	836	1,111	1,899
	Supply/Demand (%)	125%	118%	117%	124%	149%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by multiple dry year increases of 115%, 121%, 122%, 115%, and 95%.
2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

Table 3.17: CVWD's Water Supply Availability & Demand Projections - Multiple Dry Years (2031 – 2035) (AF)

		2031	2032	2033	2034	2035
Water Service Area Population		33,599	33,704	33,810	33,916	34,022
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,676**	**4,933**	**4,989**	**4,710**	**3,910**
	Normal Year Demand	4,054	4,067	4,080	4,092	4,105
	% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison	Supply/Demand Difference	1,072	815	759	1,038	1,838
	Supply/Demand (%)	123%	117%	115%	122%	147%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by multiple dry year increases of 115%, 121%, 122%, 115%, and 95%.
2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

Table 3.18: CVWD's Water Supply Availability & Demand Projections - Multiple Dry Years (2036 – 2040) (AF)

		2036	2037	2038	2039	2040
Water Service Area Population		34,129	34,235	34,343	34,450	34,558
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,749**	**5,011**	**5,068**	**4,785**	**3,972**
	Normal Year Demand	4,118	4,131	4,144	4,157	4,170
	% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison	Supply/Demand Difference	999	737	680	963	1,776
	Supply/Demand (%)	121%	115%	113%	120%	145%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by multiple dry year increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

Table 3.19: CVWD's Water Supply Availability & Demand Projections - Multiple Dry Years (2041 – 2045) (AF)

		2041	2042	2043	2044	2045
Water Service Area Population		34,667	34,775	34,884	34,994	35,103
Supply	Imported Water	2,154	2,154	2,154	2,154	2,154
	Groundwater	3,594	3,594	3,594	3,594	3,594
	Total Supply	**5,748**	**5,748**	**5,748**	**5,748**	**5,748**
	Normal Year Supply	5,748	5,748	5,748	5,748	5,748
	% of Normal Year	100%	100%	100%	100%	100%
Demand	**Total Dry Demand**	**4,824**	**5,090**	**5,148**	**4,860**	**4,034**
	Normal Year Demand	4,183	4,196	4,209	4,222	4,236
	% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison	Supply/Demand Difference	924	658	600	888	1,714
	Supply/Demand (%)	119%	113%	112%	118%	142%

Table is intended only to show CVWD will be able to meet demand for all years per the following*:

1. Total Demand based on 107.7 GPCD (2015-2020 average demand) multiplied by population projections shown above and by multiple dry year increases of 115%, 121%, 122%, 115%, and 95%.
2. All other items derived in similitude to Table 3.13.

**See notes below Table 3.13 for explanation of groundwater supply / overall demand.*

3.10 ENERGY INTENSITY

3.10.1 OVERVIEW

New to the 2020 UWMP, it is required that every urban water supplier assess the energy required to distribute their water supply to their consumers or member agencies. The water supplier's energy intensity is required for to the preparation of an UWMP, as defined in CWC Section 10631.2(a). Energy intensity vary with climate, topography, source characteristics, proximity, and other factors. Therefore, urban water suppliers face issues related to the economic costs of the energy required for their operations, as well as issues related to the sustainable supply of energy and water. Knowing how much energy is needed to deliver water to customers is important because of its significance for the State's total energy demands, and for its implications regarding greenhouse gas (GHG) emissions and climate goals for the region and state.

This Section includes an assessment of the energy intensity of the water supply operation for FMWD. Energy is required for the pumping, conveyance, treatment and distribution of water, and for collection, treatment, and discharge of wastewater, and/or conveyance and distribution of recycled water. **Figure 3.21** illustrates a typical water use diagram.

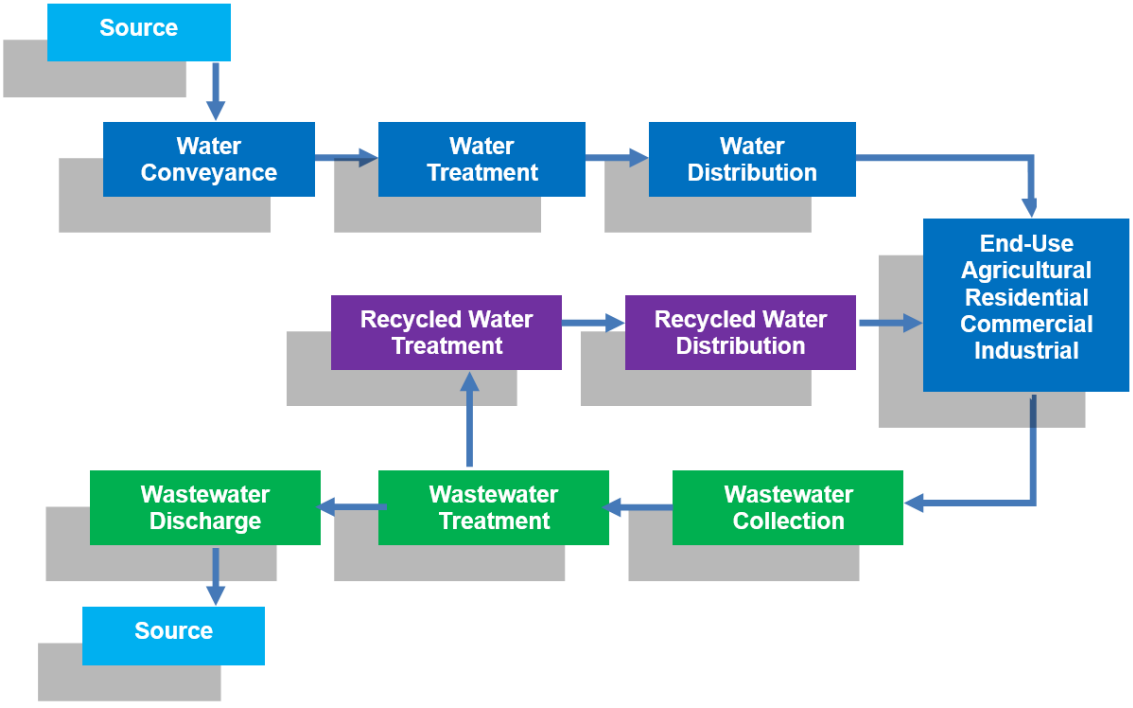


Figure 3.21: Typical Municipal Water Use Diagram

Energy intensity in respect to water supplies is a measure of unit energy consumption an urban water supplier expends per AF to convey water from the point where the supplier acquires the water to the point of delivery. Energy for public water and wastewater services are measured in kilowatt-hours of electricity, which is then normalized by water volume to express energy intensity in kilowatt-hour per acre-feet (kWh/AF).

Some of the main differences between energy use associated with various water supply sources are the distances the water must be transported from its origins (the amount of pumping necessary to harvest and distribute the water) and the location of treatment facilities in relation to the end users, among others.

3.10.2 Water Use and Energy Relationship

Energy production can emit a number of different types of Greenhouses Gas (GHGs). California's Air Resources Board recognizes that energy production accounts for between 30 and 40 percent of total GHG production in California, and include the following inventory of GHGs: Carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF3). These GHGs vary in magnitude in terms of their GHG strength, and therefore are converted to be equivalent to CO2 for the purposes of measuring GHG emission across the state. CO2 emissions (or the equivalent for other GHGs) are the common measurement for GHG emissions. Currently, statewide water uses accounts for nearly 20 percent of electricity use, and 30 percent of non-power plant related natural gas consumption. Water use and energy are linked in at least three critical ways:

- *Water pumping and purification*: The amount of energy used to pump water will depend upon the source (e.g., surface versus groundwater), the distance and height the water must be moved, and treatment requirements.
- *Wastewater treatment*: The amount of energy used in wastewater treatment plant typically ranges from 1,100 to 4,600 kWh per million gallons of wastewater treated.
- *Water heating*: In an average California home, 41 percent of the water is used for dishwashing, faucets, laundry, and bathing water that is often heated.

These amounts, in total, are so significant that one must also count the amount of GHGs from the fossil fuels that are burned to produce the oil, gas, coal and other combustibles which are then burned to produce the electricity. CVWD understand the water-energy nexus and aims to conserving water saves the energy that would have been used to convey, treat, and distribute the water. Reducing the energy consumption in water operations leads to the decreases production of GHGs.

3.10.3 Energy Usage and Intensity

In order to determine energy use related to water supply processes under CVWD's operational control, CVWD collected billing and energy quantity data provided by Southern California Edison (SCE) and GWP for 2020 (January 1, 2020 to December 31, 2020) representing the comprehensive one-year reporting period. The billing amounts for each facility were converted to an energy use quantity measured in kilowatt hours (kWh) for electricity. **Table 3.20** summarizes the energy intensity for CVWD. As shown, nearly 4.3 million kWh of energy was used to deliver over 4,216 AF of potable water. This equates to an energy intensity of 1,019.4 kWh/AF. DWR requires the reporting of energy intensity as kWh per million gallons (kWh/MG). Therefore, CVWD's energy intensity is 3,128.6 kWh/MG.

Table 3.20: CVWD Total Energy Intensity (DWR Table O1-B)

Enter Start Date for Reporting Period	1/1/2020	Urban Water Supplier Operational Control		
End Date	12/31/2020			
☐ Is upstream embedded in the values reported?		Sum of All Water Management Processes	Non-Consequential Hydropower	
Water Volume Units Used	*AF*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*4216*		*4216*
Energy Consumed (kWh)		*4297984*		*4297984*
Energy Intensity (kWh/vol. converted to MG)		*3128.6*	*#DIV/0!*	*3128.6*



SECTION 4: CONSERVATION MEASURES

2020 URBAN WATER MANAGEMENT PLAN



SECTION 4 CONSERVATION MEASURES

4.1 OVERVIEW

As a result of diminished existing supplies and difficulty in developing new supplies, water conservation is important to Southern California's sustainability. In Water Year 2018-2019, Governor Brown signed SB 606 and AB 1668 into law. The legislation required DWR, the State Water Resources Control Board (SWRCB), and three other state agencies to develop a long-term water conservation framework to "*make conservation a California way of life.*" In order to conform to the Water Action Plan, including meeting the SBx7-7 target (20 percent by 2020), many water agencies had to re-examine traditional conservation programs. Agencies statewide acknowledge that efficient water use is the foundation of its current and future water planning and operations policies.

As the California Urban Water Conservation Council (CUWCC) disbanded, MWD worked with other California water agencies to form the California Water Efficiency Partnership (CalWEP). CalWEP's mission is to maximize urban water efficiency and conservation throughout California by supporting and integrating innovative technologies and practices; encouraging effective public policies; advancing research, training, and public education; and building collaborative approaches and partnerships. The CUWCC (now CalWEP) drafted the Memorandum of Understanding Regarding Urban Water Conservation (MOU) in 1991. At that time, the MOU established 14 Best Management Practices (BMPs) which define policies, programs, practices, rules, regulations, or ordinances that result in the more efficient use or conservation of water. Eventually the original 14 BMPs were diminished to 5 BMPs as shown in **Section 4.1.1**.

This section of the UWMP satisfies the requirements of § 10631 (f) & (j) of the CWC and describes how CVWD implements each applicable BMP and how CVWD evaluates the effectiveness of the BMPs. This section also provides an estimate of existing conservation savings where information is available.

4.1.1 CalWEP BMPS

The updated CalWEP BMPs from 2015 will still be in effect for the 2020 UWMP. The BMPs are:

- ***BMP 1**: Utility Operations*
- ***BMP 2**: Public Education & Outreach*
- ***BMP 3**: Residential Programs*
- ***BMP 4**: Commercial, Institutional, & Industrial Programs*
- ***BMP 5**: Landscape Programs*

4.2 CVWD CONSERVATION PROGRAMS

CVWD recognizes the importance of water conservation and has made water use efficiency an integral part of water use planning. In 2012, CVWD became a signatory to the CUWCC (now CalWEP) by signing the MOU. As a member of CalWEP, CVWD is required to submit Bi-Annual Reports to CalWEP which document the implementation of each BMP. As Signatory to the CalWEP MOU, CVWD has committed to use good-faith efforts to implement all applicable BMPs. CVWD has maintained compliance with the BMPs since becoming a signatory. CVWD actively implements all of the measures with good faith effort by achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in each BMP's definition as described in the MOU. Water conservation is an integral part of the CVWD's water policies.

CVWD, in conjunction with FMWD and MWD, plays an active role in promoting water use efficiency in its service area. To this end, CVWD established Water Conservation Program (Phase I), which was adopted by the Board of Directors in April 2015 as Resolution No. 682, originally adopted in 2009. On May 2017, CVWD amended Resolution No. 681, which adopted a water conservation alert system. To this day, CVWD is continuously working with FMWD and MWD towards implementing the BMPs through means of various conservation measures.

Table 4.1 on the following page provides a status overview of CVWD's Conservation Measures.

Table 4.1: Conservation Measures

BMP	Description
BMP 1: Utility Operations	*Deals with water waste prohibitions, water efficiency ordinances, metering, conservation pricing, and other items related to managing water use.*
BMP 2: Public Education & Outreach	*Deals with outreach efforts including emails, newsletters, advertisements, presentations, promotions, etc. related to outreach & education.*
BMP 3: Residential Programs	*Deals with showerheads, faucets, toilets, turf removal, and leak detection surveys related to residential water use.*
BMP 4: Commercial, Industrial, & Institutional Programs	*Deals with toilets, urinals, steamers, cooling towers, food/restaurant equipment, medical equipment, and items related to commercial, institutional, and industrial water use.*
BMP 5: Landscape Programs	*Deals with establishing parameters for large landscapes, including measurements, budgets, audits, prohibitions, incentives, etc., related to large landscapes.*
Other	Any additional BMPs supported by CVWD are listed on the following pages.

4.2.1 BMP 1: UTILITY OPERATIONS

This CalWEP BMP deals with water waste prohibitions, water efficiency ordinances, metering, conservation pricing, and other items related to managing water use.

WATER WASTE PROHIBITION ORDINANCE

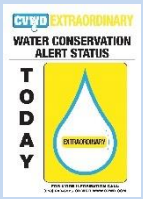
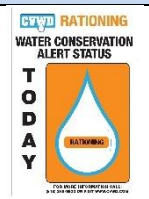
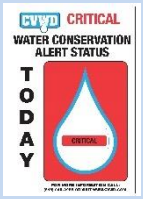
CVWD adopted Water Conservation Alert System (Resolution No. 681) and Water Conservation Program (Phase I) (Resolution No. 682) as water conservation ordinances.



Figure 4.1: Water Waste is Prohibited by District Ordinance

Water Conservation Alert System – The Water Conservation Alert System has been amended as a Phase II of the goal to reduce the risk and severity of water shortages and to notify its customers of the current conservation stage. The stages are color coded and described in **Table 4.2** on the following page.

Table 4.2: Water Conservation Alert System Codes

Alert Sign	Code	Description (as mentioned in Res. No. 681)
	Blue	Color Code "Blue" is defined as the Normal Water Conservation Alert, FMWD can meet all Member Agency demands. Standard water conservation applies as defined in Appendix G of CVWD's Rules and Regulations. **Currently (2021), CVWD has issued this alert as its current conservation status.**
	Green	Color Code "Green" is defined as an Increased Voluntary Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.
	Yellow	Color Code "Yellow" is defined as an Extraordinary Conservation Alert, when MWD is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.
	Orange	Color Code "Orange" is defined as a Rationing Conservation Alert, when MWD has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as further detailed in Appendix G of CVWD's Rules and Regulations.
	Red	Color Code "Red" is defined as a Critical Water Conservation Alert, when water supplies are drastically reduced. Customers are requested to minimize indoor water use and water outdoors no more than one (1) day per week.
	Purple	Color Code "Purple" is defined as an Emergency Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are requested to minimize indoor water use and curtail all outdoor water use.

Water Conservation Program (Phase I) – The Water Conservation Program (Phase I) was amended in April 2015 stating waste water prohibitions to its customers. The prohibitions apply to the following:

- Water hose usage
- Leaks
- Windy and rainy days
- Construction water restrictions
- Hotels/Motels
- Prohibiting outdoor watering during or 48 hours following a rain event
- Overspray and Runoff
- Irrigation Times
- Vehicle Washing
- Fire hydrants
- Reporting of waste water
- New Development
- Fountains
- Hand Watering
- Swimming pools
- Drinking water
- Pre-rinse spray valve

A detailed description of each prohibition is shown in **Section 5**.

CVWD Rules and Regulations contain a Water Waste Prohibition Policy allowing termination of water service to customers who do not comply with a notice to remedy their wasteful practice. Additionally, the Rules and Regulations contain a leak repair policy whereby a financial incentive (one-time bill adjustment) is provided for customers who promptly fix internal/external plumbing leaks. The aforementioned sections of the Rules & Regulations are included in **Appendix C**.

The CVWD staff works cooperatively with property owners to reduce water waste. CVWD's billing software automatically flags high usage thresholds from meter reading data for additional staff follow-up. Also, CVWD's field staff reports all visible water waste situations observed to Customer Service for additional follow-up by CVWD's staff.

CVWD has not conducted an evaluation of the water savings attributable to this BMP.

METERING

All CVWD water accounts are metered and billed bi-monthly based on commodity rates. CVWD has a commodity rate structure based upon a billing unit of 1,000 gallons, commonly stated as a unit. The water rate structure is a three-tier increasing block rate. A summary of the water rates is shown in **Table 4.3**.

CVWD began working on the Water Meter Replacement Program in 2012 to replace 3/4" & 1" water meters that were beyond their useful life with new "Smart Meters". The plan was to replace 4,000 meters from FY 12/13 to FY 15/16. CVWD's field crews completed this task and continue to replace meters. To date, 5,212 meters have been replaced.

CVWD is currently applying for grants to fund replacement of the lager sized water meters.

The "Smart Meter" that CVWD chose to replace the older meters with was the Sensus iPERL meter. The iPERL meter offers low flow accuracy with high flow durability. The innovative magnetic technology allows for the capture of previously unmeasured low flow and drives additional revenue for the utility. The meter is 100 percent lead-free with no moving parts and maintains its accuracy over a 20-year lifetime. The iPERL has Advance Metering Infrastructure (AMI) connectivity and 14 conditions. Diagnostic and lifetime alarms allow for quick resolution to issues experienced in the field.



Figure 4.2: Water Meter with AMI Technology

In August 2020, CVWD awarded a consulting contract to UtiliWorks Consulting, Inc. (UtiliWorks) to provide professional services in assisting CVWD for the procurement and installation of the AMI Communications Network as the next phase towards CVWD having a fully function AMI system.

CVWD is currently under contract with Aqua-Metric for the procurement and installation of the AMI Communication Network project to be completed by the end of 2021.

CONSERVATION PRICING

All of CVWD's utility water accounts are metered and billed bi-monthly based on commodity rates. CVWD has a commodity rate structure based upon a billing unit of 1,000 gallons, commonly abbreviated as a unit.

CVWD does not have a way of measuring wastewater directly from a residential unit to the sewer, so to get a reasonable estimate of the amount of flow for wastewater, CVWD bases it on a customer's average water use during the winter months (December through March). Most water during the winter is used indoors and goes into the sewer system. Typically, outdoor irrigation is minimal during the winter months.

CVWD calculates your bimonthly wastewater charge based on the previous year average winter-time water use (i.e., 2021 wastewater charge will be based on December 2019 to March 2020 average winter-time water use) and it will remain in effect for a full year (from July 2021 to June 2022). In July of each year, your bimonthly wastewater charge will be recalculated based on the previous year average winter water use.

The new rate structure was implemented in the 2016/2017 fiscal year and was developed as part of a cost-of-service study and reflects the cost of providing wastewater service to individual residences.

CVWD offers a Low-Income Program to qualifying residents where a 20 percent discount on a combined bill for water (up to 26 units), wastewater and/or wastewater standby charges. This program may be modified or terminated without prior notice and is provided to qualified customers on a first-come, first-served basis until the program funds are no longer available.

CVWD has not conducted an evaluation of the water savings attributable to this BMP, however, CVWD will continue to make customers aware of the rate structure and use it as a tool to affect water conservation.

Since the 2015 UWMP, CVWD has increased their rates towards efforts of water conservation. **Table 4.3** below provides a summary of CVWD's water and sewer rate structures. **Table 4.4** provides a summary of the rates stated in the 2015 UWMP for comparison.

Table 4.3: Current Water & Sewer Rates (as of 09/01/2019)

Sector	Water		Sewer	
	Rate Structure	Rate	Rate Structure	Rate
Single-Family	Tier 1: 0 – 10 Units	$5.17/Unit	--	Bi-Monthly: $47.79 $1.93/Unit
	Tier 2: 11 – 26 Units	$8.14/Unit		
	Tier 3: 27+ Units	$12.27/Unit		
Multi-Family	>0 Units	$7.33/Unit	--	Bi-Monthly: $31.25 $2.15/Unit
Commercial / Institutional	>0 Units	$7.33/Unit	Customer Charge	Bi-Monthly: $0
			Quantity Charge per 1,000 gal of water use	Bi-Monthly: $5.10
			Minimum Charge for Each User	Bi-Monthly: $31.25
Schools	Elementary Schools	7.33	Elementary Schools	$84.86 per 100 ADA[1]
	Middle Schools	7.33	Middle Schools	$169.73 per 100 ADA
	High Schools	7.33	High Schools	$254.59 per 100 ADA Customer Charge: $31.25
Irrigation	Tier 1: 0 – 80 Units	$5.66/Unit	Not Applicable	Not Applicable
	Tier 2: 81+ Units	$10.89/Unit		

[1] ADA = Average Daily Attendance

Table 4.4: Past Water & Sewer Rates on 2015 UWMP

Sector	Water		Sewer	
	Rate Structure	Rate	Rate Structure	Rate
Single-Family	Tier 1: 1 – 10 Units	$4.61/unit	Flat Rate	$67.50/Mo
	Tier 2: 11 – 33 Units	$5.96/unit		
	Tier 3: 34 – 50 Units	$8.50/unit		
	Tier 4: 51 + Units	$11.39/unit		
Multi-Family	> 0 Units	$5.96/Unit	Flat Rate	$67.50
Commercial / Institutional	> 0 Units	$5.96/Unit	Customer Charge	$2.10
			Quantity Charger per 1000 Gal of Water Usage	$5.50
			Minimum Charge for Each Commercial User	$67.50
Schools	Primary Schools based on Average Daily Attendance	$4.53/unit	Primary Schools based on Average Daily Attendance	$81.00/100 students
			Customer Charge	$2.10
	Secondary Schools based on Average Daily Attendance	$4.53/unit	Secondary Schools based on Average Daily Attendance	$81.00/100 students
			Customer Charge	$2.10
Irrigation	Tier 1: 1 – 70 Units	$5.96/unit	Not Applicable	Not Applicable
	Tier 2: 71+ Units	$11.39/unit		

PROGRAMS TO ASSESS & MANAGE DISTRIBUTION SYSTEM REAL LOSS

CVWD monitors water loss in its distribution system on an annual basis. It is CVWD's highest priority to repair all known distribution system and service connection leaks immediately. In the past five years, non-revenue water averaged 8.5 percent.

A significant portion of non-revenue water could be attributed to meter inaccuracy. As mentioned previously on page 4-5, CVWD embarked on a meter replacement program starting mid-June 2012 to replace their meters installed to AMIs. CVWD is currently under contract with Aqua-Metric for the procurement and installation of the AMI Communication Network project to be completed by the end of 2021.

Distribution system leaks are the most-likely culprit for loss of water. CVWD has and will be continuing on its water main replacement program and is planning on a 20-year schedule to replace its deficient pipelines. CVWD prioritized its pipe replacement program by leak history, pipe size, fire-flow rates, and age. CVWD will be working on an updated water master plan, which will further address deficiencies in the system within the next few years.

CVWD has not developed a formal methodology to estimate the water savings attributable to this BMP. There are, however, real water savings as a result of the proactive pre-screening leak detection and repair programs, and the completion of the AMI program, which maintain an acceptable non-revenue water loss of 8 percent.

4.2.2 BMP 2: PUBLIC EDUCATION & OUTREACH

This CalWEP BMP deals with outreach efforts including emails, newsletters, advertisements, presentations, promotions, etc., related to outreach & education.

SCHOOL PROGRAMS

All of CVWD's public schools within CVWD's service area fall under the Glendale Unified School District. CVWD has been working with GWP to maintain a strong commitment to support educational excellence in the Glendale Unified schools. With this in mind, GWP provides "LivingWise", a water and energy classroom program to sixth grade students in both public and private Glendale schools.

The program was created by a group of teachers for the National Energy Foundation. It is a comprehensive set of 17 hands-on learning activities that use science and other core subjects so that "LivingWise" means being "water wise", "energy wise", and making "wise decisions" to protect the environment.

Each teacher and student receives a LivingWise 86-page workbook and a kit filled with such items as low-flow showerheads, kitchen faucet aerators and toilet leak detection tablets as well as an energy efficient nightlight, a fluorescent light bulb and a CD-Rom computer disk with a "conservation entertainment experience". Because many of the lessons require the students to complete an activity at home, parents and other family members learn conservation practices right along with their students. At the end of the program, the students practice what they have learned by installing the water and energy saving kit items in their homes.

In addition to Glendale's program, CVWD sponsors school assemblies from "Shows that Teach" and "Mad Science" for both public and private schools. Both assemblies offer different interactive lessons that always include water conservation and are geared towards the water cycle, water runoff, water quality, and water supplies and distribution systems. Each elementary school in CVWD's service area is invited to participate every year.

Currently, CVWD does not have a method to evaluate the water savings attributable to this

BMP, however, CVWD will continue to administer this BMP for its ability to educate and interact with customers.

FMWD also offers volunteering opportunities, called Foothill Water Conservation Corps, to assist in water conservation and education outreach. These volunteers will participate in presentations for water conservation at clubs or events, setting up and manning booths at fairs and other community functions. Not only does this aid in spreading awareness but provides incentives for students to earn community service hours at a professional setting.

GENERAL PUBLIC INFORMATION (BROCHURES, MAILINGS, WEBSITE, ETC.)

CVWD provides water conservation literature, brochures, posters, landscape advice and tips, home water conservation devices etc., directly to the public and its customers. These materials are available at CVWD's Administrative Office and during special events. In addition, CVWD posts online classes and other information on its Facebook page. CVWD also maintains a library of water resource education conservation films and videos for loan to local organizations. MWD will also provide speakers to various groups upon request.

Currently, CVWD does not have a method to evaluate the water savings attributable to this BMP; however, CVWD will continue to administer this BMP for its ability to educate and interact with customers.

4.2.3 BMP 3: RESIDENTIAL PROGRAMS

This CalWEP BMP deals with showerheads, faucets, toilets, and leak detection surveys related to residential water use.

RESIDENTIAL PROGRAMS

Water Survey Assistance - CVWD offers formal water audits for qualified residents (those using over 22 units of water per billing period). There is a budget limit of $6,000 per year which covers 35 audits. The service is performed by a contractor, WaterWise Consulting.



Figure 4.3: Residential Water Surveys

In addition to water audits, CVWD's customer service staff respond to residential and commercial requests for investigation of high-water bills. The investigation consists of meter

leak tests, meter accuracy testing, property leak checks, irrigation system analysis, or a complete "on-premises" water audit. A water bill adjustment is given to all customers who demonstrate that they have repaired an on-site leak along with proof of the repair. This appears to be an effective water conservation measure which potential savings are outlined on the audit forms.

In addition, CVWD's utility billing software identifies customers who exceed a higher-than-normal usage threshold in a given billing period, which prompts staff to further investigate as described above. Staff costs for this included measure are part of customer service duties.

CVWD also participates in various FMWD/MWD programs aimed at increasing landscape water use efficiency for residential customers, including rebate programs that provide financial incentives. SoCal Water$mart, formerly Save Water Save A Buck, is the conservation rebate program offered through MWD. The program offers rebates for high-efficiency clothes washers (HEWC), premium high-efficiency toilets (PHET), weather-based irrigation controllers (WBIC), soil moisture sensor system (SMSS), rotating sprinkler nozzles, rain barrels/cisterns, and turf removal, as described below.

- ***Weather-Based Irrigation Controllers Program*** – This program, previously called the "Smart Timer Rebate Program," started in FY 2004/05. Under this regional program, residential and small commercial properties are eligible for a rebate when they purchase and install a weather-based irrigation controller, which has the potential to save 13,500 gallons a year per residence. Rebates start at $80 per controller for landscapes less than 1 acre in area and $35 per station for more than 1 acre.

- ***Rotating Nozzle Rebate Program –*** This rebate program started in 2007 and is offered to both residential and commercial customers. Through this program, site owners will purchase and install rotary nozzles, which can use up to 20 percent less water than conventional fan spray nozzles, in existing irrigation systems. These sprinklers reduce runoff onto sidewalks and into local storm drain system and provide uniform water distribution onto the landscape. MWD offers $2 per nozzle with a minimum of 30 nozzles.

- ***Rain Barrels & Cisterns Program –*** Residential and commercial customers can receive rebates for installing rain barrels and/or cisterns to collect rainwater for re-use for watering their landscapes. Customers may receive rebates starting at $35 per barrel or $250-$350 per cistern. The barrels and cisterns must adhere to specified design guidelines. For the past seven years, CVWD participated in a Rain Barrel and Drought-Tolerant Landscape Event that took place at Descanso Gardens (La Cañada Flintridge,

CA). CVWD co-sponsored the event along with FMWD and the Cities of Burbank, Glendale, Pasadena, and South Pasadena. As a result of the event, over 1,000 rain barrels were purchased by local residents.

- ***Soil Moisture Sensor System Program*** – For large residential sites, a soil moisture sensor, which measures soil moisture content in the active root zone, can be installed to receive rebates starting at $80 or $35 per SMSS. The sensor must be connected to a compatible irrigation system controller.

- ***Turf Removal Program*** – Through this program, residential and small commercial customers of participating retail water agencies are eligible to receive a minimum of $2 per square foot of turf removed for qualifying projects.

RESIDENTIAL PLUMBING RETROFIT

CVWD participates in the distribution of low-flow showerheads, aerators, hose shut-off nozzles, water buckets, and toilet-tank leak detection kits at its customer service counter and various local outdoor events. Assuming each device saves 3 gallons per day, approximately 3.4 AF are saved annually.

Additionally, CVWD through FMWD/MWD offered rebates through SoCal Water$mart program for high-efficiency clothes washers and premium high-efficiency toilets.

CVWD also works with the local building/planning departments of the City of La Cañada-Flintridge, City of Glendale, and County of Los Angeles to assure enforcement of the ultra-low-flush toilet (ULFT) installation requirements for new construction, and supports the prohibition of the sale of toilets using more than 1.1 gallons per flush (gpf). Developers' needs for fire-flow certificates, "will-serve" certificates, and ultimately water service connections are used as ways to ensure compliance.

Another program offered by MWD offered rebates for HETs (1.28 gpf) for both residential and CII customers. Starting November 11, 2015, rebates are only eligible for Premium HETs (1.1 gpf or less) and no longer available for HETs at 1.28 gpf.

HIGH-EFFICIENCY WASHING MACHINE REBATES

Starting in 2002, CVWD passed along MWD's high efficiency washing machine rebate. CVWD promotes the program on its website and with flyers posted at the administration office and distributed at local events.



Figure 4.4: High-Efficient Washing Machines

Residents in CVWD's service area are eligible to receive a $85 rebate when they purchase a new High Efficiency Clothes Washer (HECW) as CVWD supplements MWD's rebate. Rebates are available on a first-come, first-served basis, while funds last. To qualify for a rebate, the HECW must have a water factor of 4.0 or less. An HECW with a water factor of 4.0 will use approximately 14 gallons of water per load compared to a conventional top-loading clothes washer which can use 40 gallons or more per load. Depending on use, these machines can save 10,000 gallons of water per year. Participants are encouraged to contact their local gas and/or electric utility as additional rebates may be available.

4.2.4 BMP 4: COMMERCIAL, INDUSTRIAL, & INSTITUTIONAL PROGRAMS

CVWD has a relatively small number of commercial accounts and no industrial accounts. The vast majority of businesses within CVWD do serve as small mom and pop shops or local restaurants. CVWD currently offers financial incentives under MWD's SoCal Water$mart Program, which offers rebates for various water efficient devices to some CII customers.

***SoCal Water$mart* –** MWD launched this program on July 1, 2008 and offers rebates to assist CII customers in replacing high-flow plumbing fixtures with low-flow fixtures. Rebates are available only on those devices listed in **Table 4.5** and must replace higher water use devices. Installation of devices is the responsibility of each participant. Participants may purchase and install as many of the water saving devices as are applicable to their site.

CVWD also provided a list of restaurants to MWD for retrofit of a pre-rinse spray valve. Due to very limited number of CII customers, CVWD has no formal plans to initiate an active CII replacement program beyond the programs offered by MWD.

Table 4.5: CII Retrofit Devices & Rebate Amounts under SoCal Water$mart Program

Retrofit Device	Rebate Amount
High Efficiency Toilet	$40
Ultra-Low & Zero Water Urinal	$200
Connectionless Food Steamers	$485 per compartment
Air-Cooled Ice Machines	$1,000
Cooling Tower Conductivity Controller	$625
pH / Conductivity Controller	$1,750
Dry Vacuum Pumps	$125 per 0.5 HP
Weather Based Irrigation Controller and Computer Irrigation Controller	$35 per station and $80 per controller
Rotating Nozzles for Pop-up Spray Head Retrofits	$2 (minimum of 30 per rebate)

4.2.5 BMP 5: LANDSCAPE PROGRAMS

CVWD supports large landscape conservation through FMWD/MWD's regional programs including:

SoCal Water$mart Program – CVWD, through FMWD/MWD, offered rebates through SoCal Water$mart program for landscape plumbing retrofitting. Landscape rebates are available for WBIC, SMSS, rotating sprinkler nozzles, and turf removal. The available landscape programs are described in **Section 4.2.3** and listed below:

- Weather-Based Irrigation Controllers Program (WBIC)
- Rotating Nozzle Rebate Program
- Rain Barrels & Cisterns Program
- Soil Moisture Sensor System Program (SMSS)
- Turf Removal Program

California Friendly Landscape Training – On behalf of its member agencies, FMWD supports MWD's California Friendly Landscape and Gardening Training, which provides education to residential homeowners and professional landscape contractors on a variety of landscape water use efficiency practices. These classes are hosted by MWD's member agencies to encourage participation across the county. The Professional Training Program

course consists of four consecutive classes in landscape water management, each building upon principles presented in the preceding class. Each participant receives a bound handbook containing educational materials for each class. These classes are offered throughout the year and taught in both English and Spanish languages.

In addition, CVWD takes advantage of regional and local efforts which target and market to large landscape properties using bill inserts and direct marketing efforts. CVWD also sponsors three or more independent water efficient gardening classes per year. Topics include turf removal, design, placement, irrigation, plant selection, composting, gardening with worms, and efficient watering practices.

4.2.6 OTHER FMWD CONSERVATION MEASURES

WHOLESALE AGENCY PROGRAMS

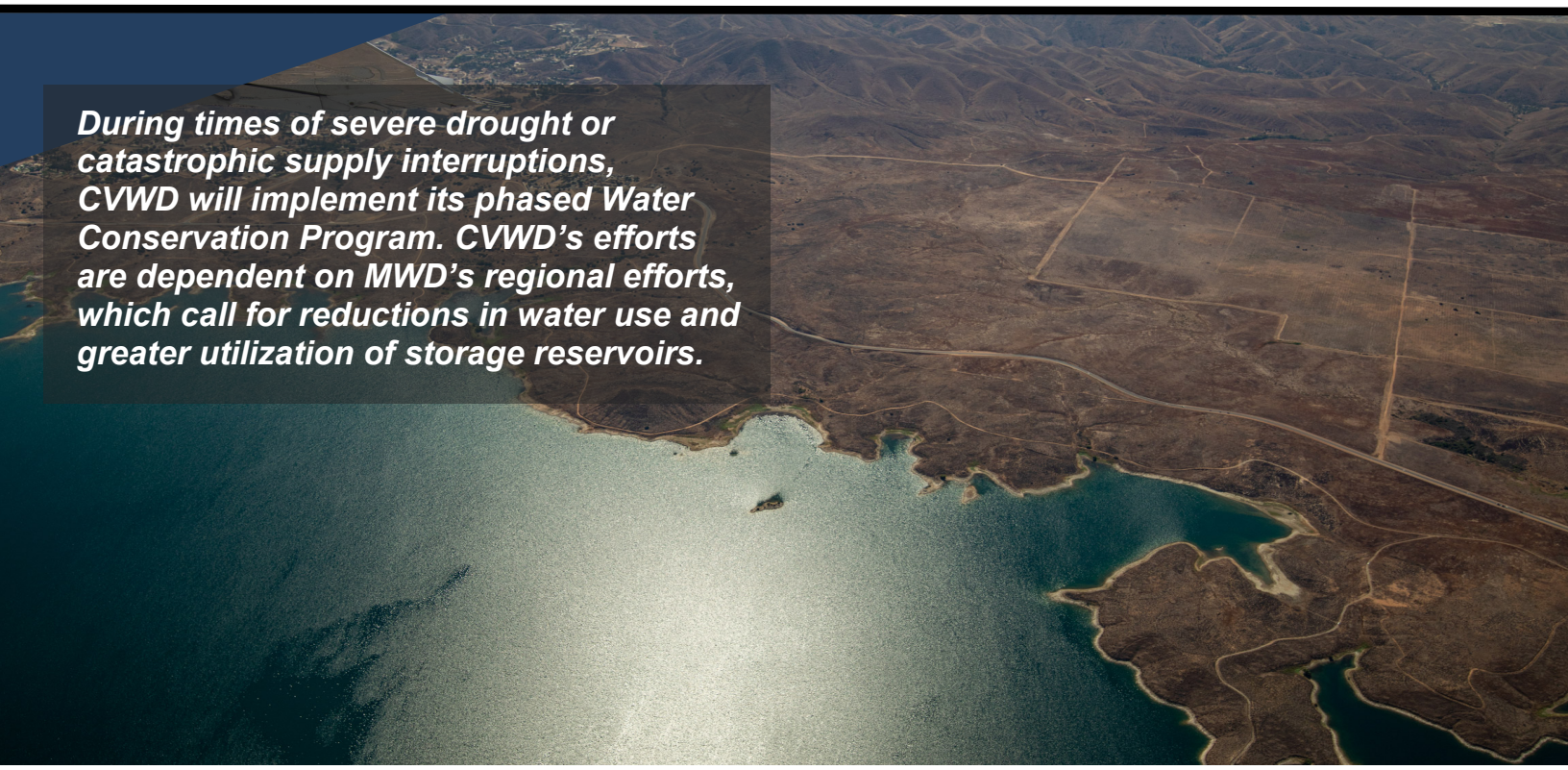
CVWD is a retail water agency. Therefore, this BMP does not apply. CVWD is a member agency of FMWD. FMWD provides financial incentives or equivalent resources, as appropriate and beneficial to distributing retail agencies, to advance water conservation efforts and effectiveness.

CVWD is currently budgeting approximately $50,500 per year for its conservation programs. The funding amounts for FY 2020-21 are shown in **Table 4.6**.

Table 4.6: CVWD's Water Use Efficiency Programs Budget for FY 20-21

Program Description	Budget
Water Conservation Expenses	$25,500
Water Conservation Rebates	$5,000
Community Outreach	$20,000
Total	**$50,500**

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SECTION 5: CONTINGENCY PLANNING

2020 URBAN WATER MANAGEMENT PLAN



SECTION 5 WATER SHORTAGE CONTINGENCY PLAN

5.1 OVERVIEW

Water supplies may be interrupted or reduced significantly in a number of ways, including droughts, earthquakes, and power outages, which hinder a water agency's ability to effectively deliver water. The ability to manage water supplies in times of drought or other emergencies is an important part of water resources management for a community.

Recent water supply challenges throughout the American Southwest and the State of California have resulted in the development of a number of policy actions that water agencies would implement in the event of a water shortage. In Southern California, the development of such policies has occurred at both the wholesale and retail level. This section addresses elements related to the urban water supplier's Water Shortage Contingency Plan describing new and existing policies that MWD, FMWD, and CVWD have in place to respond to water supply shortages, including a catastrophic interruption and greater than a 50 percent reduction in water supply.

5.2 WATER SUPPLY RELIABILITY ANALYSIS

5.2.1 WATER SERVICE RELIABILITY ASSESSMENT

Southern California is expected to experience an increase in regional demands in the years 2025 through 2045 as a result of population growth. Although increases in demand are expected, future demands are effectively limited due to the requirements of SBx7-7. It can be reasonably expected that the majority of agencies have met or were near their compliance targets for 2020 and will continue to meet, or will soon meet, their per-capita usage limit in the future.

The data in the MWD 2020 UWMP shows supply reliability projections for average and single dry years and is important to effectively project and analyze supply and demand over the next 25 years for many regional agencies. Projected supplies during single and multiple dry year scenarios indicate MWD's projected supply will exceed its projected single dry year demands in all years. Likewise, for average years, MWD supply exceeds projected demands for all years.

Due to the semi-arid nature of CVWD's climate and as a result of past drought conditions, CVWD is vulnerable to water shortages due to its climatic environment and seasonally hot summer months. **Section 3** describes the water availability during single and multiple dry year scenarios. **Tables 5.1**, **5.2**, and **5.3** summarize the supply and demand comparisons during normal, single-dry year, and multiple dry year, respectively. As shown, CVWD is capable of providing a reliable supply of water to meet the future demands.

Table 5.1: Normal Year Supply & Demand Comparison (AF) (DWR Table 7-2 R)

	2025	2030	2035	2040	2045
Supply totals	5,748	5,748	5,748	5,748	5,748
Demand totals	3,979	4,041	4,105	4,170	4,236
Difference	1,769	1,707	1,643	1,578	1,512

Table 5.2: Single Dry Year Supply & Demand Comparison (AF) (DWR Table 7-3 R)

	2025	2030	2035	2040	2045
Supply totals	5,748	5,748	5,748	5,748	5,748
Demand totals	4,412	4,481	4,552	4,624	4,697
Difference	1,336	1,267	1,196	1,124	1,051

Table 5.3: Multiple Dry Year Supply & Demand Comparison (AF) (DWR Table 7-4 R)

		2025	2030	2035	2040	2045
First year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,531	4,603	4,676	4,749	4,824
	Difference	1,217	1,145	1,072	999	924
Second year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,781	4,857	4,933	5,011	5,090
	Difference	967	891	815	737	658
Third year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,836	4,912	4,989	5,068	5,148
	Difference	912	836	759	680	600
Fourth year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,565	4,637	4,710	4,785	4,860
	Difference	1,183	1,111	1,038	963	888
Fifth year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	3,789	3,849	3,910	3,972	4,034
	Difference	1,959	1,899	1,838	1,776	1,714

5.2.2 FIVE-YEAR DROUGHT RISK ASSESSMENT

During a five-year drought, CVWD may import water to meet demands in excess of its adjudicated pumping right of 3,294 AFY as necessary. Imported water supplies, like groundwater, are subject to demand increases and reduced supplies during dry years; however, MWD modeling in its 2020 UWMP, as referenced in **Tables 3.8** and **3.9** in **Section 3**, results in 100 percent reliability for full-service demands through the year 2045 for all climatic conditions. Based on the conditions described above, CVWD anticipates the ability to meet water demand for all climatic conditions for the near future.

New to the 2020 UWMP is the Drought Risk Assessment (DRA) over a 5-year period examining the reliability of CVWD's water supplies. **Table 5.4** shows the results of the analysis. The analysis was done utilizing DWR's DRA Planning Tool to determine supply and demand projections, and to analyze CVWD's vulnerability to droughts. The tool also allows water purveyors to utilize potential water usage saving or supply augmentation methods to mitigate supply shortfalls. These water usages saving methods (restrictions) are further discussed in the WSCP. As shown, CVWD is capable to meet the projected demands based on the estimated water supplies during drought conditions without the need for WSCP stage implementation and supply augmentation.

Table 5.4: Five-Year Drought Risk Assessment (AF) (DWR Table 7-5)

	2021	2022	2023	2024	2025
Total Water Use	3,929	3,942	3,954	3,966	3,979
Total Supplies	5,741	5,745	5,748	5,748	5,748
Surplus/Shortfall w/o WSCP Action	1,812	1,803	1,794	1,782	1,769
Planned WSCP Actions (Use Reduction and Supply Augmentation)					
Supply Augmentation Benefit from WSCP Response	0	0	0	0	0
Use Reduction Savings Benefit from WSCP Response	0	0	0	0	0
Revised Surplus/Shortfall	1,812	1,803	1,794	1,782	1,769
Resulting % Use Reduction from WSCP Action	0%	0%	0%	0%	0%

Response to a future drought would follow the water use efficiency mandates of CVWD's Water Conservation Program along with implementation of the appropriate stage of regional plans, such as MWD's Water Surplus Drought Management (WSDM) Plan as described later in this section.

5.3 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

Under CWC Section 10632(a)(2), beginning by July 1, 2022, each urban water supplier is required to prepare their annual water supply and demand assessment (Annual Assessment) and submit an Annual Water Shortage Assessment Report to DWR. The Annual Water Shortage Assessment Report will be due by July 1 of every year, as required by CWC Section 10632.1.

This section outlines CVWD's procedures used in conducting an Annual Assessment, including the following: 1) written decision-making process for determining water supply reliability; and 2) key data inputs and assessment methodology for evaluating the water supply reliability for the current year and one dry year.

5.3.1 DECISION-MAKING PROCESS

CVWD's Annual Assessment will be mostly based on daily recorded water production and supply figures, which are reported to the General Manager on a daily basis throughout the year. Water consumption is monitored regularly through the metering of all CVWD service connections in its distribution system. To determine its water supply reliability and actual reductions in water use during declared water shortages or emergencies, CVWD can rely on its daily records as well as the CVWD Water Production Reports including the monthly totals. These periodical analyses are used by CVWD to manage resources to meet projected demands and adjust to changing conditions (i.e., precipitation) throughout the year.

Starting in 2022, CVWD staff will submit and present a finalized Annual Water Shortage Assessment Report to the Board of Directors for approval by June each year. CVWD staff will also present determination of recommended water shortage response actions deemed appropriate as a result of the Annual Assessment. Following approval, CVWD staff will submit the approved Annual Water Shortage Assessment Report to DWR by July 1 of every year. The functional procedures for the decision-making process are depicted in the following timeline shown in **Figure 5.1**.

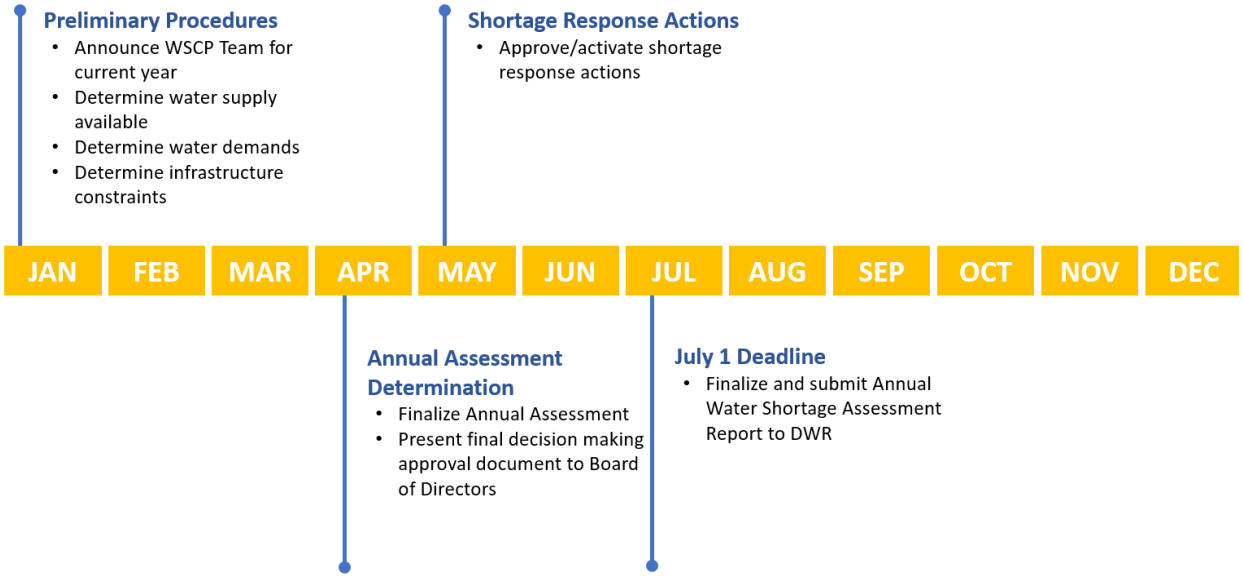


Figure 5.1: Sample Annual Assessment Decision-Making Process Timeline

5.3.2 KEY DATA INPUTS AND ASSESSMENT METHODOLOGY

This section defines the key data inputs and assessment methodology used to evaluate the water supply reliability for the anticipated conditions for the current year and for one dry year that follows. The Annual Assessment determination will focus on the current year unconstrained demand, infrastructure constraints, and total water supply availability. Moreover, the Annual Assessment will consider the current year's weather, population growth, policies in place that will impact demands, and other influencing factors. The current year available supply will incorporate the hydrological regulatory conditions for the current year and following dry year.

LOCALLY APPLICABLE EVALUATION CRITERIA

The locally applicable evaluation criteria that will be consistently relied on for each Annual Assessment include the following:

1) Assumed unconstrained demand (i.e., demand without any conservation measures) for current year and one dry year
2) Assumed total water supply availability for current year and one dry year
3) Existing infrastructure capabilities and plausible constraints
    - Any known issues with the water facilities (including water quality conditions limiting local sources)

- Planned power outages for operation and maintenance
- New construction and repairs
- Environmental mitigation measures
- Other constraints that may affect near-term water supply reliability

WATER SUPPLY SOURCES DESCRIPTION AND QUANTIFICATION

As part of the Annual Assessment, the total available water supply evaluation criteria will comprise of CVWD's water supply sources as shown and quantified in **Tables 5.5** and **5.6**.

Table 5.5: CVWD Water Supplies in 2020 (AF) (DWR Table 6-8 Retail)

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Purchased or Imported Water	from FMWD	2,141	Drinking Water	2,154
Groundwater (not desalinated)	CVWD Wells	1,933	Drinking Water	3,294
Groundwater (not desalinated)	Well #16 (GWP)	142	Drinking Water	500
Total		4,216		5,948

Table 5.6: Projected CVWD Water Supplies (AF) (DWR Table 6-9 Retail)

Water Supply	Additional Detail on Water Supply	Projected Water Supplies				
		2025	2030	2035	2040	2045
Purchased or Imported Water	MWD via FMWD	2,154	2,154	2,154	2,154	2,154
Groundwater (not desalinated)	CVWD Wells	3,294	3,294	3,294	3,294	3,294
Groundwater (not desalinated)	Well #16 (GWP)	300	300	300	300	300
Total		5,748	5,748	5,748	5,748	5,748

Imported Water Purchases

CVWD receive its imported water supply from MWD through their wholesaler FMWD. Supply from MWD originates from the Colorado River and the Sacramento-San Joaquin River Delta in Northern California. Currently, CVWD supply is comprised of 48 percent imported water and is projected to able to have access of its full Tier 1 limit supply with FMWD of 2,154 AF as shown in **Table 5.6**.

Groundwater Supply

CVWD utilizes groundwater from the Verdugo Groundwater Basin. CVWD draws from this groundwater through 12 of its wells which fulfills 52 percent of its total supply. CVWD's current safe yield of the Basin is 3,294 AFY as shown in **Table 5.6**. Furthermore, CVWD has agreements with GWP to produce additional groundwater through Well #16 to obtain an additional 300 AFY. Groundwater supplies within the Verdugo Basin have remained stable throughout the recent drought during 2012 – 2016. As a result, groundwater production rights within the basin will continue to remains the same into the future until otherwise mandated for reduction by the Upper Los Angeles River Area (ULARA) Watermaster.

5.4 SHORTAGE STAGES AND SHORTAGE RESPONSE ACTIONS

5.4.1 MWD STAGES OF ACTION

WATER SURPLUS & DROUGHT MANAGEMENT PLAN (WSDM)

CVWD works in conjunction with FMWD and MWD to implement conservation measures within the framework of MWD's Water Shortage and Drought Management (WSDM) Plan. The WSDM Plan was developed in 1999 by MWD with assistance and input from its member agencies. The plan addresses both surplus and shortage contingencies. MWD's WSDM Plan documents the stages of action that it would undertake in response to a water supply shortage. FMWD's water supply shortage stages reflect MWD's WSDM Plan.



Figure 5.2: Severe Droughts Highlight the Importance of Conservation Ordinances (Lake Oroville in 2014)

The WSDM Plan guiding principle is to minimize adverse impacts of water shortage. The plan guides the operations of water resources (local resources, Colorado River, SWP, and regional storage) to ensure regional reliability. It identifies the expected sequence of resource management actions MWD will take during surpluses and shortages of water to minimize the probability of severe shortages, which require curtailment of full-service demands. Mandatory allocations are avoided to the extent practical; however, in the event of an extreme shortage, an allocation plan will be implemented.

In addition to its WSDM Plan, MWD developed a Water Supply Allocation Plan (WSAP), which provides a standardized methodology for allocation of supplies during times of extreme shortage (Stage 7 in MWD's WSDM Plan). During a shortage, CVWD's imported water supplies will be allocated based on the methodology documented in FMWD's Allocation Plan, which typically mirrors the MWD allocation plan.

MWD's WSDM and WSAP Plans help guide drought management for many agencies throughout the region.

The description of shortage stages below is from MWD's 2020 UWMP, page 2-28:

> *"**Shortage**: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.*
>
> ***Severe Shortage**: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.*
>
> ***Extreme Shortage**: Metropolitan allocates available supply to full-service customers.*
>
> *The WSDM Plan also defines six shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. Thus, a 10 percent shortfall in imported supplies could be a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be defined as a more severe shortage.*
>
> *When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, Metropolitan is still able to meet all end-use demands for water. For shortage stages 1 through 3, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 4 and 5, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation and exercising water transfer options, or purchasing water on the open market."*

MWD WATER SUPPLY ALLOCATION PLAN (FOR WSDM SHORTAGE STAGE 7)

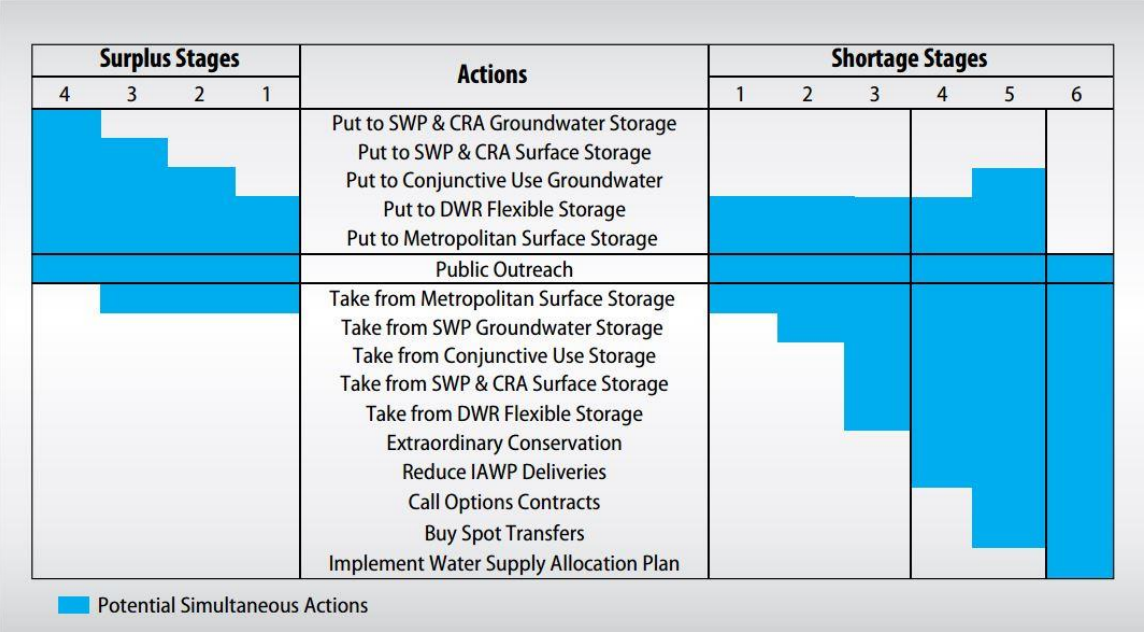


Figure 5.3: MWD WSDM Surplus & Drought Stages

In February 2008, MWD's Board of Directors adopted a WSAP, which includes a methodology for calculating supply allocations in the event that MWD enters a Shortage Stage 7 and is unable to meet the demands of its member agencies. MWD revised its WSAP in 2014 to include the following updates: new FY 12-13 to FY 13-14 baseline, implement a Conservation Demand Hardening Adjustment, create a separate Groundwater Replenishment Allocation for applicable agencies, and replace WSAP Penalty Rates with Allocation Surcharges based on the marginal costs of turf removal. It should be noted that the WSAP is not a rationing plan. Rather, it is a pricing plan where water is allocated at regular prices and agencies that choose to take more than the allocated water pay surcharges. The surcharge pricing mechanism acts to discourage the use of water above the allocation. The WSAP uses a combination of estimated total retail demands and historical local supply production within the member agency service area to estimate the demands on MWD from each member agency in a given year. Based on a number of factors, including storage and supply conditions, MWD then determines whether it has the ability to meet these demands or will need to allocate its limited supplies among its member agencies. Thus, implicit in MWD's decision not to implement an allocation of its supplies is that, at a minimum, MWD will be able to meet the demands identified for each of the member agencies.

According to MWD's 2015 IRP, the approach seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level and takes into account

growth, local investments, changes in supply conditions and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs. The methodology attempts to allocate supplies based on an estimate of an agency's relative need for imported water using the following process:

1. Establish a baseline for total retail demands (and adjust for growth) to determine the allocation year total retail demands. ("*What are your total water demands?*")

2. Estimate the amount of local supplies to be utilized in the allocation year and subtract from total retail demands. This is the allocation year baseline demand on MWD. ("*How much imported water do you need from MWD?*")

3. Apply the minimum allocation percentage (per the regional shortage level) to the allocation year baseline demand and provide minor adjustments based on various criteria. ("*Restrict normal supply deliveries and provide allocation.*")

BASE PERIOD CALCULATIONS (USED TO DETERMINE WSAP REDUCTIONS)

The Base Period is calculated using data from FY 2012-13 and FY 2013-14. Base Period wholesale demands are based on the two-year average of demands on MWD during the Base Period, including full-service, seawater barrier, seasonal shift, and surface storage operating agreement demands.

Local supplies for the base period are calculated using a two-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, and other imported supplies. Non-potable recycling production is not included in this calculation, which, according to MWD, is intended to address the impact of demand hardening due to recycled water use.

Total potable retail demands for the Base Period are then calculated by adding the Base Period wholesale demands on MWD and the Base Period local supplies.

WSAP ALLOCATION YEAR CALCULATIONS

The next step is to estimate water needs in an allocation year by (1) adjusting the Base Period total retail demands for population or economic growth, and (2) accounting for changes in local supplies.

The Base Period retail demands are adjusted for growth using the average annual rate of population growth occurring since the two-year base period based on county-level data generated by the California Department of Finance.

Next, these growth-adjusted demands are adjusted again to account for (1) gains and losses of local supply, and (2) extraordinary increases in production over the base year. According to MWD, these adjustments are made to give a more accurate estimate of actual supplies in the allocation year, and, in turn, more accurately reflect an agency's demand for MWD supplies.



Figure 5.4: MWD's Diamond Valley Lake (Potential Reserves for WSAP Allocations)

The adjustment for gains in local supplies is intended to account for planned or scheduled gains in local supply production above the Base Period, which are not due to extraordinary actions to increase water supply in the allocation year. These previously scheduled increases in supply programs (i.e., San Diego County Water Authority/Imperial Irrigation District) or local production are added to the base period local supplies. Again, new supplies from non-potable recycling projects are not counted as local supplies.

While the local agency does become more reliable with the addition of the new supplies, assuming that the new supplies are available during an allocation, the benefits of these programs are partially offset because the impact of adding the new supplies to the Base

Period local supplies is to reduce an agency's dependence on MWD and thus their allocation under the WSAP.

Alternatively, only a portion of the additional supplies from what are termed "extraordinary increases in production" are added back to Allocation Year local supplies depending on the retail shortage level. Extraordinary increases in production include such efforts as purchasing transfers or mining of groundwater basins. By adding only a percentage of the yield from these supplies to Allocation Year local supplies, it has the effect of "setting aside" the majority of yield for the agency who procured the supply.

Table 5.7 reflects the set of percentages used in the WSAP to establish water allocations for each agency.

Table 5.7: Water Allocation Percentages

Regional Shortage Level	Regional Shortage Percentage	Wholesale Minimum Percentage	Maximum Retail Impact Adjustment Maximum
1	5%	92.5%	2.5%
2	10%	85.0%	5.0%
3	15%	77.5%	7.5%
4	20%	70.0%	10.0%
5	25%	62.5%	12.5%
6	30%	55.0%	15.0%
7	35%	47.5%	17.5%
8	40%	40.0%	20.0%
9	45%	32.5%	22.5%
10	50%	25.0%	25.0%

5.4.2 FMWD SHORTAGE STAGES OF ACTION

FMWD's plan mirrors MWD's plan with two exceptions. The first exception is that since FMWD does not take delivery of any Seawater Barrier water and FMWD is considered ineligible for the Replenishment Allocation, reference to those deliveries has been deleted.

The second exception is because of the way the water is allocated, without a further adjustment, total water allocated to FMWD's member agencies will never match the total water allocated to FMWD. Thus, an adjustment has been added to prorate the

difference between the amount allocated to FMWD by MWD and the initial allocation by FMWD.

Additionally, FMWD will reconcile over use and under use of member agency allocations at the same time that MWD does, typically at the end of every 12 months. Any allocation under used by agencies will be pooled together in one pot to be distributed to those agencies who over use their allocation. Any agency using that pooled water will be charged the regular FMWD Tier 1 or Tier 2 rate for having taken the water plus 50 percent of MWD's penalty rate. Any penalties assessed would go into the Water Resource and Conservation Fund.

FMWD only assesses 50 percent of the surcharge against its retail agencies in situations where FMWD is not subject to the Allocation Surcharge from MWD. In cases where FMWD as a whole is subject to the Allocation Surcharge from MWD, member retail agencies that have over used their allocation will take on the obligation proportionally and be subject to 100 percent of the surcharge.

Supply Allocation Formula Elements

The following are the elements of the allocation formula:

Base Period Demands **–** A two-year average of historical water use utilizing data from FY 2012-13 and FY 2013-14. Water use is divided into three components: total retail demand, locally produced water, and imported water.

Growth Adjustment **–** Retail demands are adjusted for growth between the base period and the time of allocation based on county level estimates of average annual growth in population. Growth for Los Angeles County is 0.46 percent. Agencies have an option to use weighted average population and job growth instead based on an appeal process to MWD.

Local Supplies **–** The amount of local supplies that are planned to be utilized in an allocation year.

Extraordinary Allocation Year Local Supplies **–** These are previously unscheduled local water supplies to be utilized in an allocation year, including transfers, recycled water, desalination, and recovery of groundwater. This amount is credited without reduction in the Wholesale Minimum Allocation. In addition, it decreases both the Retail Impact Adjustment and the reliance on MWD.

Conservation Demand Hardening Adjustment **–** An adjustment is made for demand hardening due to active conservation based on GPCD. Calculation considers conservation savings, dependence on MWD and the associated Regional Shortage Level percentage.

Regional Shortage Percentage **–** This is the percentage of shortage between supplies and demands and will be declared by MWD's Board. **Table 5.7** contains the percentages used to establish water allocations for agencies.

Wholesale Minimum Allocation **–** This is the first step in the formula and provides the minimum imported water allocation from MWD. It is calculated as an allocation baseline demand on MWD (Base Period Demands minus Local Supplies) multiplied by the Wholesale Minimum Percentage of the associated Regional Shortage Level.

Retail Impact Adjustment **–** This is the maximum additional allocation an agency may receive based on impacts to retail customers. Those agencies with less local supplies would receive a higher adjustment than those agencies with more local supplies. This adjustment is calculated as a percent dependence on MWD times the allocation baseline demand on MWD multiplied by the Retail Impact Adjustment factor of the associated Regional Shortage Level.

Minimum Per-Capita Adjustment **–** An adjustment made should gallons per capita per day for an agency drop to 100 GPCD or lower.

Total FMWD Allocation **–** A preliminary allocation is provided to agencies based on calculations, which mirror MWD's WSAP. Without a further adjustment, total water allocated to FMWD's member agencies will never match the total water allocated to FMWD. Thus, an adjustment has been added to prorate the difference between the amount allocated to FMWD by MWD and the initial allocation by FMWD.

Allocation Surcharge **–** Previously known as WSAP Penalty Rates, an Allocation Surcharge will be in effect based on the costs to implement outdoor water use reductions through turf removal programs. The Allocation Surcharge would provide a price signal based on the marginal conservation costs incurred to reduce water use in dry and shortage years.

Conservation Plan Ordinance

FMWD's Conservation Plan (adopted April 2009; revised plan adopted June 2021) establishes a comprehensive staged water conservation program, which will encourage

reduced water consumption within FMWD through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within FMWD. In June 2021, FMWD amended its Conservation Plan to conform to six standard water shortage levels as required by CWC Section 10632(a)(3)(A) and to better align with long-term water use goals. Along with permanent water conservation requirements, FMWD's Water Conservation Plan consists of six stages, which are described in **Table 5.8**, to respond to a reduction in potable water available to FMWD for distribution to its customers. Stage 1 conservation requirements are in effect at all times unless a mandatory conservation stage has been implemented by the Board of Directors.

5.4.3 CVWD STAGES OF ACTION

CVWD has adopted a Water Conservation Program. The purpose of this program is to provide water conservation regulations, in a phased approach, to minimize the effect of a shortage of water supplies on the customers of CVWD during various critical stages of a water shortage. Along with permanent water conservation requirements, CVWD's Water Conservation Program consists of the following six stages, as shown in **Table 5.8**, to respond to a reduction in potable water available to CVWD for distribution to its customers with Phase 1 conservation requirements in effect at all times unless a mandatory conservation stage has been implemented by CVWD Board of Directors.

Table 5.8: Water Supply Shortage Stages and Conditions – Rationing Stages

Stage No.	Water Supply Conditions	% Shortage
Phase 1 - Color Code "Blue" – Normal Water Conservation Alert	FMWD can meet all Member Agency demands. Voluntary water conservation applies.	Up to 10%
Phase 2 - Color Code "Green" – Increased Voluntary Water Conservation Alert	Some supplies have been impacted, and customers should increase efforts to conserve.	10% to 20%
Phase 3 - Color Code "Yellow" – Extraordinary Water Conservation Alert	MWD is withdrawing water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers.	20% to 30%
Phase 4 - Color Code "Orange" – Rationing Water Conservation Alert	MWD has implemented its allocation plan to its member agencies. Thus, supplies are limited.	30% to 40%
Phase 5 - Color Code "Red" – Critical Water Conservation Alert	Water supplies are reduced drastically.	40% to 50%
Phase 6 - Color Code "Purple" – Emergency Water Conservation Alert	Water supplies are only available for health and safety needs.	Greater than 50%

5.4.4 PROHIBITIONS

CVWD's Water Conservation Plan promotes the efficient use of water, reduce or eliminate water waste, complement CVWD's Water Quality regulations and urban runoff reduction efforts, and enable implementation of CVWD's Water Shortage Contingency Measures. Prohibitions include, but are not limited to: restrictions on outdoor watering, washing of vehicles, food preparation establishments, repairing of leaks and other malfunctions, swimming pools, decorative water features, construction activities, and water service provisions, which can be found in **Table 5.9**.

Table 5.9: Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.	Phase 1 - Color Code "Blue"
Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, streets, adjacent lands or into gutters shall not be permitted.	Phase 1 - Color Code "Blue"
Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.	Phase 1 - Color Code "Blue"
Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.	Phase 1 - Color Code "Blue"
No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings. With the exception of drip irrigation systems or weather based irrigation controllers,	Phase 1 - Color Code "Blue"

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
residential timers shall not run for more than a total of 10 minutes per station.	
Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.	Phase 1 - Color Code "Blue"
No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.	Phase 1 - Color Code "Blue"
The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.	Phase 1 - Color Code "Blue"
Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.	Phase 1 - Color Code "Blue"
Water for construction purposes including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.	Phase 1 - Color Code "Blue"
The use of potable water from fire hydrants shall be limited to firefighting related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.	Phase 1 - Color Code "Blue"
No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.	Phase 1 - Color Code "Blue"
Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about CVWD's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.	Phase 1 - Color Code "Blue"

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.	Phase 1 - Color Code "Blue"
Where applicable, restaurants must utilize water conserving nozzles.	Phase 1 - Color Code "Blue"
Watering Days: Odd/Even assigned days	Phase 2 - Color Code "Green"
Watering Days: Tuesday, Thursday, Saturday	Phase 3 - Color Code "Yellow"
Residential and commercial landscape irrigation is limited to no more than two (2) days per week on Tuesday and Saturday. Exempt are public areas owned or operated by School Districts or public use areas greater than 4,000 square feet.	Phase 4 - Color Code "Orange"
The filling, refilling or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited. Exemptions: Commercial Repairs mandated by the Federal Virginia Graeme Baker Act, or adding water for the prevention of equipment failure is permissible, however, the District strongly urges that a cover be used to prevent evaporation and thereby reducing the frequency of refilling.	Phase 4 - Color Code "Orange"
The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited. Exemptions: Adding water for the prevention of equipment failure is permissible.	Phase 4 - Color Code "Orange"
Vehicle washing is restricted to the use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle.	Phase 4 - Color Code "Orange"
Fix leaks within 48 hours.	Phase 4 - Color Code "Orange"
1 day limit per week year-round irrigation.	Phase 5 - Color Code "Red"
All outdoor water use is prohibited.	Phase 6 - Color Code "Purple"
Fix any leaks within 24 hours.	Phase 6 - Color Code "Purple"

5.4.5 CONSUMPTION REDUCTION METHODS

Methods to reduce the use of potable water exist in all Water Shortage Levels are listed in **Table 5.10**.

Table 5.10: Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Phase 1 Conservation Measures	"Blue"	Up to 10%
Phase 2 Conservation Measures	"Green"	10% to 20%
Phase 3 Conservation Measures	"Yellow"	20% to 30%
Phase 4 Conservation Measures	"Orange"	30% to 40%
Phase 5 Conservation Measures	"Red"	40% to 50%
Phase 6 Conservation Measures	"Purple"	>50%

5.4.6 CATASTROPHIC SUPPLY INTERRUPTION

Given the great distances imported water supplies travel to reach the FMWD service area, the region is vulnerable to interruptions along hundreds of miles of aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, this water is distributed to customers through an intricate network of pipes and water mains that are susceptible to damage from earthquakes and other disasters, natural or otherwise.

MWD

MWD has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP Plans. MWD also developed an Emergency Storage Objective to mitigate potential interruption in water supplies resulting from catastrophic occurrences within the Southern California region, including seismic events along the San Andreas Fault. In addition, MWD is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences that could occur outside of the Southern California region, such as a probable maximum seismic event in the Delta, which could cause levee failure and disruption of SWP deliveries.

In July 2019, MWD's Board adopted amendments to their Administrative Code allowing deliveries of member agency water supplies in MWD's system during an emergency. With

these enabled deliveries, MWD's member agencies will be able to deliver their water through MWD's system under specific emergency conditions. Emergency deliveries using a portion of MWD's system can only be made if MWD is unable to make deliveries to a member agency due to physical damage to its system resulting from a natural disaster or other emergency, and there are no alternatives.

CVWD

For a sudden or catastrophic water supply interruption, CVWD has developed an Emergency Preparedness and Disaster Response Plan, as required by the State Water Resource Control Board, and an Emergency Response Plan (ERP) to ensure the most effective use of its resources for the benefit and protection of facilities and employees, in addition to the preservation of a reliable water supply for its customers.

Power Outage **–** In the event of a power outage, CVWD maintains five emergency standby power generators. One of the emergency generators is stationary and dedicated to power water supply wells and the auxiliary equipment at the Glenwood Nitrate Operations Center. Four emergency generators are portable and are mounted on trailers. They can be mobilized to any pump station for movement of water out of a reservoir into a higher pressure zone. Each pump station site is equipped with emergency power receptacles and transfer switches, which allow personnel to hook up the portable generators. The fourth generator is located at CVWD's Administrative Office. CVWD also has Universal Power Supply systems on the computer systems at the Administrative Office, the Supervisory Control and Data Acquisition (SCADA) systems at the Glenwood Nitrate Operations Facility and at booster station at well sites. In addition, FMWD operates standby emergency generators, which could be used by CVWD.

Water Outage **–** In the event of a water outage, CVWD has the ability to receive water from the City of Glendale, La Cañada Irrigation District, and Los Angeles Department of Water and Power (LADWP) through emergency water supply interconnections.

City of Glendale Emergency Interconnection:

- Glendale/CVWD emergency interconnection was installed in 2004 and allows for CVWD to receive up to 5.0 cubic feet per second (cfs) from Glendale.
- Glendale and CVWD also have an agreement for emergency hydrant-to-hydrant interconnections that allows CVWD to take water from Glendale or for Glendale to take water from CVWD.

La Cañada Irrigation District (LCID) Interconnection:

- CVWD has an interconnection with LCID that allows CVWD to take water from LCID into CVWD's Zone 3.
- LCID has two interconnections with CVWD that allows LCID to take water from CVWD into LCID westerly zones.

LADWP Interconnection:

- CVWD to receive up to 2.2 cfs or 1.9 MGD from LADWP, which will provide an emergency water supply to FMWD through a metered connection.
- LADWP to receive up to 2.2 cfs from CVWD through a booster pump system that will provide LADWP water in emergency situations.

CVWD is an active member of the southern region of the statewide Water Agency Response Network (WARN), a mutual aid coalition of water departments and agencies which allows for coordination of resources during disasters or catastrophic events.

Supplemental Water Supplies – Supplemental water supplies to help offset future shortages due to drought would be available through FMWD via MWD and their WSDM. The WSDM is referenced in FMWD's 2020 UWMP and described in detail in MWD's 2020 UWMP.

Preparation actions for possible catastrophes are summarized in **Table 5.11**.

Table 5.11: Preparation Actions for Catastrophe

Possible Catastrophe	Preparation Actions
Regional Power Outage	• Emergency Preparedness and Disaster Response Plan • Standby Emergency Power Generators • Interconnections with nearby agencies • Water Agency Response Network Membership • Supplemental Water Supplies
Earthquake	
Supply Contamination	
Terrorist Act which Interrupts Service	
Other(s)	

5.4.7 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

INTRODUCTION

Earthquakes can vary significantly in magnitude and the amount of damage caused. Major earthquakes can cause loss of electrical power, damage to CVWD's structures and

equipment, disruption of service, and injuries to staff. This section provides a description of CVWD's procedures (i.e., response and mitigation) after an earthquake event.

As mandated in CWC Section 10632.5, beginning January 1, 2020, water suppliers are required to include a seismic risk assessment and mitigation plan as part of their WSCP to assess the vulnerability of each of the various facilities of their water system and mitigate those vulnerabilities. If an urban water supplier does not have a seismic risk assessment and mitigation plan, the urban water supplier may instead, per CWC Section 10632.5(c), include a local hazard mitigation plan (LHMP) or a multi-hazard mitigation plan. This requirement is satisfied by the incorporation of elements and analyses from CVWD's Risk and Resilience Assessment (RRA), ERP, and seismic evaluation as well as the 2019 County of Los Angeles All-Hazards Mitigation Plan (attached as **Appendix D**). The complete RRA and ERP documents are not presented within this plan due to the highly confidential nature of the reports. Although CVWD does not currently have a Seismic Risk Assessment and Mitigation Plan, CVWD applied for a planning grant in March 2019 and was awarded funding by the Federal Emergency Management Agency in April 2020 to complete an LHMP.

CVWD LHMP

During the LHMP process, residents and officials from neighboring agencies will be asked to contribute by sharing local knowledge of the area's vulnerability to hazards and by suggesting ways CVWD can mitigate disasters. CVWD also formed a Steering Committee made up of local stakeholders, who oversaw the plan's development and outreach. The committee met on a monthly basis for approximately seven months and meetings were open to the public. The LHMP process was started in late 2020, with a seismic evaluation, and is expected to be completed by the Fall of 2021.



Figure 5.5: The Five Phases of Emergency Management

LHMP Goals and Objectives

The six goals of CVWD's LHMP are listed below:

1. Protect life and property

2. Maintain continuity of essential water and sewer services
3. Increase public awareness of the risk of loss of water/sewer service
4. Facilitate partnerships with recognized stakeholders within the Crescenta Valley and implement a coordination plan between the stakeholders
5. Protect local water supply sources
6. Protect against environmental consequences caused by water and sewer system failure initiated by natural hazards

The CVWD Steering Committee members identified the following plan objectives:

- Implement activities that assist in protecting lives by making CVWD's infrastructure, critical facilities, and other properties more resistant to natural hazards
- Protect water quality and supply
- Properly address aging infrastructure issues to reduce/minimize future hazards and disasters
- Raise awareness and communicate to the Crescenta Valley Community about the risks to CVWD assets
- Leverage grant funding and low interest loan programs to implement hazard mitigation capital projects
- Establish policies to ensure mitigation projects are prioritized for critical facilities, services, and infrastructure
- Create, rehabilitate, enhance, and preserve local ecosystems to serve as natural hazard mitigation functions

SEISMOLOGY OF WATER FACILITIES & VULNERABILITY

According to the maps provided on the California Office of Emergency Services' online planning tool (My Plan) and the California Geological Survey's online earthquake hazards zone application (EQ Zapp), no portion of the CVWD system is crossed by a known fault line as shown in **Figure 5.6**. Furthermore, based on the CVWD seismic evaluation, none of CVWD's pipelines, wells, booster pump stations, reservoirs, or other water facilities are located in areas containing soft, fine grained soils, which amplify the earthquake energy during an earthquake. All water facilities are located in areas of very dense and stiff soil. Therefore, there are no CVWD potable water structures with an extremely high risk of earthquake damage. There are, however, areas with increased risk due to landslides, liquefaction, and some CVWD facilities that are more susceptible to earthquake damage than other facilities.

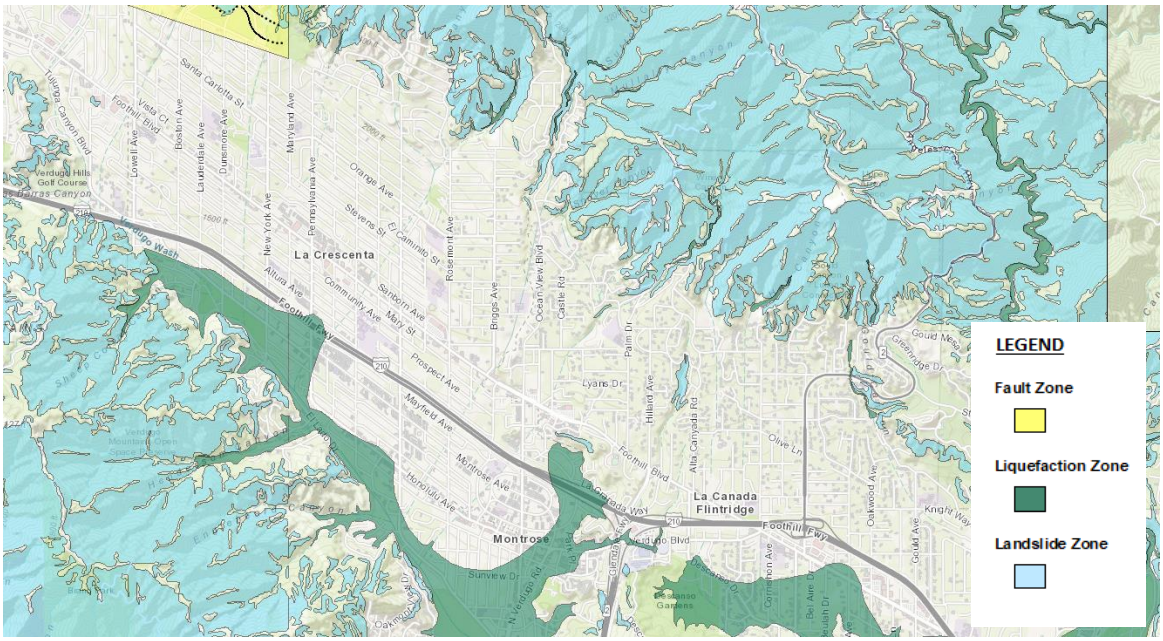


Figure 5.6: Seismic Hazards within CVWD Service Area (California Geological Survey)

An earthquake is caused by the shifting of tectonic plates beneath the Earth's surface. Ground shaking from moving geologic plates collapses buildings and bridges, and sometimes triggers landslides, avalanches, flash floods, fires and tsunamis. The strong ground motion of earthquakes has the potential to cause a great deal of damage to drinking water and wastewater utilities, particularly since most utility components are constructed from inflexible materials (i.e., concrete, metal pipes). Earthquakes create many cascading and secondary impacts that may include, but are not limited to:

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination and sinkholes and/or large pools of water throughout the service area
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways

Additional seismic risks will be further described in the CVWD LHMP.

ERP – EARTHQUAKE EMERGENCY RESPONSE

CVWD is currently updating its ERP to replace its existing ERP by December 31, 2021 in order to meet the requirements of America's Water Infrastructure Act of 2018 (AWIA).

The ERP provides CVWD staff with the necessary information, strategies, procedures, and mitigation actions to address earthquake emergencies. CVWD's ERP policies are intended to guide disaster management planners and emergency responders, and to provide a consistently high level of preparedness at all the facilities.

Per the ERP, after a major earthquake, the Emergency Operations Center (EOC) will be activated if potential or significant damage has occurred in CVWD's service area, and the situation cannot be handled by routine public safety response or immediate mutual aid assistance. The General Manager shall assess the situation and establish the incident command post as necessary. In the event of an emergency, CVWD personnel will be required to inspect all water facilities for apparent signs of damage or abnormal conditions and conserve the existing water supply in the reservoirs from loss through water line breaks in the distribution system.

CVWD SEISMIC EVALUATION

As part of the LHMP preparation process, CVWD performed a seismic evaluation in 2020 involving seismological and geological investigations of the CVWD service area that was used to evaluate the susceptibility of the water system to damage following an earthquake. The purposes of the seismic evaluation were as follows:

- Determine the probability of damage to potable water structures and identify the expected functionality of essential features of the system after a major earthquake in the service area.
- Identify the amount of potable water structures located in high hazard areas (i.e., liquefaction zones, soft soils, landslide risk zones).
- Protect human life against earthquake hazard as it affects the existing water system.

Figures 5.7 and **5.8** show some of the results of the seismic evaluation regarding the potential for damage due to the impacts of a major earthquake event. The evaluation used the aftermath of the 1994 Northridge earthquake as a basis.

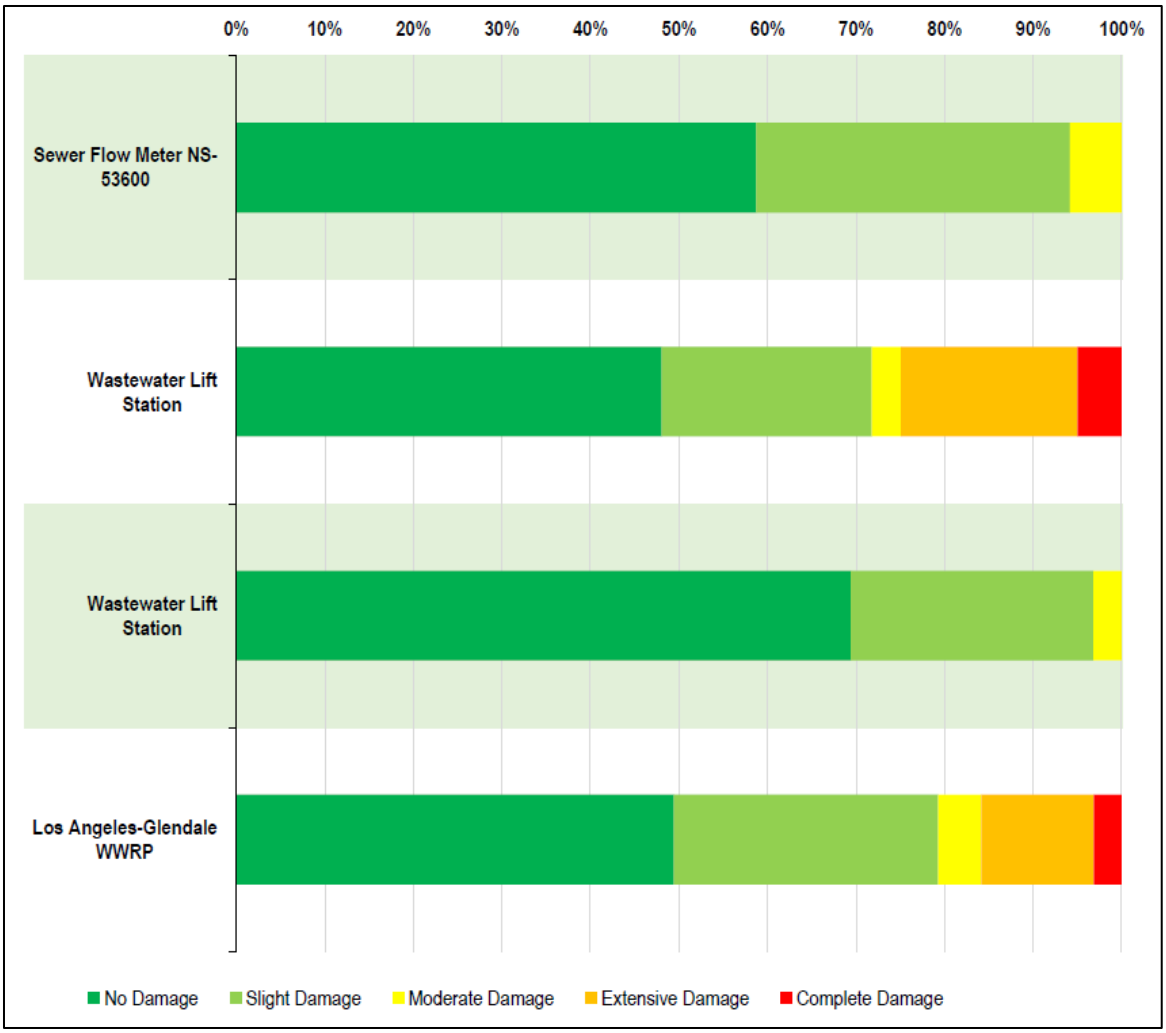


Figure 5.7: Probability of Damage to Facilities from a Magnitude 6.9 Event

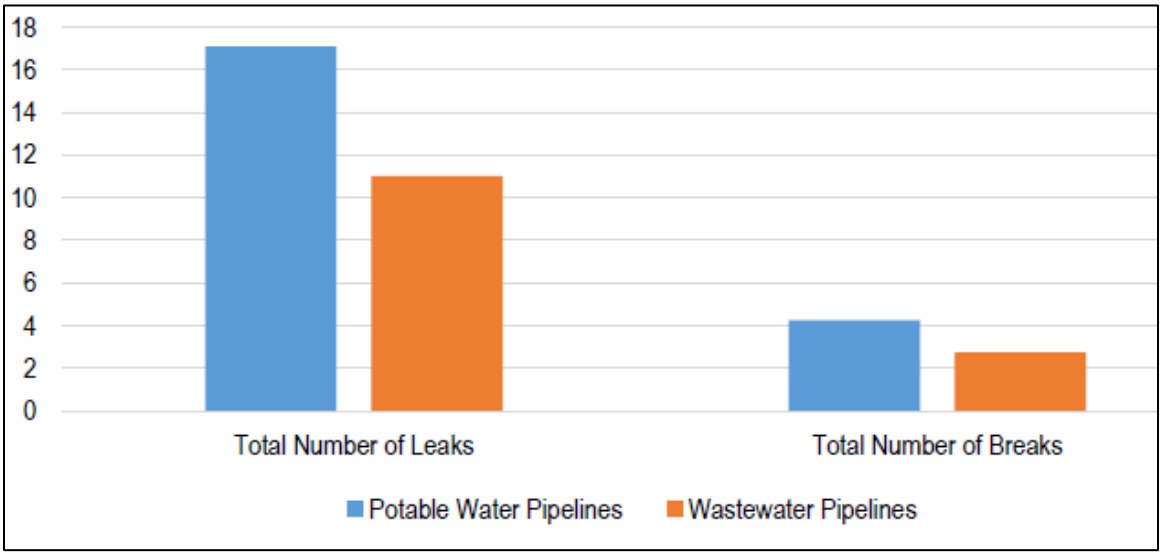


Figure 5.8: Pipeline Repairs Required after a Magnitude 6.9 Event

MITIGATION ACTIONS

Hazard mitigation may occur during any phase of a threat, emergency, or disaster. Mitigation can and may take place during the preparedness (before), response (during), and recovery (after) phases. The process of hazard mitigation involves evaluating a hazard's impact and identifying and implementing actions to minimize or eliminate the impact.

As part of the LHMP planning process and risk assessment, CVWD's Core Planning Team developed a mitigation action plan, consisting of pre-mitigation projects, to present how CVWD can reduce the risk and vulnerability of people, property, infrastructure, natural and cultural resources, and economic impacts to future disaster losses, including earthquake events. Emphasis was placed on both existing and future development.

Pre-mitigation projects to mitigate earthquake events may include, but are not limited to, the following:

- New Portable Emergency Electrical Generators – four (4) new portable generators to be staged at Booster Pump Station sites to move water to higher elevations.
- New Seismic Sensors & Valve Actuators on Reservoir Inlet/Outlet Valves (4 sites) to close valve and save water.
- Emergency Preparedness Education Site and Water Refilling Station at Rosemont Reservoir.

Specific seismic mitigation actions/measures will be further described in the CVWD LHMP.

5.5 COMMUNICATION PROTOCOLS

5.5.1 INTRODUCTION

CVWD's communication protocol includes the various channels that CVWD will utilize to convey critical messages regarding water shortage allocations and voluntary and mandatory actions. The goal of CVWD is to provide more public outreach to help increase awareness of water shortages. A strong communication strategy and a common understanding on the water supply situation and necessary actions between CVWD and its customers, the public, elected officials, and other key stakeholders are essential should the WSCP need to be activated. How the water shortage messages are addressed to the public are described in this communication protocol. The communication protocol will be in place prior to a water supply shortage and be initiated in Stage 2 Increased Voluntary Conservation. Activation of the communication protocol will continue through all

subsequent water shortage stages. CVWD will ensure outreach efforts are reaching key audiences as needed.

It is important to communicate to its customers the following when urgent conservation is needed:

- Which shortage stage is being implemented;
- What response actions are triggered to save water;
- Why water needs to be saved; and
- What actions CVWD is taking to respond to the water supply situation.

5.5.2 COORDINATION

The goal of CVWD's outreach plans during dry periods and water shortages is to maintain effective coordination with key audiences. In order to maintain reliability in this communication, CVWD will work closely with the Board of Directors. During dry periods or other times of limited supply, the frequency and extent of coordination will increase to ensure outreach tactics are consistent with the changing needs of CVWD and its customers. In addition to collaboration with its wholesaler, FMWD, CVWD will seek opportunities with outside organizations and agencies to complement its own outreach.

5.5.3 COMMUNICATION GOALS

Communication objectives during an existing or anticipated water shortage condition include the following:

- Motivate key audiences (i.e., customers) to increase conservation in following any voluntary or mandatory actions called for at the current stage of the WSCP.
- Raise awareness of the drought, regulations, or other conditions affecting water sources and supplies.
- Educate customers, key stakeholders, elected officials, and the general public about water supply reliability, water quality, and water delivery.
- Prepare customers for any potential escalation of the supply shortage stages.

5.5.4 COMMUNICATION PROTOCOL FOR CURRENT OR PREDICTED SHORTAGE

A current or predicted shortage, as determined by CVWD's Annual Assessment, will be addressed to the public and its customers upon submittal of the Annual Water Shortage Assessment Report to DWR by July 1 of every year. This notice may be conducted by

CVWD's website, signage in front of the CVWD office, and wholesale agency coordination.

5.5.5 COMMUNICATION PROTOCOL FOR SHORTAGE RESPONSE ACTIONS TRIGGERED OR ANTICIPATED TO BE TRIGGERED

CVWD's customers and public will be notified about any triggered or anticipated to be triggered shortage response actions. CVWD monitors and measures the projected supply and demand for water by its customers monthly and recommends the stage of conservation required to the Board of Directors. After Stage 3, 4, 5 or 6 is declared, and at each regular board meeting, the Board of Directors will consider a report by the General Manager concerning the then current water supply status. The Board will change the stage designation as appropriate; however, the Board will not impose mandatory measures without first conducting a duly-noticed public hearing pursuant to Water Code Sections 350 et seq., or 375 et seq. The appropriate stage of water conservation and the shortage response action triggered by the stage is then declared in a public notification posted on CVWD's website and published in a daily newspaper.

5.5.6 OTHER RELEVANT COMMUNICATION PROTOCOLS

To reduce water use consumption during any water shortage stage, CVWD will increase its public education and outreach efforts to build awareness of needed actions from the public. Moreover, CVWD will regularly revise its outreach campaign to reflect current supply conditions. Key communication strategies and associated water shortage stage implementation are listed below:

- Promote available water assistance resources for vulnerable populations; specialized outreach for impacted industries (Stages 3 and 4).
- Keep stakeholders aware of conditions (all Stages).
- Proclaim stage change to key stakeholders and the general public (all Stages).
- Conduct meetings with elected officials and other key civic and business leaders (Stage 2).
- Encourage reduced optional outdoor use through outreach (Stages 3 and 4).

CVWD may implement these communication strategies through its newsletters, website, and social media platforms to reflect supply conditions. In addition, CVWD may conduct news briefings or other media outlets (i.e., TV, radio, newspapers) to announce changes in supply conditions.

5.5.7 CRISIS COMMUNICATION PROTOCOL

In the event of a catastrophic supply interruption due to a natural disaster or damage to CVWD's facilities, CVWD will implement communication procedures in accordance with local, regional, state, and federal emergency response guidelines as outlined in its ERP. Depending upon the severity of the emergency and potential damage to CVWD's facilities, CVWD may determine that it is necessary to utilize the Standardized Emergency Management System (SEMS) response and the Incident Command System (ICS). Public information and crisis communication are an integral part of the ICS structure. National Incident Management System (NIMS), SEMS, and ICS have been integrated into the ERP. It provides for a strategic response by all employees and assigns specific responsibilities in the event the plan is activated.

When an incident occurs, the General Manager (Emergency Response Manager), District Engineer (Emergency Operations Center Manager) and the Operations Manager (Field Crew Supervisor) will go to the designated EOC and begin implementation of CVWD procedures and employ appropriate strategies from the shortage stages in **Table 5.2**.

Crisis communication efforts will concentrate on providing information to the public and external audiences. Furthermore, outreach messaging will reflect emergency conditions and the need to focus on health and public safety. CVWD will keep the Board of Directors informed of incident status and coordinate with public health officials.

CVWD will maintain communication with FMWD and its customers. Situation status reporting will be conducted during each operational shift during an event. In addition, CVWD may also authorize release of public information to news media to announce conditions and explain needed action. Finally, CVWD will ensure ongoing coordination with emergency response services with daily advisories or alerts as needed.

5.6 COMPLIANCE AND ENFORCEMENT

The District will use all means at its disposal to communicate compliance with its WSCP, including, but not limited to:

- Direct mailings
- Billing messages
- Website posts
- Press releases
- Social media posts
- Newspaper advertisements
- Speaker groups
- Waste of water reporting

5.6.1 PENALTIES OR CHARGES

Any customer who violates provisions of CVWD's Water Conservation Plan Ordinance by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may be cited by CVWD and may be subject to written notices, surcharges, fines, flow restrictions, service disconnection, and/or service termination, which are detailed in **Table 5.12**.

Table 5.12: Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Written Notice (Warning)	First Violation (Any Phase)
Written Notice with Description of Penalties	Second Violation (Any Phase)
Flow restrictors (installation: $150, removal: $100) for a period of not less than 48 hours	Third Violation (Any Phase)
Flow restrictors (installation: $200, removal: $150) for a period of not less than one week OR Discontinuation of water service	Flagrant Disregard of ordinance or Multiple Violations (Any Phase)

For any violations subsequent to the second violation, if the penalty assessed is, or includes the installation of a flow-restrictor or the discontinuance of water service to the customer for any period of time, notice of the fact of the violation will be delivered 15 working days before the penalty is to be enacted, in the following manner:

- Personal delivery of written notice to the customer at their residence or place of business and obtain their signature of delivery.
- Return receipt delivery to customer at their residence or place of business.

All notices will contain, in addition to the facts of the violation, a statement of the possible penalties for the present violation for which the notice was written and each subsequent violation, a statement of the anticipated date of the penalty, if any, will be enacted for the present violation, and a statement informing the customer of the customer's right to a hearing on the violation.

5.6.2 APPEAL REGARDING VIOLATIONS

Any customer against whom a restriction or limitation is levied has the right to a hearing and a right to appeal to the Board of Directors. Written request from customer to the District must be received within 15 working days of the date of notification of the violation. Before

the hearing can be scheduled, all existing plumbing fixtures in the structure must be retrofitted exclusively with water-conserving plumbing fixtures including low flush or high efficiency toilets, low flow showerheads, and aerators. A water audit will be used to verify installation.

Enactments of the appropriate penalty will be deferred until the appeal is resolved.

If the appeal decision is not in favor of the customer, the determined penalty will be enacted within 10 days after the customer is advised of the decision in writing through certified mail, return receipt requested.

5.7 LEGAL AUTHORITIES

Under California law, including CWC Chapter 3 (commencing with Section 350) of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the CVWD Board is authorized to implement the water shortage response actions outlined in this section. In all water shortage cases, shortage response actions to be implemented will be at the discretion of the CVWD Board and will be based on an assessment of the supply shortage, customer response, and need for demand reductions.

It is noted that upon proclamation by the Governor of a state of emergency under the California Emergency Services Act, Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code, based on drought conditions, the state will defer to implementation of locally adopted water shortage contingency plans to the extent practicable. CVWD will coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

5.8 FINANCIAL CONSEQUENCES OF WSCP IMPLEMENTATION

CVWD has established a target reserve of funds within its annual budget to address the issue of lost revenue during a water shortage or drought situation. CVWD has an established reserve level that includes a 25 percent rate stabilization fund, which can offset short-term loss of revenue. The total target reserve level consists of $1,000,000, 3 months of operations and maintenance costs (less the cost of imported water) and 25 percent of expected rate revenue. In the case of a long-term water shortage or drought situation,

CVWD has instituted a tiered rate structure on its customers to offset the loss of revenue that will occur. Such measures are listed in **Tables 5.13** and **5.14**.

Table 5.13: Proposed Measures to Overcome Revenue Impacts

Name of Measures
Reserve Funds
Rate Stabilization Fund
Rate Structure Adjustment

Table 5.14: Proposed Measures to Overcome Expenditure Impacts

Name of Measures
Obtain Alternative Sources of Funding
Defer Certain Expenditures

5.9 MONITORING AND REPORTING

5.9.1 REDUCTION MEASURING MECHANISM

Under normal water supply conditions, potable water production figures are recorded daily. Water Production totals are reported to the General Manager and the Management staff on a daily basis and monthly totals are incorporated into CVWD's Water Production Report.

During any declared water shortage emergency, the General Manager and the Management staff will compare the daily water production to a maximum water supply capacity and a targeted daily production to see if the reduction goals are being met. Those daily updates will be forwarded to CVWD's Board of Directors semi-monthly. Corrective action may be taken by the CVWD Board of Directors if reduction goals are not met.

During local water shortage emergencies due to a natural disaster, production figures will be monitored daily by the General Manager and the Management staff. Reports will be provided to the CVWD Board of Directors as necessary. Water use Monitoring Mechanisms are listed in **Table 5.15**.

Table 5.15: Water Use Monitoring Mechanisms

Mechanisms for Determining Actual Reductions	Type of Data Expected
Daily Records	Potable water production figures

5.10 SPECIAL WATER FEATURE DISTINCTION

As required under CWC 10632(b), water features that are not pools or spas must be analyzed and defined separately from pools and spas in the WSCP. Non-pool or non-spa water features may use recycled water, whereas, for health and safety considerations, pools and spas must use potable water. Although CVWD does not currently use recycled water and does not have the ability to use recycled water due to a lack of infrastructure, CVWD would use non-potable water for non-pool water features if and when recycled water supply ever becomes available to CVWD. Furthermore, the WSCP requires potable water recirculation for fountains and decorative water features.

5.11 WSCP ADOPTION AND REFINEMENT PROCEDURES

5.11.1 WSCP PUBLIC NOTICE AND ADOPTION

To encourage broad community participation in the WSCP preparation process, CVWD provided 60-day notification letters to agencies within CVWD's service area. Copies of the draft WSCP were made available for public review at the CVWD office prior to the public hearing. Shortly before the public hearing, a two-week and a one-week notice was published in the local press alerting the public of the public hearing. At a subsequent board meeting following the public hearing, CVWD's final WSCP was approved and adopted by its Board of Directors on June 9, 2021. **Appendix E** contains the Board resolution adopting the WSCP. The final plan was submitted to DWR within 30 days of Board adoption and includes all information necessary to meet the requirements of CWC Section 10632.

By June XX, 2021, CVWD's approved WSCP was filed with DWR. By July 1, 2021, CVWD's plan was submitted to the California State Library, County of Los Angeles, and cities within its service area. CVWD will make the plan available for public review no later than 30 days after filing with DWR.

5.11.2 WSCP REFINEMENT PROCEDURES

This section discusses the process for reviewing and updating the WSCP to ensure it

remains actively used, relevant and appropriate to the community, and consistent with applicable state and requirements. It is vital that CVWD's WSCP remain up to date so as to best ensure shortage risk tolerance is adequate, appropriate water shortage mitigation strategies are implemented as needed, proper procedures for water efficient practices are in place for the community, and better alignment with long-term water use goals.

The CVWD Core Planning Team is responsible for maintaining this plan and updating it as needed. The Director of Engineering and the Regulatory and Public Affairs Manager are the primary CVWD staff members who will carry out this process, under the direction of the General Manager or other appropriate staff member. The General Manager, or their designee, will serve as the WSCP project manager and will coordinate maintenance of the plan, conduct the formal review process, and direct the plan updates. The project manager will assign tasks, which may include collecting data, developing new or updated water shortage mitigation measures, updating sections of the plan, and presenting the plan to others.

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SECTION 6: RECYCLED WATER

2020 URBAN WATER MANAGEMENT PLAN



SECTION 6 RECYCLED WATER

6.1 OVERVIEW

Recycled water is defined as domestic wastewater purified through primary, secondary and tertiary treatment. The Southern California region, from Ventura to San Diego, discharges over 1 billion gallons of treated wastewater to the ocean each day. Since recycled water is acceptable for a variety of non-potable water purposes such as irrigation, groundwater recharge, and commercial/industrial processes, it is considered a reliable and drought-proof water source and could greatly reduce the region's reliance on imported water. As technological improvements continue to reduce treatment costs, and as public perception and acceptance continue to improve, more reuse opportunities should develop, which will increase demands for recycled water. Recycled water is a critical part of the California water picture because of the area's high likelihood of drought. As part of its overall water resources planning, CVWD continues to investigate the feasibility and cost-effectiveness of using recycled water.

Cost-effective opportunities for using recycled water are limited due to the lack of large users or large irrigated areas within CVWD's service area. In addition, there is presently a possible source from Glendale Water and Power, but no infrastructure is available. This potential use of recycled water is continually assessed by CVWD, FMWD, and MWD.

6.2 WASTEWATER DESCRIPTION & DISPOSAL

6.2.1 WASTEWATER COLLECTION

Municipal wastewater is generated in CVWD's service area from a combination of residential, commercial, and industrial sources. The quantities of wastewater generated are generally proportional to the population and the water used in the service area. It is estimated that customers within CVWD's service area generate wastewater based on 80 percent of potable water demand, although that is not a strict figure.

CVWD operates a sewage collection system with approximately 6,000 connections. The system transports this wastewater outside CVWD boundaries to a regional wastewater

treatment plant owned by the City of Los Angeles. CVWD pays a flow-based share of treatment and disposal costs to the City of Los Angeles and the treated effluent from the Los Angeles-Glendale (LAG) Water Reclamation Plant (WRP) or LAGWRP. CVWD generates approximately 550 to 600 MG of raw wastewater annually.

Wastewater collection volumes are shown in **Table 6.1**.

Table 6. 1: CVWD Wastewater Collected Within Service Area (AF) (DWR Table 6-2 Retail)

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume	Volume of Wastewater Collected from UWMP Service Area 2020	Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
CVWD	Estimated	3,373	Los Angeles County Sanitation District	Los Angeles-Glendale Water Reclamation Plant	No	No
Total Wastewater Collected from Service Area in 2020:		3,373				
NOTES: Estimated wastewater amount to be 80 percent of water demand.						

6.2.2 WASTEWATER TREATMENT

LOS ANGELES-GLENDALE WRP

The LAGWRP serves a small portion of the west side of La Cañada Flintridge and La Crescenta. The wastewater is treated through a three-step process imitating nature's cleaning processes also referred as tertiary treatment. The LAGWRP processes approximately 20 MG of non-potable water each day. Five new concurrent projects are underway at the LAG campus to improve daily wastewater and recycled water treatment operations and to reduce the strain on major sewers and the Hyperion Water Reclamation Plant. All five



Figure 6.1: Los Angeles-Glendale Plant

projects are targeted to be completed by December 2024.

6.3 CURRENT RECYCLED WATER USES

There are currently no recycled water uses within CVWD's service area.

6.4 POTENTIAL RECYCLED WATER USES

There are currently no potential recycled water uses within CVWD's service area. It is cost prohibitive due to the low demand for recycled water; however, CVWD will continue to evaluate potential projects.

6.4.1 DIRECT NON-POTABLE REUSE

CVWD does not have the potential for direct non-potable reuse within their service area due to no existing recycled water system.

6.4.2 INDIRECT POTABLE REUSE

CVWD does not have the potential for indirect potable reuse within their service area.

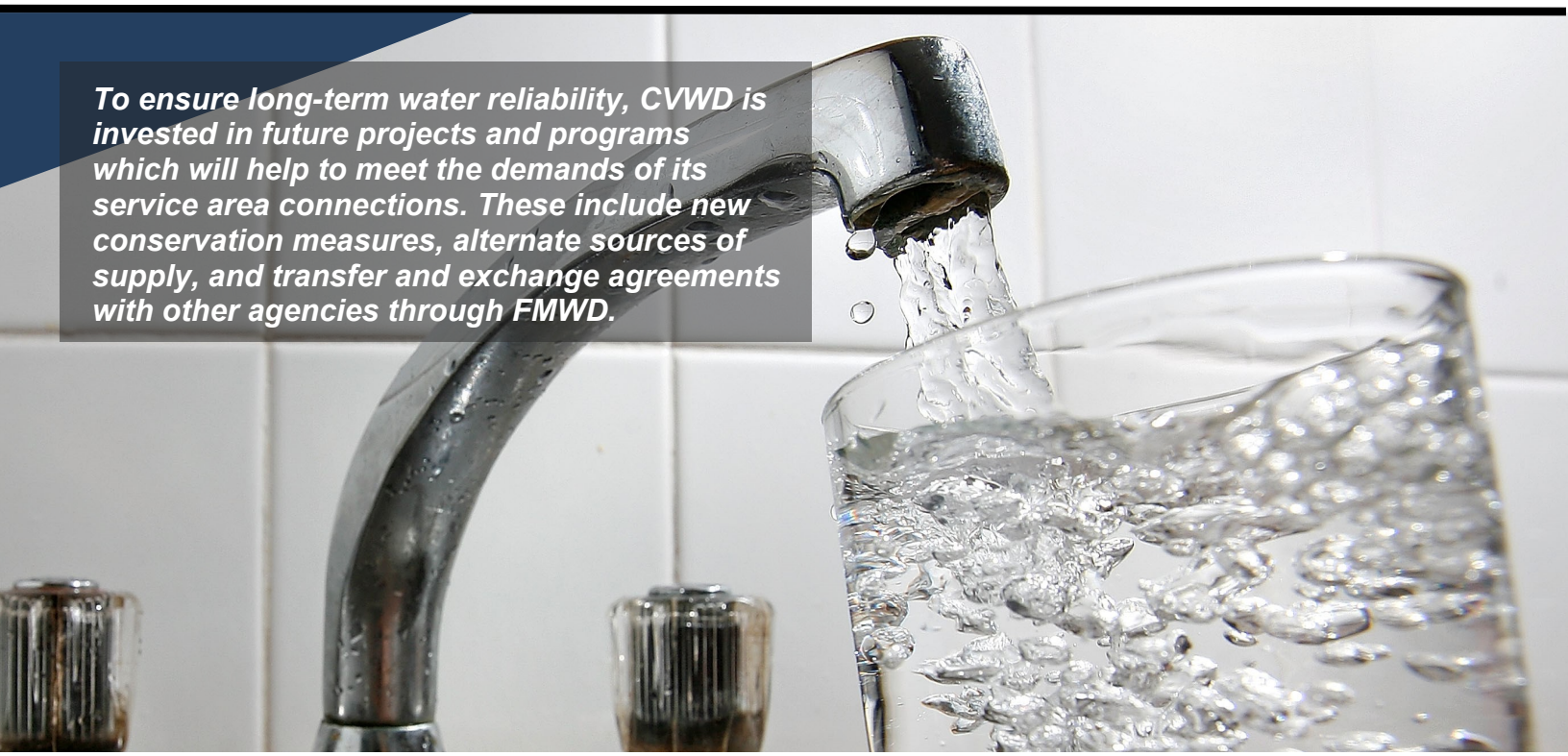
6.5 OPTIMIZATION PLAN

Because CVWD is not using recycled water at this time, it is not practicable to provide a recycled water optimization plan.

To determine if a recycled water project is cost-effective, cost/benefit analyses must be conducted for each potential project. This raises the issue of technical and economic feasibility of a recycled water project requiring a relative comparison to alternative water supply options. Analyses indicate that capital costs of water recycling in CVWD's service area exceed the cost of purchasing additional imported water from MWD.

CVWD will continue to conduct cost/benefit analyses for various recycled water projects and seek creative solutions in coordination with MWD and other cooperative agencies. These include solutions for funding, regulatory requirements, institutional arrangements, and public acceptance.

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To ensure long-term water reliability, CVWD is invested in future projects and programs which will help to meet the demands of its service area connections. These include new conservation measures, alternate sources of supply, and transfer and exchange agreements with other agencies through FMWD.

SECTION 7: FUTURE SUPPLY PROJECTS & PROGRAMS

2020 URBAN WATER MANAGEMENT PLAN



SECTION 7 FUTURE WATER SUPPLY PROJECTS & PROGRAMS

7.1 OVERVIEW

In general, CVWD continually reviews practices that will provide its customers with adequate and reliable supplies. As discussed in previous sections, CVWD is dedicated to maximizing its supply sources while reducing its dependency on imported supplies. CVWD considers plans for alternate sources such as recycled, greywater, and rainwater harvesting. This section discusses planned and potential future water supply projects and programs, while updating existing plans from 2015 as well as presenting new plans.

7.2 MWD REGIONAL SUPPLY PROJECTS & PROGRAMS

MWD is implementing water supply alternative strategies for the region and on behalf of member agencies to ensure available water in the future, including:

- Conservation
- Water recycling & groundwater recovery
- Storage and groundwater management programs within the region
- Storage related to SWP & CRA
- Other water supply management programs outside of the region

MWD has made investments in conservation and supply augmentation as part of its long-term water management strategy. MWD's approach to a long-term water management strategy was to develop an Integrated Resource Plan (IRP) to include diversified supply sources.

MWD is currently updating its IRP; however, that process will not be completed until after submittal of this UWMP. The IRP projects demands and identifies a mix of supplies to meet those demands. These supplies include desalination, recycling, conservation, brackish groundwater recovery and conjunctive use. MWD has financial incentive programs in place for local agencies to develop these supplies. FMWD, as a member agency of MWD, supports these incentive programs and contributes to these financial incentives through its payments for water from MWD.

7.3 WATER MANAGEMENT TOOLS

Resource optimization, such as local groundwater, storm water recharge, and recycled feasibility studies to minimize the needs for imported water, is key for CVWD to meet future water demands. CVWD can meet projected demands with existing facilities and distribution systems. With the eventual replacement of older wells with new and more efficient wells in addition to the continued efforts in reducing water waste, CVWD can meet projected demands with existing facilities and distribution systems.

7.4 TRANSFER OR EXCHANGE OPPORTUNITIES

At this time, CVWD is not currently involved in any transfer or exchange opportunities.

7.5 PLANNED WATER SUPPLY PROJECTS & PROGRAMS

GROUNDWATER RECHARGE

CVWD is working towards the development of the Crescenta Valley County Park Multiuse Project. This Project will allow CVWD to increase groundwater storage in the Basin by installation and maintenance of underground infiltration galleries underneath portions of the existing park. This will be accomplished by utilizing the existing Los Angeles County flood control channels (Verdugo Wash) and surface flow within the Crescenta Valley to divert storm water during the rainy season and capturing dry weather flow to proposed underground infiltration basins within the recreational areas. The project will potentially increase the local water supply by an annual average of 340 AFY, thus enhancing CVWD's groundwater resource and reducing dependence on imported supplies. Also, through the process of capture, treatment, and reuse of storm water and dry weather flow, the project could potentially reduce pollutant load from contaminating the Los Angeles River.

NEW WELLS

CVWD is planning to replace its older groundwater wells with new modern constructed wells over a 10-year period, which started in 2015. The existing wells are between 55 to 80 years old and are reaching the end of their useful life. CVWD's current program is to perform at least two well rehabilitations a year, which includes cleaning the well casing with chemical treatment and installation of steel linear to extend the life of a well.

RESERVOIR REHABILITATION

In Fall 2020, CVWD began the rehabilitation of the Rosemont Reservoir. The 500,000-gallon reservoir rehabilitation project is midway through its construction phase, with most of its heavy construction completed. Construction is currently in Phase II of the rehabilitative process, including sandblasting, stripping, and adding primer coats to both the inside and outside of the tank. The project is estimated to be completed by April 2021. The reservoir structure has not been rehabilitated in over 20 years, and though the tank is starting to show signs of aging, its structural integrity has not been compromised over the years. This reservoir project is part of CVWD's Reservoir Rehabilitation Program for the next 12-years where CVWD plans to rehabilitated one reservoir per year.

7.6 DESALINATION OPPORTUNITIES

There are technologies in place to remove the salts in both brackish groundwater and ocean water for potable use. CVWD does not have any projects to remove salts from local supplies to replace imported water; however, it supports these projects through MWD's programs where MWD provides incentives to other agencies for treatment.

7.6.1 DESALINATION OF GROUNDWATER

There are currently no brackish groundwater opportunities within CVWD's service area.

7.6.2 DESALINATION OF OCEAN WATER

CVWD does not have opportunities to directly develop desalinated supplies. It does not border the ocean and cannot participate directly in ocean desalination; however, CVWD supports MWD's Seawater Desalination Program, which provides incentives to MWD's member agencies of up to $340 per AF for the production of desalinated ocean water.

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CVWD recognizes that the success of its operations comes from the participation of other agencies and the general public. For this 2020 UWMP, CVWD encouraged participation prior to the public hearing and Board Adoption.

SECTION 8: UWMP ADOPTION PROCESS

2020 URBAN WATER MANAGEMENT PLAN

SECTION 8 PLAN ADOPTION PROCESS



8.1 OVERVIEW

Recognizing that close coordination among other relevant public agencies is the key to the success of its 2020 UWMP, CVWD worked closely with other agencies to develop and update this planning document. CVWD provided 60-day notification letters to encourage agencies to participate in the UWMP preparation process. Copies of the draft UWMP and draft WSCP were made available for public review at the CVWD office prior to the public hearing. Shortly before the public hearing, a two-week and a one-week notice was published in the local press alerting the public of the public hearing. At a subsequent Board meeting following the public hearing, CVWD adopted the 2020 UWMP and WSCP on June 8, 2021. Finally, as required by the UWMP Act, this 2020 UWMP and the WSCP are being provided by CVWD to DWR, the California State Library, and the public within 30 days of Board adoption. Details of coordination efforts are provided in **Sections 8.1.1** and **8.2**.

CVWD's 2020 UWMP is a collaborative effort involving its own staff, outside agencies, and the general public.

8.1.1 WATER CODE REQUIREMENTS

Article 3 of the CWC requires that CVWD provide a minimum level of agency and public participation during the UWMP preparation process, as well as the adoption and implementation process of the UWMP. **Table 8.1** on the following page summarizes external coordination and outreach activities carried out by CVWD during the preparation of its 2020 UWMP, along with corresponding dates.

Also in accordance with Article 3 of the CWC, CVWD is required to distribute its official (adopted) UWMP and WSCP and make it publicly available. After the adoption of the 2020 UWMP and WSCP by Board Resolution No. XXX (attached as **Appendix E**) on June 9, 2021, CVWD provided copies of its adopted UWMP in accordance with **Table 8.2**.

Table 8.1: Coordination & Outreach during UWMP Preparation

Effort	Description	Date
"60-Day Notification"	Letters sent to Cities, County, & other Agencies	March 9, 2021
Public Hearing	Public Hearing Held at CVWD Headquarters (two-week and one-week notices published)	June 9, 2021
Board Adoption	Board Adoption of UWMP by Resolution	June 9, 2021

Table 8.2: UWMP & WSCP Distribution Following Adoption of Plans

Effort	Description	Date
DWR Submittal	Submitted UWMP and WSCP to DWR (within 30 days of adoption)	June 15, 2021
Agency Submittal	Submitted UWMP and WSCP to the California State Library and County of Los Angeles (within 30 days of adoption)	June 15, 2021
Public Access	Made UWMP and WSCP available to public (within 30 days of submittal to DWR)	June 15, 2021

8.2 DETAILS OF COORDINATION EFFORTS

8.2.1 GENERAL PUBLIC COORDINATION

To meet the CWC and to provide for its own benefit, CVWD has actively solicited community participation during the UWMP preparation and adoption process by performing the following activities:

- Encouraging attendance and participation in Board Meetings prior to the actual UWMP Public Hearing as part of CVWD's ongoing community outreach efforts
- Soliciting comments on the UWMP while providing copies of its Draft 2020 UWMP at the CVWD office and on its website
- Holding a public hearing for the express purpose of inviting UWMP comments and

opening the floor for public comments to be received

On June 9, 2021, CVWD held a Public Hearing to receive comments on the 2020 UWMP, including the WSCP as part of the UWMP. Notification of the public meeting for consideration of adoption of CVWD's draft UWMP was printed in a local newspaper, a copy of which is provided in **Appendix F**. All comments received prior to and during the Public Hearing were taken into consideration in the preparation of the final report. No comments were received during the public hearing.

8.2.2 OUTSIDE AGENCY COORDINATION

CVWD coordinated the development of this UWMP with several outside agencies and the cities which reside in CVWD's service area.

All of CVWD's water supply planning relates to the policies, rules, and regulations of its regional and local providers. CVWD is dependent on imported water from MWD via FMWD and local groundwater from the Basin which is an adjudicated basin within the ULARA. CVWD is also a member of the Administrative Committee, which oversees the ULARA Watermaster. The Watermaster is responsible for coordinating all groundwater pumping activities within the Basin. As such, CVWD involved these entities in the development of its 2020 Draft UWMP at various levels of contribution as summarized in **Table 8.3**.

Table 8.3: UWMP Coordination Efforts

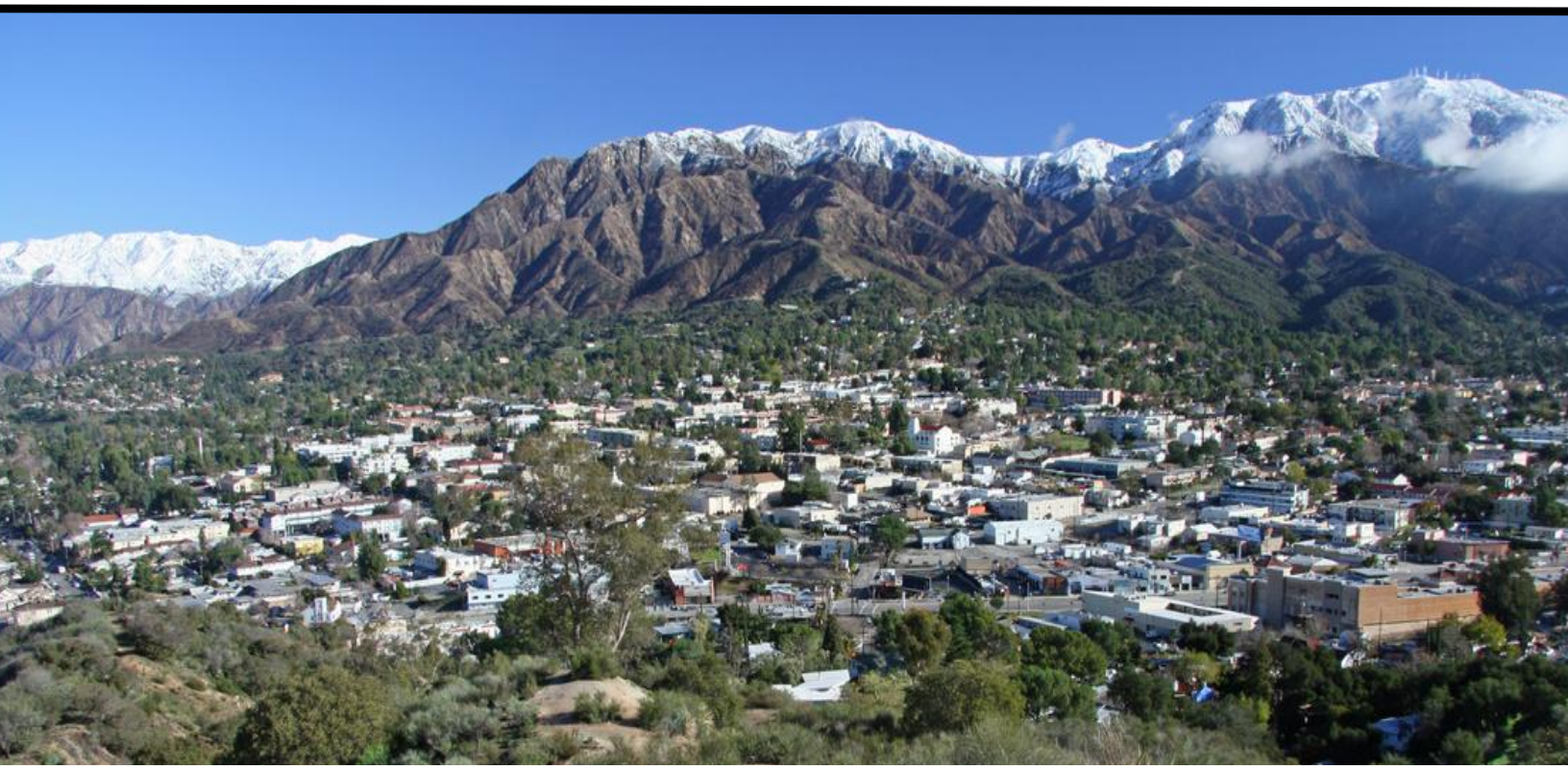
Agency	Helped Plan Prep.	Contacted for Assistance	Comments on Draft	Notified of Public Hearing	Attended Public Hearing
FMWD	✓	✓	✓	✓	✓
City of Glendale		✓		✓	
City of La Cañada Flintridge		✓		✓	
LA County		✓		✓	

8.3 UWMP SUBMITTAL

CVWD's final 2020 UWMP and WSCP were approved by its Board of Directors on June

9, 2021. The final plans were submitted to DWR within 30 days of Board approval and includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

By June 15, 2021, CVWD's approved 2020 UWMP and WSCP was filed with DWR. By July 1, 2021, CVWD's plans were submitted to the California State Library, County of Los Angeles, and cities within its service area. CVWD will make both plans available for public review no later than 30 days after filing with DWR.



APPENDICES A - I

2020 URBAN WATER MANAGEMENT PLAN

Appendix A: ULARA Judgment

Crescenta Valley Water District 2020 Urban Water Management Plan

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, vs. CITY OF SAN FERNANDO, ET AL. Defendants.	No. 650079 JUDGMENT

There follows by consecutive paging a Table of Contents (pages i. to vi.), Recitals (page 1), Definitions and List of Attachments (pages 1 to 6), Designation of Parties (page 6), Declaration re Geology and Hydrology (pages 6 to 12), Declaration of Rights (pages 12 to 21), Injunctions (pages 21 to 22), Continuing Jurisdiction (page 23), Watermaster (pages 23 to 29), Physical Solution (pages 29 to 34), and Miscellaneous Provisions (pages 34 to 35), and Attachments (pages 36 to 46). Each and all of said several parts constitute a single integrated Judgment herein.

1. RECITALS

This matter was originally tried before the Honorable Edmund M. Moor, without jury, commencing on March 1, 1966, and concluding with entry of Findings, Conclusions and Judgment on March 14, 1968, after more than 181 trial days. Los Angeles appealed from said judgment and the California Supreme Court, by unanimous opinion, (14 Cal. 3d 199) reversed and remanded the case; after trial of some remaining issues on remand, and consistent with the opinion of the Supreme Court, and pursuant to stipulations, the Court signed and filed Findings of Fact and Conclusions of Law. Good cause thereby appearing,

IT IS ORDERED, ADJUDGED AND DECREED:

2. DEFINITIONS AND ATTACHMENTS

2.1 Definitions of Terms. As used in this Judgment, the following terms shall have the meanings herein set forth:

[1] Basin or Ground Water Basin -- A subsurface geologic formation with defined boundary conditions, containing a ground water reservoir, which is capable of yielding a significant quantity of ground water.

[2] Burbank -- Defendant City of Burbank.

[3] Crescenta Valley -- Defendant Crescenta Valley County Water district.

[4] Colorado Aqueduct -- The aqueduct facilities and system owned and operated by MWD for the importation of water from the Colorado River to its service area.

[5] Deep Rock -- Defendant Evelyn M. Pendleton, dba Deep Rock Artesian Water Company.

[6] Delivered Water -- Water utilized in a water supply distribution system, including reclaimed water.

[7] Eagle Rock Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[8] Extract or Extraction -- To produce ground water, or its production, by pumping or any other means.

[9] Fiscal Year -- July 1 through June 30 of the following calendar year.

[10] Foremost -- Defendant Foremost Foods Company, successor to defendant Sparkletts Drinking Water Corp.

[11] Forest Lawn -- Collectively, defendants Forest Lawn Cemetery Association, Forest Lawn Company, Forest Lawn Memorial-Park Association, and American Security and Fidelity Corporation.

[12] Gage F-57 -- The surface stream gaging station operated by Los Angeles County Flood Control District and situated in Los Angeles Narrows immediately upstream from the intersection of the Los Angeles River and Arroyo Seco, at which point the surface outflow from ULARA is measured.

[13] Glendale -- Defendant City of Glendale.

[14] Ground Water -- Water beneath the surface of the ground and within the zone of saturation.

[15] Hersch & Plumb -- Defendants David and Eleanor A. Hersch and Gerald B. and Lucille Plumb, successors to Wellesley and Duckworth defendants.

[16] Import Return Water -- Ground water derived from percolation attributable to delivered imported water.

[17] Imported Water -- Water used within ULARA, which is derived from sources outside said watershed. Said term does not include inter-basin transfers wholly within ULARA.

[18] In Lieu Storage -- The act of accumulating ground water in a basin by intentional reduction of extractions of ground water which a party has a right to extract.

[19] Lockheed -- Defendant Lockheed Aircraft Corporation.

[20] Los Angeles -- Plaintiff City of Los Angeles, acting by and through its Department of Water and Power.

[21] Los Angeles Narrows -- The physiographic area northerly of Gage F-57 bounded on the east by the San Rafael and Repetto Hills and on the west by the Elysian Hills, through which all natural outflow of the San Fernando Basin and the Los Angeles River flow en route to the Pacific Ocean.

[22] MWD -- The Metropolitan Water District of Southern California, a pubic agency of the State of California.

[23] Native Safe Yield -- That portion of the safe yield of a basin derived from native waters.

[24] Native Waters -- Surface and ground waters derived from precipitation within ULARA.

[25] Overdraft -- A condition which exists when the total annual extractions of ground water from a basin exceed its safe yield, and when any temporary surplus has been removed.

[26] Owens-Mono Aqueduct -- The aqueduct facilities owned and operated by Los Angeles for importation to ULARA water from the Owens River and Mono Basin watersheds easterly of the Sierra-Nevada in Central California.

[27] Private Defendants -- Collectively, all of those defendants who are parties, other than Glendale, Burbank, San Fernando and Crescenta Valley.

[28] Reclaimed Water -- Water which, as a result of processing of waste water, is made suitable for and used for a controlled beneficial use.

[29] Regulatory Storage Capacity -- The volume of storage capacity of San Fernando Basin which is required to regulate the safe yield of the basin, without significant loss, during any long-term base period of water supply.

[30] Rising Water -- The effluent from a ground water basin which appears as surface flow.

[31] Rising Water Outflow -- The quantity of rising water which occurs within a ground water basin and does not rejoin the ground water body or is not captured prior to flowing past a point of discharge from the basin.

[32] Safe Yield - The maximum quantity of water which can be extracted annually from a ground water basin under a given set of cultural conditions and extraction patterns, based on the long-term supply, without causing a continuing reduction of water in storage.

[33] San Fernando -- Defendant City of San Fernando.

[34] San Fernando Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[35] Sportsman's Lodge -- Defendant Sportsman's Lodge Banquet Association.

[36] Stored Water -- Ground water in a basin consisting of either (1) imported or reclaimed water which is intentionally

spread, or (2) safe yield water which is allowed to accumulate by In Lieu Storage. Said ground waters are distinguished and separately accounted for in a ground water basin, notwithstanding that the same may be physically commingled with other waters in the basin.

[37] Sylmar Basin -- The separate ground water basin underlying the area indicated as such on Attachment "A".

[38] Temporary Surplus - The amount of ground water which would be required to be removed from a basin in order to avoid waste under safe yield operation.

[39] Toluca Lake -- Defendant Toluca Lake Property Owners Association.

[40] ULARA or Upper Los Angeles River Area - The Upper Los Angeles River watershed, being the surface drainage area of the Los Angeles River tributary to Gage F-57.

[41] Underlying Pueblo Waters -- Native ground waters in the San Fernando Basin which underlie safe yield and stored waters.

[42] Valhalla -- Collectively, Valhalla Properties, Valhalla Memorial Park, Valhalla Mausoleum Park.

[43] Van de Kamp -- Defendant Van de Kamp's Holland Dutch Bakers, Inc.

[44] Verdugo Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[45] Water Year -- October 1 through September 30 of the following calendar year.

Geographic Names, not herein specifically defined, are used to refer to the places and locations thereof as shown on Attachment "A".

2.2 List of Attachments. There are attached hereto the following documents, which are by this reference incorporated in this Judgment and specifically referred to in the text hereof:

"A" -- Map entitled "Upper Los Angeles River Area", showing Separate Basins therein.

"B" -- List of "Dismissed Parties".

"C" -- List of "Defaulted Parties".

"D" -- List of "Disclaiming Parties".

"E" -- List of "Prior Stipulated Judgments."

"F" -- List of "Stipulated Non-Consumptive or Minimal-Consumptive Use Practices."

"G" -- Map entitled "Place of Use and Service Area of Private Defendants."

"H" -- Map entitled "Public Agency Water Service Areas."

3. PARTIES

3.1 Defaulting and Disclaiming Defendants. Each of the defendants listed on Attachment "C" and Attachment "D" is without any right, title or interest in, or to any claim to extract ground water from ULARA or any of the separate ground water basins therein.

3.2 No Rights Other Than as Herein Declared. No party to this action has any rights in or to the waters of ULARA except to the extent declared herein.

4. DECLARATION RE GEOLOGY AND HYDROLOGY

4.1 Geology.

4.1.1 ULARA. ULARA (or Upper Los Angeles River Area), is the watershed or surface drainage area tributary to the Los

Angeles River at Gage F-57. Said watershed contains a total of 329,000 acres, consisting of approximately 123,000 acres of valley fill area and 206,000 acres of hill and mountain area, located primarily in the County of Los Angeles, with a small portion in the County of Ventura. Its boundaries are shown on Attachment "A". The San Gabriel Mountains form the northerly portion of the watershed, and from them two major washes--the Pacoima and the Tujunga--discharge southerly. Tujunga Wash traverses the valley fill in a southerly direction and joins the Los Angeles River, which follows an easterly course along the base of the Santa Monica Mountains before it turns south through the Los Narrows. The waters of Pacoima Wash as and when they flow out of Sylmar Basin are tributary to San Fernando Basin. Lesser tributary washes run from the Simi Hills and the Santa Susana Mountains in the westerly portion of the watershed. Other minor washes, including Verdugo Wash, drain the easterly portion of the watershed which consists of the Verdugo Mountains, the Elysian, San Rafael and Repetto Hills. Each of said washes is a non-perennial stream whose flood flows and rising waters are naturally tributary to the Los Angeles River. The Los Angeles River within ULARA and most of said tributary natural washes have been replaced, and in some instances relocated, by concrete-lined flood control channels. There are 85.3 miles of such channels within ULARA, 62% of which have lined concrete bottoms.

4.1.2 San Fernando Basin. San Fernando Basin is the major ground water basin in ULARA. It underlies 112,047 acres and is located in the area shown as such on Attachment "A". Boundary conditions of the San Fernando Basin consist on the east and

northeast of alluvial contacts with non-waterbearing series along the San Rafael Hills and Verdugo Mountains and the Santa Susana Mountains and Simi Hills on the northwest and west and the Santa Monica Mountains on the south. Water-bearing material in said basin extends to at least 1000 feet below the surface. Rising water outflow from the San Fernando Basin passes its downstream and southerly boundary in the vicinity of Gage F-57, which is located in Los Angeles Narrows about 300 feet upstream from the Figueroa Street (Dayton Street) Bridge. The San Fernando Basin is separated from the Sylmar Basin on the north by the eroded south limb of the Little Tujunga Syncline which causes a break in the ground water surface of about 40 to 50 feet.

4.1.3 Sylmar Basin. Sylmar Basin underlies 5,565 acres and is located in the area shown as such on Attachment "A". Water-bearing material in said basin extends to depths in excess of 12,000 feet below the surface. Boundary conditions of Sylmar Basin consist of the San Gabriel Mountains on the north, a topographic divide in the valley fill between the Mission Hills and San Gabriel Mountains on the west, the Mission Hills on the southwest, Upper Lopez Canyon Saugus Formation on the east, along the east bank of Pacoima Wash, and the eroded south limb of the Little Tujunga Syncline on the south.

4.1.4 Verdugo Basin. Verdugo Basin underlies 4,400 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Verdugo Basin consist of the San Gabriel Mountains on the north, the Verdugo Mountains on the south and southwest, the San Rafael Hills on the southeast and the topographic divide on the east between the drainage area that is

tributary to the Tujunga Wash to the west and Verdugo Wash to the east, the ground water divide on the west between Monk Hill-Raymond Basin and the Verdugo Basin on the east and a submerged dam constructed at the mouth of Verdugo Canyon on the south.

4.1.5 Eagle Rock Basin. Eagle Rock Basin underlies 807 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Eagle Rock Basin consist of the San Rafael Hills on the north and west and the Repetto Hills on the east and south with a small alluvial area to the southwest consisting of a topographic divide.

4.2 Hydrology.

4.2.1 Water Supply. The water supply of ULARA consists of native waters, derived from precipitation on the valley floor and runoff from the hill and mountain areas, and of imported water from outside the watershed. The major source of imported water has been from the Owens-Mono Aqueduct, but additional supplies have been and are now being imported through MWD from its Colorado Aqueduct and the State Aqueduct.

4.2.2 Ground Water Movement. The major water-bearing formation in ULARA is the valley fill material bounded by hills and mountains which surround it. Topographically, the valley-fill area has a generally uniform grade in a southerly and easterly direction with the slope gradually decreasing from the base of the hills and mountains to the surface drainage outlet at Gage F-57. The valley fill material is a heterogeneous mixture of clays, silts, sand and gravel laid down as alluvium. The valley fill is of greatest permeability along and easterly of Pacoima and Tujunga Washes and generally throughout the eastern

portion of the valley fill area, except in the vicinity of Glendale where it is of lesser permeability. Ground water occurs mainly within the valley fill, with only negligible amounts occurring in hill and mountain areas. There is no significant ground water movement from the hill and mountain formations into the valley fill. Available geologic data do not indicate that there are any sources of native ground water other than those derived from precipitation. Ground water movement in the valley fill generally follows the surface topography and drainage except where geologic or man-made impediments occur or where the natural flow has been modified by extensive pumping.

4.2.3 Separate Ground Water Basins. The physical and geologic characteristics of each of the ground water basins, Eagle rock, Sylmar, Verdugo and San Fernando, cause impediments to inter-basin ground water flow whereby there is created separate underground reservoirs. Each of said basins contains a common source of water supply to parties extracting ground water from each of said basins. The amount of underflow from Sylmar Basin, Verdugo Basin and Eagle Rock Basin to San Fernando Basin is relatively small, and on the average has been approximately 540 acre feet per year from the Sylmar Basin; 80 acre feet per year from Verdugo Basin; and 50 acre feet per year from Eagle Rock Basin. Each has physiographic, geologic and hydrologic differences, one from the other, and each meets the hydrologic definition of "basin". The extractions of water in the respective basins affect the other water users within that basin but do not significantly or materially affect the ground water levels in any of the other basins. The underground reservoirs of

Eagle Rock, Verdugo and Sylmar Basins are independent of one another and of the San Fernando Basin.

4.2.4 Safe Yield and Native Safe Yield. The safe yield and native safe yield, stated in acre feet, of the three largest basins for the year 1964-65 was as follows:

Basin	Safe Yield	Native Safe Yield
San Fernando	90,680	43,660
Sylmar	6,210	3,850
Verdugo	7,150	3,590

The safe yield of Eagle Rock Basin is derived from imported water delivered by Los Angeles. There is no measurable native safe yield.

4.2.5 Separate Basins -- Separate Rights. The rights of the parties to extract ground water within ULARA are separate and distinct as within each of the several ground water basins within said watershed.

4.2.6 Hydrologic Condition of Basins. The several basins within ULARA are in varying hydrologic conditions, which result in different legal consequences.

4.2.6.1 San Fernando Basin. The first full year of overdraft in San Fernando Basin was 1954-55. It remained in overdraft continuously until 1968, when an injunction herein became effective. Thereafter, the basin was placed on safe yield operation. There is no surplus ground water available for appropriation or overlying use from San Fernando Basin.

4.2.6.2 Sylmar Basin. Sylmar Basin is not in overdraft. There remains safe yield over and above the present reasonable beneficial overlying uses, from which

safe yield the appropriative rights of Los Angeles and San Fernando may be and have been exercised.

4.2.6.3 Verdugo Basin. Verdugo Basin was in overdraft for more than five consecutive years prior to 1968. Said basin is not currently in overdraft, due to decreased extractions by Glendale and Crescenta Valley on account of poor water quality. However, the combined appropriative and prescriptive rights of Glendale and Crescenta Valley are equivalent to the safe yield of the Basin. No private overlying or appropriative rights exist in Verdugo Basin.

4.2.6.4 Eagle Rock Basin. The only measure water supply to Eagle Rock Basin is import return water by reason of importations by Los Angeles. Extractions by Foremost and Deep Rock under the prior stipulated judgments have utilized the safe yield of Eagle Rock Basin, and have maintained hydrologic equilibrium therein.

5. DECLARATION OF RIGHTS

5.1 Right to Native Waters.

5.1.1 Los Angeles River and San Fernando Basin.

5.1.1.1 Los Angeles' Pueblo Right. Los Angeles, as the successor to all rights, claims and powers of the Spanish Pueblo de Los Angeles in regard to water rights, is the owner of a prior and paramount pueblo right to the surface waters of the Los Angeles River and the native ground waters of San Fernando Basin to meet its reasonable beneficial needs and for its inhabitants.

5.1.1.2 Extent of Pueblo Right. Pursuant to said pueblo right, Los Angeles is entitled to satisfy its needs and those of its inhabitants within its boundaries as from time to time modified. Water which is in fact used for pueblo right purposes is and shall be deemed needed for such purposes.

5.1.1.3 Pueblo Right -- Nature and Priority of Exercise. The pueblo right of Los Angeles is a prior and paramount right to all of the surface waters of the Los Angeles River, and native ground water in San Fernando Basin, to the extent of the reasonable needs and uses of Los Angeles and its inhabitants throughout the corporate area of Los Angeles, as its boundaries may exist from time to time. To the extent that the Basin contains native waters and imported waters, it is presumed that the first water extracted by Los Angeles in any water year is pursuant to its pueblo right, up to the amount of the native safe yield. The next extractions by Los Angeles in any year are deemed to be from import return water, followed by stored water, to the full extent of Los Angeles' right to such import return water and stored water. In the event of need to meet water requirements of its inhabitants, Los Angeles has the additional right, pursuant to its pueblo right, withdraw temporarily from storage Underlying Pueblo Waters, subject to an obligation to replace such water as soon as practical.

5.1.1.4 Rights of Other Parties. No other party to this action has any right in or to the surface waters of the

Los Angeles River or the native safe yield of the San Fernando Basin.

5.1.2 Sylmar Basin Rights.

5.1.2.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground waters in Sylmar Basin.

5.1.2.2 Overlying Rights. Defendants Moordigian and Hersch & Plumb own lands overlying Sylmar Basin and have a prior correlative right to extract native waters from said Basin for reasonable beneficial uses on their said overlying lands. Said right is appurtenant to said overlying lands and water extracted pursuant thereto may not be exported from said lands nor can said right be transferred or assigned separate and apart from said overlying lands.

5.1.2.3 Appropriative Rights of San Fernando and Los Angeles. San Fernando and Los Angeles own appropriative rights, of equal priority, to extract and put to reasonable beneficial use for the needs of said cities and their inhabitants, native waters of the Sylmar Basin in excess of the exercised reasonable beneficial needs of overlying users. Said appropriative rights are:

San Fernando	3,580 acre feet
Los Angeles	1,560 acre feet.

5.1.2.4 No Prescription. The Sylmar Basin is not presently in a state of overdraft and no rights by prescription exist in said Basin against any overlying or appropriative water user.

5.1.2.5 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Sylmar Basin.

5.1.3 Verdugo Basin Rights.

5.1.3.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Verdugo Basin.

5.1.3.2 Prescriptive Rights of Glendale and Crescenta Valley. Glendale and Crescenta Valley own prescriptive rights as against each other and against all private overlying or appropriative parties in the Verdugo Basin to extract, with equal priority, the following quantities of water from the combined safe yield of native and imported waters in Verdugo Basin:

Glendale	3,856 acre feet
Crescenta Valley	3,294 acre feet.

5.1.3.3 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Verdugo Basin.

5.1.4 Eagle Rock Basin Rights.

5.1.4.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Eagle Rock Basin.

5.1.4.2 No Rights in Native Waters. The Eagle Rock Basin has no significant or measurable native safe yield and no parties have or assert any right or claim to native waters in said Basin.

5.2 Rights to Imported Waters.

5.2.1 San Fernando Basin Rights.

5.2.1.1 Rights to Recapture Import Return Water. Los Angeles, Glendale, Burbank and San Fernando have each caused imported waters to be brought into ULARA and to be delivered to lands overlying the San Fernando Basin, with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of San Fernando Basin. Each of said parties has a right to extract from San Fernando Basin that portion of the safe yield of the Basin attributable to such import return waters.

5.2.1.2 Rights to Store and Recapture Stored Water. Los Angeles has heretofore spread imported water directly in San Fernando Basin. Los Angeles, Glendale, Burbank and San Fernando each have rights to store water in San Fernando Basin by direct spreading or in lieu practices. To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from San Fernando Basin. The right to extract waters attributable to such storage practices is an undivided right to a quantity of water in San Fernando Basin equal to the amount of such Stored Water to the credit of any party, as reflected in Watermaster records.

5.2.1.3 Calculation of Import Return Water and Stored Water Credits. The extraction rights of Los Angeles, Glendale, Burbank and San Fernando in San Fernando Basin in

any year, insofar as such rights are based upon import return water, shall only extend to the amount of any accumulated import return water credit of such party by reason of imported water delivered after September 30, 1977. The annual credit for such import return water shall be calculated by Watermaster based upon the amount of delivered water during the preceding water year, as follows:

Los Angeles:	20.8% of all delivered water (including reclaimed water) to valley fill lands of San Fernando Basin.
San Fernando:	26.3% of all imported and reclaimed water delivered to valley-fill lands of San Fernando Basin.
Burbank:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas.
Glendale:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas (i.e., total delivered water, [including reclaimed water], less 105% of total sales by Glendale in Verdugo Basin and its tributary hills).

In calculating Stored Water credit, by reason of direct spreading of imported or reclaimed water, Watermaster shall assume that 100% of such spread water reached the ground water in the year spread.

5.2.1.4 Cumulative Import Return Water Credits. Any import return water which is not extracted in a given water year shall be carried over, separately accounted for,

and maintained as a cumulative credit for purposes of future extractions.

5.2.1.5 Overextractions. In addition to extractions of stored water, Glendale, Burbank or San Fernando may, in any water year, extract from San Fernando Basin an amount not exceeding 10% of such party's last annual credit for import return water, subject, however, to an obligation to replace such overextraction by reduced extractions during the next succeeding water year. Any such overextraction which is not so replaced shall constitute physical solution water, which shall be deemed to have been extracted in said subsequent water year.

5.2.1.6 Private Defendant. No private defendant is entitled to extract water from the San Fernando Basin on account of the importation of water thereto by overlying public entities.

5.2.2 Sylmar Basin Rights.

5.2.2.1 Rights to Recapture Import Return Waters. Los Angeles and San Fernando have caused imported waters to be brought into ULARA and delivered to lands overlying the Sylmar Basin with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of Sylmar Basin. Los Angeles and San Fernando are entitled to recover from Sylmar Basin such imported return waters. In calculating the annual entitlement to recapture such import return water, Los Angeles and San Fernando shall be entitled to 35.7% of the preceding water year's imported water delivered by such

party to lands overlying Sylmar Basin. Thus, by way of example, in 1976-77, Los Angeles was entitled to extract 2370 acre feet of ground water from Sylmar Basin, based on delivery to lands overlying said Basin of 6640 acre feet during 1975-76. The quantity of San Fernando's imported water to, and the return flow therefrom, in the Sylmar Basin in the past has been of such minimal quantities that it has not been calculated.

5.2.2.2 Rights to Store and Recapture Stored Water. Los Angeles and San Fernando each have the right to store water in Sylmar Basin equivalent to their rights in San Fernando Basin under paragraph 5.2.1.2 hereof.

5.2.2.3 Carry Over. Said right to recapture stored water, import return water and other safe yield waters to which a party is entitled, if not exercised in a given year, can be carried over for not to exceed five years, if the underflow through Sylmar Notch does not exceed 400 acre feet per year.

5.2.2.4 Private Defendants. No private defendant is entitled to extract water from within the Sylmar Basin on account of the importation of water thereto by overlying public entities.

5.2.3 Verdugo Basin Rights.

5.2.3.1 Glendale and Crescenta Valley. Glendale and Crescenta Valley own appropriative and prescriptive rights in and to the total safe yield of Verdugo Basin, without regard as to the portions thereof derived from native water and from delivered imported waters,

notwithstanding that both of said parties have caused waters to be imported and delivered on lands overlying Verdugo Basin. Said aggregate rights are as declared in Paragraph 5.1.3.2 of these Conclusions.

5.2.3.2 Los Angeles. Los Angeles may have a right to recapture its import return waters by reason of delivered import water in the Basin, based upon imports during and after water year 1977-78, upon application to Watermaster not later than the year following such import and on subsequent order after hearing by the Court.

5.2.3.3 Private Defendants. No private defendant, as such, is entitled to extract water from within the Verdugo Basin on account of the importation of water thereto by overlying public entities.

5.2.4 Eagle Rock Basin Rights.

5.2.4.1 Los Angeles. Los Angeles has caused imported water to be delivered for use on lands overlying Eagle Rock Basin and return flow from said delivered imported water constitutes the entire safe yield of Eagle Rock Basin. Los Angeles has the right to extract or cause to be extracted the entire safe yield of Eagle Rock Basin.

5.2.4.2 Private Defendants. No private defendants have a right to extract water from within Eagle Rock Basin, except pursuant to the physical solution herein.

6. INJUNCTIONS

Each of the parties named or referred to in this Part 6, its officers, agents, employees and officials is, and they are, hereby

ENJOINED and RESTRAINED from doing or causing to be done any of the acts herein specified:

6.1 Each and Every Defendant -- from diverting the surface waters of the Los Angeles River or extracting the native waters of SAN FERNANDO BASIN, or in any manner interfering with the prior and paramount pueblo right of Los Angeles in and to such waters, except pursuant to the physical solution herein decreed.

6.2 Each and Every Private Defendant -- from extracting ground water from the SAN FERNANDO, VERDUGO, or EAGLE ROCK BASINS, except pursuant to physical solution provisions hereof.

6.3 Defaulting and Disclaiming Parties (listed in Attachments "C" and "D") -- from diverting or extracting water within ULARA, except pursuant to the physical solution herein decreed.

6.4 Glendale -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution; and from extracting water from VERDUGO BASIN n excess of its appropriative and prescriptive right declared herein.

6.5 Burbank -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution decreed herein.

6.6 San Fernando -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution herein decreed.

6.7 Crescenta Valley -- from extracting ground water from VERDUGO BASIN in any year in excess of its appropriative and prescriptive right declared herein.

6.8 Los Angeles -- from extracting ground water from SAN FERNANDO BASIN in any year in excess of the native safe yield, plus any import return water credit and stored water credit of said city; provided, that where the needs of Los Angeles require the extraction of Underlying Pueblo Waters, Los Angeles may extract such water subject to an obligation to replace such excess as soon as practical; and from extracting ground water from VERDUGO BASIN in excess of any credit for import return water which Los Angeles may acquire by reason of delivery of imported water for use overlying said basin, as hereinafter confirmed on application to Watermaster and by subsequent order of the Court.

6.9 Non-consumptive and Minimal Consumptive Use Parties. The parties listed in Attachment "F" are enjoined from extracting water from San Fernando Basin, except in accordance with practices specified in Attachment "F", or pursuant to the physical solution herein decreed.

7. CONTINUING JURISDICTION

7.1 Jurisdiction Reserved. Full jurisdiction, power and authority are retained by and reserved to the Court for purposes of enabling the Court upon application of any party or of the Watermaster by motion and upon at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate, for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment or to add to the provisions thereof consistent with the rights herein decreed; provided, however, that no such modification, amendment or amplification shall result in a change in the provisions of Section 5.2.1.3 or 9.2.1 hereof.

8. WATERMASTER

8.1 Designation and Appointment.

8.1.1 Watermaster Qualification and Appointment. A qualified hydrologist, acceptable to all active public agency parties hereto, will be appointed by subsequent order of the Court to assist the Court in its administration and enforcement of the provisions of this Judgment and any subsequent orders of the Court entered pursuant to the Court's continuing jurisdiction. Such Watermaster shall serve at the pleasure of the Court, but may be removed or replaced on motion of any party after hearing and showing of good cause.

8.2 Powers and Duties.

8.2.1 Scope. Subject to the continuing supervision and control of the Court, Watermaster shall exercise the express powers, and shall perform the duties, as provided in this

Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

8.2.2 Requirement for Reports, Information and Records. Watermaster may require any party to furnish such reports, information and records as may be reasonably necessary to determine compliance or lack of compliance by any party with the provisions of this Judgment.

8.2.3 Requirement of Measuring Devices. Watermaster shall require all parties owning or operating any facilities for extraction of ground water from ULARA to install and maintain at all times in good working order, at such party's own expense, appropriate meters or other measuring devices satisfactory to the Watermaster.

8.2.4 Inspection by Watermaster. Watermaster shall make inspections of (a) ground water extraction facilities and measuring devices of any party, and (b) water use practices by any party under physical solution conditions, at such times and as often as may be reasonable under the circumstances to verify reported data and practices of such party. Watermaster shall also identify and report on any new or proposed new ground water extractions by any party or non-party.

8.2.5 Policies and Procedures. Watermaster shall, with the advice and consent of the Administrative Committee, adopt and amend from time to time Policies and Procedures as may be reasonably necessary to guide Watermaster in performance of its duties, powers and responsibilities under the provisions of this judgment.

8.2.6 Data Collection. Watermaster shall collect and verify data relative to conditions of ULARA and its ground water basins from the parties and one or more other governmental agencies. Where necessary, and upon approval of the Administrative Committee, Watermaster may develop supplemental data.

8.2.7 Cooperation With Other Agencies. Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts (including any party) to secure or exchange data to the end that the purpose of this Judgment, including its physical solution, may be fully and economically carried out.

8.2.8 Accounting for Non-consumptive Use. Watermaster shall calculate and report annually the non-consumptive and consumptive uses of extracted ground water by each party listed in Attachment "F".

8.2.9 Accounting for Accumulated Import Return Water and Stored Water. Watermaster shall record and verify additions, extractions and losses and maintain an annual and cumulative account of all (a) stored water and (b) import return water in San Fernando Basin. Calculation of losses attributable to Stored Water shall be approved by the Administrative Committee or by subsequent order of the Court. For purposes of such accounting, extractions in any water year by Glendale, Burbank or San Fernando shall be assumed to be first from accumulated import return water, second from stored water, and finally pursuant to physical solution; provided, that any such city may, by written

notice of intent to Watermaster, alter said priority of extractions as between import return water and stored water.

8.2.10 Recalculation of Safe Yield. Upon request of the Administrative Committee, or on motion of any party and subsequent Court order, Watermaster shall recalculate safe yield of any basin within ULARA. If there has been a material long-term change in storage over a base period (excluding any effects of stored water) in San Fernando Basin the safe yield shall be adjusted by making a corresponding change in native safe yield of the Basin.

8.2.11 Watermaster Report. Watermaster shall prepare annually and (after review and approval by Administrative Committee) cause to be served on all active parties, on or before May 1, a report of hydrologic conditions and Watermaster activities within ULARA during the preceding water year. Watermaster's annual report shall contain such information as may be requested by the Administrative Committee, required by Watermaster Policies and Procedures or specified by subsequent order of this Court.

8.2.12 Active Party List. Watermaster shall maintain at all times a current list of active parties and their addresses.

8.3 Administrative Committee.

8.3.1 Committee to be Formed. An Administrative Committee shall be formed to advise with, request or consent to, and review actions of Watermaster. Said Administrative Committee shall be composed of one representative of each party having a right to extract ground water from ULARA, apart from the physical

solution. Any such party not desiring to participate in such committee shall so advise Watermaster in writing.

8.3.2 Organization and Voting. The Administrative Committee shall organize and adopt appropriate rules and regulations to be included in Watermaster Policies and Procedures. Action of the Administrative Committee shall be by unanimous vote of its members, or of the members affected in the case of an action which affects one or more basins but less than all of ULARA. In the event of inability of the Committee to reach a unanimous position, the matter may, at the request of Watermaster or any party, be referred to the Court for resolution by subsequent order after notice and hearing.

8.3.3 Function and Powers. The Administrative Committee shall be consulted by Watermaster and shall request or approve all discretionary Watermaster determinations. In the event of disagreement between Watermaster and the Administrative Committee, the matter shall be submitted to the Court for review and resolution.

8.4 Watermaster Budget and Assessments.

8.4.1 Watermaster's Proposed Budget. Watermaster shall, on or before May 1, prepare and submit to the Administrative Committee a budget for the ensuing water year. The budget shall be determined for each basin separately and allocated between the separate ground water basins. The total for each basin shall be allocated between the public agencies in proportion to their use of ground water from such basin during the preceding water year.

8.4.2 Objections and Review. Any party who objects to the proposed budget, or to such party's allocable share thereof, may

apply to the Court within thirty (30) days of receipt of the proposed budget from Watermaster for review and modification. Any such objection shall be duly noticed to all interested parties and heard within thirty (30) days of notice.

8.4.3 Notice of Assessment. After thirty (30) days from delivery of Watermaster's proposed budget, or after the order of Court settling any objections thereto, Watermaster shall serve notice on all parties to be assessed of the amount of assessment and the required payment schedule.

8.4.4 Payment. All assessments for Watermaster expenses shall be payable on the dates designated in the notice of assessment.

8.5 Review of Watermaster Activities.

8.5.1 Review Procedures. All actions of Watermaster (other than budget and assessment matters, which are provided for in Paragraph 8.4.2) shall be subject to review by the Court on its own motion or on motion by any party, as follows:

8.5.1.1 Noticed Motion. Any party may, by a regularly noticed motion, apply to the court for review of any Watermaster's action. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties.

8.5.1.2 De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties of a date for taking evidence and argument, and on the date so designated shall review de novo the question at issue. Watermaster's findings or decision, if any, may be received in evidence at

said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

8.5.1.3 Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

9. PHYSICAL SOLUTION

9.1 Circumstances Indicating Need for Physical Solution. During the period between 1913 and 1955, when there existed temporary surplus waters in the San Fernando Basin, overlying cities and private overlying landowners undertook to install and operate water extraction, storage and transmission facilities to utilize such temporary surplus waters. If the injunction against interference with the prior and paramount rights of Los Angeles to the waters of the San Fernando and Eagle Rock Basins were strictly enforced, the value and utility of those water systems and facilities would be lost or impaired. It is appropriate to allow continued limited extraction from the San Fernando and Eagle Rock Basins by parties other than Los Angeles, subject to assurance that Los Angeles will be compensated for any cost, expense or loss incurred as a result thereof.

9.2 Prior Stipulated Judgments. Several defendants heretofore entered into separate stipulated judgments herein, during the period June, 1958 to November, 1965, each of which judgments was subject to the court's continuing jurisdiction. Without modification of the substantive terms of said prior judgments, the same are categorized and merged into this judgment and superseded hereby in the exercise of the Court's continuing jurisdiction, as follows:

9.2.1 Eagle Rock Basin Parties. Stipulating defendants Foremost and Deep Rock have extracted water from Eagle Rock Basin, whose entire safe yield consist of import return waters of Los Angeles. Said parties may continue to extract water from Eagle Rock Basin to supply their bottled drinking water requirements upon filing all required reports on said extraction with Watermaster and Los Angeles and paying Los Angeles annually an amount equal to $21.78 per acre foot for the first 200 acre feet, and $39.20 per acre foot for any additional water extracted in any water year.

9.2.2 Non-consumptive or Minimal-consumptive Operations. Certain stipulating defendants extract water from San Fernando Basin for uses which are either non-consumptive or have a minimal consumptive impact. Each of said defendants who have a minimal consumptive impact has a connection to the City of Los Angeles water system and purchases annually an amount of water at least equivalent to the consumptive loss of extracted ground water. Said defendants are:

Non-Consumptive

Walt Disney Productions

Sears, Roebuck & Co.

Minimal-Consumptive

Conrock Co., for itself and as successor to California Materials Co.; Constance Ray White and Lee L. White; Mary L. Akmadzich and Peter J. Akmadzich

Livingston Rock & Gravel, for itself and as successor to Los Angeles Land & Water Co.

The nature of each said defendant's water use practices is described in Attachment "F". Subject to required reports to and inspections by Watermaster, each said defendant may continue extractions for said purposes so long as in any year such party continues such non-consumptive or minimal-consumptive use practices.

9.2.3 Abandoned Operations. The following stipulating defendants have ceased extracting water from San Fernando Basin and no further need exists for physical solution in their behalf:

Knickerbocker Plastic Company, Inc.

Carnation Company

Hidden Hills Mutual Water Company

Southern Pacific Railroad Co.

Pacific Fruit Express Co.

9.3 Private Defendants. There are private defendants who installed during the years of temporary surplus relatively substantial facilities to extract and utilize ground waters of San Fernando Basin. Said defendants may continue their extractions for consumptive use up to the indicated annual quantities upon payment of compensation to the appropriate city wherein their use of water is principally located, on the basis of the following physical solution:

9.3.1 Private Defendants and Appropriate Cities. Said private defendants and the cities to which their said extractions shall be charged and to which physical solution payment shall be made are:

			Annual Quantities (acre feet)
Los Angeles	-	Toluca Lake	100
		Sportsman's Lodge	25
		Van de Kamp	120
Glendale	-	Forest Lawn	400
		Southern Service Co.	75
Burbank	-	Valhalla	300
		Lockheed	25

Provided that said private defendants shall not develop, install or operate new wells or other facilities which will increase existing extraction capacities.

9.3.2 Reports and Accounting. All extractions pursuant to this physical solution shall be subject to such reasonable reports and inspection as may be required by Watermaster.

9.3.3 Payment. Water extracted pursuant hereto shall be compensated for by annual payment to Los Angeles, and as agreed upon pursuant to paragraph 9.3.3.2 to Glendale and Burbank, thirty days from day of notice by Watermaster, on the following basis:

9.3.3.1 Los Angeles. An amount equal to what such party would have paid had water been delivered from the distribution system of Los Angeles, less the average energy cost of extraction of ground water by Los Angeles from San Fernando.

9.3.3.2 Glendale or Burbank. An amount equal to the sum of the amount payable to Los Angeles under paragraph 9.4 hereof and any additional charges or conditions agreed upon by either such city and any private defendant.

9.4 Glendale and Burbank. Glendale and Burbank have each installed, during said years of temporary surplus, substantial facilities to extract and utilize waters of the San Fernando Basin. In addition to the use of such facilities to recover import return water, the distribution facilities of such cities can be most efficiently utilized by relying upon the San Fernando Basin for peaking supplies in order to reduce the need for extensive new surface storage. Glendale and Burbank may extract annual quantities of ground water from the San Fernando Basin, in addition to their rights to import return water or stored water, as heretofore declared, in quantities up to:

Glendale	5,500 acre feet
Burbank	4,200 acre feet;

provided, that said cities shall compensate Los Angeles annually for any such excess extractions over and above their declared rights at a rate per acre foot equal to the average MWD price for municipal and industrial water delivered to Los Angeles during the fiscal year, less the average energy cost of extraction of ground water by Los Angeles from San Fernando Basin during the preceding fiscal year. Provided, further, that ground water extracted by Forest Lawn and Southern Service Co. shall be included in the amount taken by Glendale, and the amount extracted by Valhalla and Lockheed shall be included in the amount taken by Burbank. All water taken by Glendale or Burbank pursuant hereto shall be charged against Los Angeles' rights in the

year of such extractions.

In the event of emergency, and upon stipulation or motion and subsequent order of the Court, said quantities may be enlarged in any year.

9.5 San Fernando. San Fernando delivers imported water on lands overlying the San Fernando Basin, by reason of which said city has a right to recover import return water. San Fernando does not have water extraction facilities in the San Fernando Basin, nor would it be economically or hydrologically useful for such facilities to be installed. Both San Fernando and Los Angeles have decreed appropriative rights and extraction facilities in the Sylmar Basin. San Fernando may extract ground water from the Sylmar Basin in a quantity sufficient to utilize its San Fernando Basin import return water credit, and Los Angeles shall reduce its Sylmar Basin extractions by an equivalent amount and receive an offsetting entitlement for additional San Fernando Basin extractions.

9.6 Effective Date. This physical solution shall be effective on October 1, 1978, based upon extractions during water year 1978-79.

10. MISCELLANEOUS PROVISIONS

10.1 Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein by a separate designation to be filed with Watermaster within thirty (30) days after Notice of Entry of Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster activity may file a waiver of notice on a form to be

provided by Watermaster. Thereafter such party shall be removed from the Active Party list. For purposes of service on any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment, such service shall be made personally or by deposit in the United States mail, first class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

10.2 Notice of Change in Hydrologic Condition -- Sylmar Basin. If Sylmar Basin shall hereafter be in a condition of overdraft due to increased or concurrent appropriations by Los Angeles and San Fernando, Watermaster shall so notify the Court and parties concerned, and notice of such overdraft and the adverse effect thereof on private overlying rights shall be given by said cities as prescribed by subsequent order of the Court, after notice and hearing.

10.3 Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and licensees and upon the agents, employees and attorneys in fact of all such persons.

10.4 Costs. Ordinary court costs shall be borne by each party, and reference costs shall be borne as heretofore allocated and paid.

DATED: _____, 1979.

_____
Judge of the Superior Court

TABLE OF CONTENTS

	Page
1. RECITALS	1
2. DEFINITIONS AND ATTACHMENTS	1
2.1 Definition of Terms	1
2.2 List of Attachments	6
3. PARTIES	6
3.1 Defaulting and Disclaiming Defendants	6
3.2 No Rights Other Than as Herein Declared	6
4. DECLARATION RE GEOLOGY AND HYDROLOGY	6
4.1 Geology	6
4.1.1 ULARA	6
4.1.2 San Fernando Basin	7
4.1.3 Sylmar Basin	8
4.1.4 Verdugo Basin	8
4.1.5 Eagle Rock Basin	9
4.2 Hydrology	9
4.2.1 Water Supply	9
4.2.2 Ground Water Movement	9
4.2.3 Separate Ground Water Basins	10
4.2.4 Safe Yield and Native Safe Yield	11
4.2.5 Separate Basins -- Separate Rights	11
4.2.6 Hydrologic Condition of Basins	11
4.2.6.1 San Fernando Basin	11
4.2.6.2 Sylmar Basin	12
4.2.6.3 Verdugo Basin	12
4.2.6.4 Eagle Rock Basin	12
5. DECLARATION OF RIGHTS	12

Page

5.1 Right to Native Waters 12
5.1.1 Los Angeles River and San Fernando Basin. . . 12
5.1.1.1 Los Angeles' Pueblo Right. 12
5.1.1.2 Extent of Pueblo Right 13
5.1.1.3 Pueblo Right -- Nature and Priority of Exercise 13
5.1.1.4 Rights of Other Parties 14
5.1.2 Sylmar Basin Rights 14
5.1.2.1 No Pueblo Rights 14
5.1.2.2 Overlying Rights 14
5.1.2.3 Appropriative Rights of San Fernando and Los Angeles 14
5.1.2.4 No Prescription 15
5.1.2.5 Other Parties 15
5.1.3 Verdugo Basin Rights 15
5.1.3.1 No Pueblo Rights 15
5.1.3.2 Prescriptive Rights of Glendale and Crescenta Valley 15
5.1.3.3 Other Parties 15
5.1.4 Eagle Rock Basin Rights 15
5.1.4.1 No Pueblo Rights 15
5.1.4.2 No Rights in Native Waters 16
5.2 Rights to Imported Waters 16
5.2.1 San Fernando Basin Rights 16
5.2.1.1 Rights to Recapture Import Return Water 16
5.2.1.2 Rights to Store and Recapture Stored Water 16

Page

5.2.1.3 Calculation of Import Return Water and Stored Water Credits . 17
5.2.1.4 Cumulative Import Return Water Credits 18
5.2.1.5 Overextractions 18
5.2.1.6 Private Defendant 18
5.2.2 Sylmar Basin Rights 18
5.2.2.1 Rights to Recapture Import Return Waters 18
5.2.2.2 Rights to Store and Recapture Stored Water 19
5.2.2.3 Carry Over 19
5.2.2.4 Private Defendants 19
5.2.3 Verdugo Basin Rights 20
5.2.3.1 Glendale and Crescenta Valley . . 20
5.2.3.2 Los Angeles 20
5.2.3.3 Private Defendants 20
5.2.4 Eagle Rock Basin Rights 20
5.2.4.1 Los Angeles 20
5.2.4.2 Private Defendants 21
6. INJUNCTIONS 21
6.1 Each and Every Defendant 21
6.2 Each and Every Private Defendant 21
6.3 Defaulting and Disclaiming Parties 21
6.4 Glendale 21
6.5 Burbank 21
6.6 San Fernando 22

Page

6.7 Crescenta Valley 22
6.8 Los Angeles 22
6.9 Non-Consumptive and Minimal Consumptive Use Parties 22
7. CONTINUING JURISDICTION 23
7.1 Jurisdiction Reserved 23
8. WATERMASTER 23
8.1 Designation and Appointment 23
8.1.1 Watermaster Appointment 23
8.2 Power and Duties 23
8.2.1 Scope 23
8.2.2 Requirement for Reports, Information and Records 24
8.2.3 Requirement of Measuring Devices 24
8.2.4 Inspection by Watermaster 24
8.2.5 Policies and Procedures 24
8.2.6 Data Collection 25
8.2.7 Cooperation With Other Agencies 25
8.2.8 Accounting for Non-consumptive Use 25
8.2.9 Accounting for Accumulated Import Return Water and Stored Water 25
8.2.10 Recalculation of Safe Yield 26
8.2.11 Watermaster Report 26
8.2.12 Active Party List 26
8.3 Administrative Committee 26
8.3.1 Committee to be Formed 26
8.3.2 Organization and Voting 27
8.3.3 Function and Powers 27

Page

8.4 Watermaster Budget and Assessments 27
8.4.1 Watermaster's Proposed Budget 27
8.4.2 Objections and Review 28
8.4.3 Notice of Assessment 28
8.4.4 Payment 28
8.5 Review of Watermaster Activities 28
8.5.1 Review Procedures 28
8.5.1.1 Noticed Motion 28
8.5.1.2 De Novo Nature of Proceedings . . . 28
8.5.1.3 Decision 29
9. PHYSICAL SOLUTION 29
9.1 Circumstances Indicating Need for Physical Solution 29
9.2 Prior Stipulated Judgment 29
9.2.1 Eagle Rock Basin Parties 30
9.2.2 Non-Consumptive or Minimal-Consumptive Operations 30
9.2.3 Abandoned Operations 31
9.3 Private Defendants 31
9.3.1 Private Defendants and Appropriate Cities . 32
9.3.2 Reports and Accounting 32
9.3.3 Payment 32
9.3.3.1 Los Angeles 32
9.3.3.2 Glendale or Burbank 33
9.4 Glendale and Burbank 33
9.5 San Fernando 34
9.6 Effective Date 34
10. MISCELLANEOUS PROVISIONS 34

Page

10.1 Designation of Address for Notice and Service . . . 34

10.2 Notice of Change in Hydrologic Condition--
Sylmar Basin 35

10.3 Judgment Binding on Successors 35

10.4 Costs 35

ATTACHMENTS

"A" -- Map entitled "Upper Los Angeles River Area",
showing separate basins therein 36

"B" -- List of "Dismissed Parties" 37

"C" -- List of "Defaulted Parties" 39

"D" -- List of "Disclaiming Parties 41

"E" -- List of "Prior Stipulated Judgment 42

"F" -- List of "Stipulated Non-consumptive or Minimal-
consumptive Use Practices" 43

"G" -- Map entitled "Place of Use and Service Area of
Private Defendants" 45

"H" -- Map entitled "Public Agency Water Service Areas" . . 46

Appendix B: Rockhaven Well Operation & Water Sale Agreement

Crescenta Valley Water District 2020 Urban Water Management Plan

R105828

CITY OF GLENDALE

AND

CRESCENTA VALLEY WATER DISTRICT

ROCKHAVEN WELL OPERATION

AND WATER PURCHASE/SALE AGREEMENT

This Agreement for the operation of the Rockhaven Well and Water Purchase/Sale Agreement ("Agreement"), is made and entered between the City of Glendale acting by and through Glendale Water and Power (interchangeably referred to as "Glendale" or "GWP") and Crescenta Valley Water District (referred to as "District") (also referred to as each a "PARTY" and collectively, the "PARTIES"), on this ____ day of _____, 2015 ("Effective Date"), with reference to the following facts and intentions, which the PARTIES agree are true and correct to the best of their knowledge and belief:

RECITALS

A. The groundwater rights of District and Glendale within the Verdugo Basin located within the Upper Los Angeles River Watershed in Los Angeles County ("Verdugo Basin") are defined by the January 26, 1979 Judgment in Los Angeles County Superior Court Case No. 650079, entitled *City of Los Angeles, a Municipal Corporation v. City of San Fernando, et. al.* ("Judgment"). The Judgment is incorporated in the Agreement by this reference as though fully set forth herein.

B. District and Glendale are the only parties with rights in and to the Verdugo Basin. The Judgment provides that the total Safe-Yield for the Verdugo Basin is 7,150 acre-feet per year ("AF/Y"). The Judgment further adjudicates the rights of the PARTIES to the Verdugo Basin and allocates the entire Safe Yield between them.

C. Each PARTY holds adjudicated water rights in and to the Verdugo Basin as follows: 3,856 AF/Y for GWP and 3,294 AF/Y for District.

D. In 2011, GWP constructed a groundwater well, commonly known as the Rockhaven Well ("Well"), at 2740 Hermosa Avenue in order to pump groundwater from the Verdugo Basin for its use.

E. The Well is capable of producing groundwater, however, the water is contaminated with nitrates, rendering the groundwater from the Well unsuitable for reasonable use without proper treatment.

F. The District desires to operate the Well and its existing infrastructure for GWP and construct additional facilities and features through which groundwater pumped at the Well can be purchased by the District and delivered to District's nitrate treatment facility pursuant to the terms and conditions as set forth in this Agreement and District may thereafter make use of such treated water for its use.

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated into the operative provisions of this Agreement by this reference, and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the PARTIES hereto agree as follows:

AGREEMENT

1. ADJUDICATED RIGHTS.

1.1 District recognizes and acknowledges Glendale's right to pump 3,856 AF/Y from the Verdugo Basin under the Judgment.

1.2 Glendale recognizes and acknowledges District's right to pump 3,294 AF/Y from the Verdugo Basin.

1.3 The PARTIES acknowledge that they are each entitled to pump no more than their rights as set forth herein, per the Judgment.

1.4 District acknowledges and agrees that nothing in this Agreement, or otherwise, shall be construed as a past, present, or future, abandonment, forfeiture or waiver by Glendale of its rights, nor any portion thereof, to the 3,856 AF/Y from the Verdugo Basin. District further acknowledges and agrees that District's past, present or future pumping from the Verdugo Basin in excess of District's right at 3,294 AF/Y shall not give rise to any right, claim or interest by District to any quantity of water in excess of District's right as set forth herein per the Judgment.

2. TERM. The term of this Agreement shall be for a period of 25 years commencing on the Effective Date; provided, however, that PARTIES may terminate this Agreement pursuant to Article 10, below.

3. FINANCAL. GWP shall invoice the District on a monthly basis, an amount based on the following three (3) components and the Five Year Cost Agreement as shown in Exhibit "A". GWP shall invoice the District using the sample form in Exhibit "B".

a. **Existing Well and Infrastructure Cost.** District agrees to reimburse GWP for the original cost of construction of the Well and existing facilities and features thereto ("Existing Infrastructure"). The amount to be reimbursed shall be based on the 50-year life cycle of the Existing Infrastructure over the 25-year term of the lease and an agreed upon interest rate on investment. In other words, this component of the monthly payment will be 1/600 of the original cost of construction, and at the conclusion of the original term of this Agreement, half the cost will be repaid.

District acknowledges and agrees that payments made pursuant to this section shall not cause or vest any ownership interest in District in the Well. District shall own the improvements constructed by District pursuant to Section 4 of this Agreement.

b. **Water Usage Cost.** District agrees to pay GWP for the groundwater produced from the Well at a reasonably consistent rate equal to or better than 225 gallons per minute, at a rate per acre-foot as shown in Exhibit "A".

District agrees to pay GWP for the groundwater produced, if the Well is unable to produce water at a reasonably consistent rate of 225 gallons per minute, at a rate per acre-foot as shown in Exhibit "A".

District acknowledges and agrees that the water pumped from the well shall be from the Glendale adjudicated right of 3,856 AF/Y.

District acknowledges that water currently available from the Well may not be suitable for consumption, potable or agricultural use and agrees to purchase water under this Agreement and during its term on an "as is" basis.

c. **Land Lease Cost.** District agrees to enter into a ground lease agreement ("Lease Agreement") with the City of Glendale whereby District shall lease the land necessary to carry out the intent of this Agreement. The form of the Lease Agreement is attached hereto as Exhibit "D". The cost to lease the land for the term in Section 2 is shown in Exhibit "A".

3.1 District agrees to pay Glendale within 30 calendar days after receiving the invoice following the first of each month.

3.2 These components are based on a Cost Analysis Study dated October 2014, prepared by Raftelis Financial Consultants and attached hereto as Exhibit "C". The Cost Analysis Study, the study assumptions and the components shall be reviewed and adjusted every five (5) years from the date of this agreement.

4 **IMPROVEMENTS.**

District shall, at its sole cost and expense, design and install any necessary infrastructure, equipment, facilities, or features ("Improvement(s)") including but not limited to, pumps, motors, piping, meters, small structures, electrical and telemetry systems, waste drain lines, and water mains in connection with the transportation and delivery of water from the Well to District's water treatment facility. District agrees to install a water meter at the Well to accurately record water flows in a manner acceptable to GWP. District shall obtain any necessary permits or licenses related to the construction of any Improvement at its sole cost and expense. District shall comply with all laws and regulatory standards in effect at the time of construction of any Improvement, including any requirements imposed under the California Environmental Quality Act (CEQA) and California Department of Public Health. District shall own any and all Improvements constructed.

5 **MAINTENANCE AND REPAIRS.** District shall, at its sole cost and expense, keep and maintain the Existing Infrastructure and any additional Improvements and shall make all necessary repairs and alterations thereto. District agrees to annually calibrate any water meter(s) installed to maintain their accuracy, and any such calibration shall be conducted in the presence of GWP staff.

6 **LEASE OF GLENDALE LAND BY DISTRICT.** District agrees to lease the land necessary for District to access and operate the Existing Infrastructure as well as build, maintain and operate the Improvements. The subject land is depicted in the map attached hereto as Exhibit "D". The Lease Agreement to be executed by the PARTIES shall be

concurrent to this Agreement and shall be incorporated herein by reference, for the amount and under the terms and conditions stated therein.

7 **WATER OPERATION.** Upon the execution of Ground Lease Agreement described in Section 6 of this Agreement, District shall be solely responsible for the cost and operations of the Existing Infrastructure and any Improvements thereon.

8 **GRANTS.** District shall be the lead agency for obtaining any grants from the State of California to finance the construction of the Improvements.

District shall obtain prior approval from Glendale of any future improvements not described in Section 4 of this agreement

District and GWP shall share equally the costs associated with providing matching funds as part of any grants obtained from the State of California for the project proposed herein.

The parties agree that District will apply and deduct the payments to be made by District to Glendale pursuant to Section 3 of this Agreement towards Glendale's portion of the matching funds for grants obtained pursuant to this Section 8, until such time that Glendale's matching fund portion obligation is paid in full.

9 **INDEMNITY.** Each PARTY agrees to indemnify, defend, and hold the other PARTY and its respective officers, employees, and agents and representatives harmless from and against any and all liability, suits, actions, proceedings, judgments, claims, losses, liens, damages, injuries (whether in contract, in tort, including personal injury, accidental death or property damage, or as part of an environmental claim, and regardless of whether the allegations are false, fraudulent or groundless), costs and expenses (including attorney fees, litigation, arbitration, mediation, appeal expenses) which in whole or in part arise out of or are connected with, or which are alleged to have arisen out of or to have been connected with, each PARTY's performance under this Agreement.

The indemnified PARTY: (i) shall promptly provide the indemnifying PARTY with written notice of any claim, demand, lawsuit, or the like for which it seeks indemnification pursuant to this Article __ and provide the indemnifying PARTY with copies of any demands, notices, summons, or legal papers received in connection with such claim, demand, lawsuit, or the like; (ii) shall not settle any such claim, demand, lawsuit, or the like without the prior written consent of the indemnifying PARTY; and (iii) shall fully cooperate with the indemnifying PARTY in the defense of the claim, demand, lawsuit, or the like. A delay in notice shall not relieve the indemnifying PARTY of its indemnity obligation, except (1) to the extent the indemnifying PARTY can show it was prejudiced by the delay; and (2) the indemnifying PARTY shall not be liable for any settlement or litigation expenses incurred before the time when notice is given. This provision shall survive expiration or termination of the Agreement.

10 **TERMINATION.**

10.1 Termination Right of GWP. GWP shall have the right to terminate this Agreement upon giving written notice of such termination to District at least ninety (90) days in advance and pursuant to the notice requirements as set forth in

Section 11.9. In the event that such termination by GWP occurs then Glendale will reimburse the depreciated cost incurred by District in connection with the construction based on the 50-year life cycle of the Improvements. Under no circumstances shall GWP have a right or interest in the District's Glenwood nitrate treatment facility.

10.2 Termination Right of District. District shall have the right to terminate this Agreement upon giving written notice of such termination to GWP at least ninety (90) days in advance, pursuant to the notice requirements as set forth in Section 11.9. In the event of such termination by District, GWP shall not be obligated to reimburse District for any costs incurred by District in the construction, or removal, as elected by District in its sole discretion, of any Improvement. Under no circumstances shall GWP have a right or interest in the District's Glenwood nitrate treatment facility.

10.3 Termination of Lease Agreement. This Agreement shall automatically be terminated upon the termination of the Lease Agreement.

11 GENERAL PROVISIONS.

11.1 Assignment. No PARTY shall assign any right or interest in this Agreement, nor delegate any duty owed, without the other PARTY'S prior written consent. Any attempted assignment or delegation shall be void and ineffective for all purposes, and shall constitute a material breach and grounds for immediate termination or suspension of this Agreement. In the event PARTIES consent to an assignment or delegation, the assignee, delegatee, or its legal representative shall agree in writing to personally assume, perform, and be bound by all of the terms of this Agreement.

11.2 Successors. Subject to the provision regarding assignment, above, this Agreement shall be binding on the heirs, executors, administrators, successors, and assigns of the respective PARTIES.

11.3 Insurance. During the term of this Agreement, District shall carry, at its own cost and expense, the following policies of insurance: (i) Insurance against loss or damage to Existing Infrastructure and any Improvements thereon, as is customarily maintained with respect to works and properties of a like character, which may be carried in conjunction with any other policies of fire and extended coverage insurance; (ii) commercial general liability (CGL) insurance with respect to District's activities in connection with this Agreement, such insurance to afford protection of up to One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) general aggregate; and (iii) Workers' Compensation insurance as necessary and required by the laws of the State of California. Upon written request, District shall deliver to GWP copies of each certificate insurance policy obtained.

11.4 No Third-Party Beneficiaries. This Agreement is for the benefit of PARTIES only, and is not intended to benefit any third parties. This Agreement does not

create, and shall not be construed to create, any rights enforceable by any person, partnership, corporation, joint venture, limited liability company or other form of organization, association or entity of any kind that is not a PARTY to this Agreement.

11.5 **Attorneys' Fees.** If any action at law or in equity is brought to enforce or interpret the provisions of this Agreement, the prevailing PARTY shall be entitled to reasonable attorney's fees in addition to any other relief to which it may be entitled.

11.6 **Construction.** The provisions of this Agreement shall be liberally construed to effectuate its purposes. The language of this Agreement shall be construed simply according to its plain meaning and shall not be construed for or against any PARTY, as each PARTY has participated in the drafting of this Agreement.

11.7 **Entire Agreement.** In conjunction with the matters considered herein, this Agreement, and the concurrently executed Ground Lease Agreement between the Parties, shall contain the entire understanding and agreement of the PARTIES, and there have been no promises, representations, agreements, warranties or undertakings by any of the PARTIES, either oral or written, of any character or nature binding except as stated herein and the Ground Lease Agreement. This Agreement, and/or the Ground Lease Agreement, may be modified, altered or amended only by an instrument in writing, executed by the PARTIES, and by no other means. Each PARTY waives its right to claim, contest or assert that this Agreement was modified, canceled, superseded or changed by any oral agreement, course of conduct, waiver or estoppel.

11.8 **Severability.** Should any part, term or provision of this Agreement or any document required herein to be executed be declared invalid, void or unenforceable, all remaining parts, terms and provisions hereof shall remain in full force and effect and shall in no way be invalidated, impaired or affected thereby.

11.9 **Notices.** All notices, approvals, acceptances, and other communication required or permitted under this Agreement shall be in writing and shall be deemed validly given on the date either: 1) personally delivered to the address indicated below, or 2) on the third business day following deposit, postage prepaid, using certified mail, return receipt requested, in any U.S. Postal mailbox or at any U.S. Post Office, or 3) one business day after the dispatch date by overnight delivery service, or 4) on the date of transmission by facsimile or electronic mail to the number or e-mail address provided below. All notices shall be addressed to the following:

GLENDALE WATER AND POWER
Attn: Ramon Abueg
Assistant General Manager
Glendale Water and Power
City of Glendale

141 North Glendale Ave., 4th Level
Glendale, CA 91206-4496
Facsimile: (818) 552-2852
E-mail: RAbueg@GlendaleCA.GOV

CRESCENTA VALLEY WATER DISTRICT
Attn: Dennis Erdman
General Manager
2700 Foothill Boulevard
La Crescenta, CA 91214-3516
Facsimile: (818) 248-1659
E-mail: derdman@cvwd.com

Any PARTY may change its address by giving the other PARTIES written notice of its new address as provided above.

11.10 Governing Law. This Agreement will be governed by the laws of California, without regard to conflicts of law.

11.11 Waiver. No waiver of any provision or consent to any action shall constitute a waiver of any other provision or consent to any other action, whether or not similar. No waiver or consent shall constitute a continuing waiver or consent or commit a PARTY to provide a waiver or consent in the future except to the extent specifically stated in writing. No waiver shall be binding unless executed in writing by the PARTY making the waiver, based on a full and complete disclosure of all material facts relevant to the waiver requested.

11.12 Authorizations. All individuals executing this Agreement on behalf of the respective PARTIES certify and warrant that they have the capacity, and have been duly authorized to so execute this Agreement on behalf of the entity so indicated.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their officers hereunto duly authorized on the day and year first above written.

CITY OF GLENDALE

Date: 2/23/15

Scott Ochoa
City Manager

CRESCENTA VALLEY WATER DISTRICT

Dated Nov. 24, 2014

Dennis Erdman
General Manager

APPROVED AS TO FORM

Senior Assistant City Attorney
Date 2/23/15

EXHIBIT "A"

Rockhaven Well Water Purchase and Sale Agreement

Five Year Cost Agreement

2015 – 2019

Exhibit "A"

City of Glendale and Crescenta Valley Water District
Rockhaven Well Water Purchase and Sale Agreement
Five Year Cost Agreement

Year	2015		2016		2017		2018		2019	
Existing Well and Infrastructure Cost	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly
	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251
Water Usage Cost	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)
	$276	$236	$290	$248	$305	$261	$321	$275	$337	$289
Land Lease Cost	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly
	$15,040	$1,253	$15,040	$1,253	$15,491	$1,291	$15,956	$1,330	$16,435	$1,370

Notes:

1. Cost shown above are based on the Cost Analysis Study and Worksheets prepared by Raftelis Financial Consultants dated September, 2014

1. Cost shown above are based CVWD/GWP receiving Prop. 84, Drought Relief Grant

2. Cost and Assumptions of the Cost Analysis Study and Worksheets to be reviewed and revised every 5 years, next revision in 2020.

EXHIBIT "B"

Glendale/CVWD Sample

Monthly Invoice

EXHIBIT "B"

MONTHLY PAYMENT FORM
ROCKHAVEN WELL

Month: _____ Year: 2014

WATER USAGE:

End-of-Month Rockhaven Well Meter Read = 17441424 cubic feet (cf)

Prior End-of-Month Rockhaven Well Meter Read = 00000000 cf

Total Usage for Month: 17,441,424 cf ÷ 43,560 = 400.40 Acre-Feet, (AF)

a) Usage for Month at 225 gpm or more: 17,441,424 cf ÷ 43,560 = 400.40 AF

b) Usage for Month at 225 gpm or less: 0.00 cf ÷ 43,560 = 0.00 AF

WATER USAGE COST [1]:

a)	$276 per AF x	400.4 AF =	$ 110,510.40
b)	$236 per AF x	0.00 AF =	$ 0.00
	Total Water Usage Cost		**$ 110,510.40**

EXISTING WELL AND INFRASTRUCTURE COST [1]:

$51,012 per year or $4,251 per month **$ 4,251.00**

LAND LEASE COST [1]:

$15,040 per year or $1,253 per month **$ 1,253.00**

Total Payment, CVWD to Glendale **$ 116,014.70**

Approved by: _____ Glendale

Approved by: _____ CVWD

NOTES:

1. *Unit Costs shown are in accordance with Exhibit "A" of the Agreement.*
2. *Glendale and CVWD will meet prior to the of the 5th year to revised and adjust the unit costs in accordance with Section 3.2 of the Agreement*

EXHIBIT "C"

Cost Analysis Study

Dated October 2014

Prepared by

Raftelis Financial Consultants

Table 1
Existing CVWD Water Supply Costs

Description			CY 2014	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15	CY 2030 16
Rockhaven Well Production	Production Capacity (GPM)	Annual Average Downtime																	
Average Annual Water Production (GPM)	400	25%	300																
Projected Rockhaven Water Production (AFY)			484	242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
FMWD Imported Water Costs (Base Case)	Inflation Rate	Actual 2013	CY 2014 Budgeted																
Existing FMWD Tier 1 Imported Water Supply Costs	5%	$847	$890	$935	$981	$1,030	$1,082	$1,136	$1,193	$1,252	$1,315	$1,381	$1,450	$1,522	$1,598	$1,678	$1,762	$1,850	$1,943
CVWD Power Costs for FMWD deliveries	6%	$145	$154	$163	$173	$183	$194	$206	$218	$231	$245	$260	$275	$292	$309	$328	$348	$368	$390
Total Unit Cost for FMWD deliveries ($/AF)		$992		$1,097	$1,154	$1,213	$1,276	$1,342	$1,411	$1,483	$1,560	$1,640	$1,725	$1,814	$1,908	$2,006	$2,110	$2,219	$2,333
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level				$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515	$1,128,973
Grand Total			$25,640,758																

Table 2
Rockhaven Well Future Construction Costs

Description		Cost
Rockhaven Well Project Capitalized Cost		
Transmission Pipe to Blending Plant (a)		$240,000
Well Equipment		
Pump & Motor		$90,000
Electrical		$90,000
Piping		$40,000
SCADA/Telemetry		$44,000
Building/Misc		$35,000
Site work		$25,000
Subtotal		$564,000
Construction Cost Multipliers		
Contingency	20%	$112,800
Engineering & Permitting	15%	$84,600
Soils Engineering	1%	$5,640
Construction Mgmt	10%	$56,400
CVWD Labor, Eqpt, Mtls		$21,560
Grand Total Capital Cost (2014)		**$845,000**
Rockhaven Well Site Costs (2013)		
Local Wellsite Labor		
Weekly	Hrs	10
Annual	Hrs	520
Burdened Labor Rate ($/hour)		$60
Annual Labor Cost		$31,200
Materials Cost at Wellsite ($/year)		$5,000
Total Annual Labor & Materials		**$36,200**

a. The transmission line is 1,200 ft. at $200/lf.

Table 3
Rockhaven Well Water Supply Alternative Analysis

Inputs | Conditional Output | Key Output | Cashflow Input (paid to GWP) | Cashflow Input (production costs)

Description	Amortization & Inflation Rates			CY 2014 Day 1	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15
Amortized Compensation Schedule for 2011 GWP Construction Costs at Rockhaven Well	2%	Period (Years) 50	CY 2011 Total $1,095,841	$711,426	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)	3%	25	$660,000	$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916	
Groundwater Rights Lease from GWP																			
Projected Rate for Verdugo Basin GW Leasing ($/AF)	3%			$183	$193	$202	$212	$220	$234	$246	$258	$271	$285	$299	$314	$329	$346	$363	
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	
CVWD Payment to GWP for Producing Adjudicated GW				$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708	
Rockhaven Well Variable Incremental Production Costs		2013 Rate ($/AFY)		$2,664.02	$5,487.88	$5,652.52													
Power ($95 per AF)	6%	$95		$107	$113	$120	$127	$135	$143	$151	$161	$170	$180	$191	$203	$215	$228	$241	
Treatment & Blending of Groundwater	3%	$220		$233	$240	$248	$255	$263	$271	$279	$287	$296	$305	$314	$323	$333	$343	$353	
Other Miscellaneous O&M Costs	3%	$10		$11	$11	$12	$12	$12	$13	$13	$14	$14	$14	$15	$15	$16	$16	$17	
Total Cost ($/AF)		$325		$351	$365	$379	$394	$410	$426	$443	$461	$480	$499	$520	$541	$563	$587	$611	
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	
Annual O&M Costs for Production of Rockhaven Well Water				$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657	
Rockhaven Well Fixed O&M Costs	3%			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805	
Cashflow for Rockhaven Well Water Supply (Alternative Case)																			
CVWD Repayment of GWP Construction Costs					$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)					$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
CVWD GW Production Right Lease Payment to GWP					$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Annual O&M Costs for Production of Rockhaven Well Water					$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
CVWD Production Costs for Rockhaven Well Water		Grand Total			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Total Annual CVWD Costs of Operating Rockhaven Well					$226,934	$368,433	$381,946	$396,056	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Grand Total 25 Yr. Expenditures for Rockhaven Well Water Supply		$14,533,308																	
Comparison of 25 Year Water Supply Alternatives		Grand Total																	
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level		$25,640,756			$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,020	$970,674	$1,020,784	$1,073,515
Less Annual CVWD Costs of Rockhaven Well Supply Alternative		$14,533,308		$150,000	$226,934	$368,433	$381,946	$396,056	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Net Annual O&M Savings of Rockhaven Well vs. Imported Supply		$11,107,449		-$150,000	$38,571	$189,916	$205,157	$221,288	$238,358	$256,420	$275,527	$295,736	$317,108	$339,707	$363,598	$388,853	$415,544	$443,751	$473,556
Discount Rate of Return for 25 Year Cashflow	8.50%			$11,107,449															
Annual Payments to GWP from CVWD		Grand Total																	
Reimbursements for GWP Construction Costs at Well		$905,601			$17,437	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
Lease of Rockhaven Wellsite		$486,005			$13,250	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Lease of Groundwater Rights from GWP (Water)		$1,870,693			$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
		$2,842,302			$75,059	$154,555	$160,009	$165,720	$171,700	$177,962	$184,520	$191,388	$198,581	$206,114	$214,005	$222,270	$230,927	$239,997	$249,497
Rockhaven Production Payments to GWP ($/AF)			PRODUCTION		$310	$319	$331	$342	$355	$368	$381	$396	$410	$426	$442	$459	$477	$496	$516

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 255,994**	**$ 422,194**	**$ 437,989**	**$ 454,514**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		**-$160,875**	**$ 9,588**	**$ 136,318**	**$ 149,286**	**$ 163,013**
Well and Pipeline Construction Cost Subtotal		-$160,875				

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well			$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP			$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Annual Payments to GWP		**-$160,875**	**$ 132,783**	**$ 206,385**	**$ 214,063**	**$ 222,129**

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 55,920	$ 117,599	$ 123,656	$ 130,025
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 245,184**	**$ 399,460**	**$ 414,084**	**$ 429,377**

FMWD Import

Imported Water Supply Equivalent		$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery		$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant		**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings	**-$845,000**	**$ 20,398**	**$ 159,052**	**$ 173,191**	**$ 188,149**

Well and Pipeline Construction Cost

Subtotal	-$845,000

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP	$ 55,920	$ 117,599	$ 123,656	$ 130,025
Annual Payments to GWP	**$ 121,972**	**$ 183,651**	**$ 190,158**	**$ 196,993**

EXHIBIT "D"

LEASE AGREEMENT

Between City of Glendale

and

Crescenta Valley Water District

LEASE AGREEMENT

THIS GROUND LEASE AGREEMENT ("Lease Agreement") is made and entered into as of _____, 2014, by and between the **CITY OF GLENDALE, CALIFORNIA,** ("Landlord"), a municipal corporation, and **CRESCENTA VALLEY WATER DISTRICT** ("Tenant"), also referred to as each a "Party" and collectively "Parties".

RECITALS

WHEREAS, Landlord is the owner of certain real property a portion of which is the subject of the terms of this Lease Agreement, which portion is legally described in Exhibit "A" and shown in Exhibit "B" as the "Leased Premises" (hereinafter referred to as the "Leased Premises"); Said Exhibits "A" and "B" are attached hereto and incorporated herein by reference.

WHEREAS, Landlord and Tenant have entered into an executed a memorandum of understanding and agreement entitled City of Glendale and Crescenta Valley Water District Rockhaven Well Operation And Water Purchase/Sale Agreement ("MOU"), which MOU sets forth the Parties' understanding and agreement pertaining to Tenant's proposed use of the Leased Premises;

WHEREAS, Tenant desires to enter into a lease with Landlord for the Leased Premises; and

WHEREAS, Landlord is willing to grant such a lease, subject to the terms and conditions of this Lease Agreement.

NOW, THEREFORE, in consideration of the promises and of the mutual obligations and agreements in this Lease, the Parties agree as follows:

1. TERM

1.1 The term of this Lease Agreement shall be for a period of twenty five (25) years, commencing thirty days following the City Council's approval by way of an ordinance authorizing the subject Lease Agreement. The term of the Lease may be terminated sooner in any one or more of the following: abandonment or voluntary surrender of the Lease by Tenant; forfeiture of the Lease after an uncured breath of the terms of the Lease Agreement; and/or for any other reason stated in this Lease Agreement.

1.2 This Lease Agreement shall terminate prior to the expiration of its Term in the event the MOU between the Parties is terminated, at which time this Lease Agreement shall terminate on the date of the termination of the MOU.

1.3 Landlord may terminate this Lease Agreement, in the event the operations on the Lease Premises are posing or constituting an emergency affecting public welfare, safety and security, and/or in the event Landlord requires the use of the Leased Premises to address an emergency affecting public welfare, safety and security. Such termination shall be effective immediately and shall be without the requirement of any prior notice to Tenant. Landlord will make every effort to provide Tenant with one (1) week notice of termination in instances of public emergency affecting public security and/or safety only if providing such notice is possible in light of the events and circumstances surrounding the emergency.

1.4 This Lease Agreement shall terminate prior to the expiration of its Term in the event the MOU between the Parties is terminated, at which time this Lease Agreement shall terminate on the date of the termination of the MOU.

2. USE OF PREMISES

2.1 The Leased Premises shall be used solely for the purpose of installation/construction of vertical turbine pump and motor, a small building enclosure on a concrete pad over the groundwater well, above ground discharge piping with a flow meter, electrical/telemetry system to provide power for the pump and ability to remotely monitor and control the pump, asphaltic concrete paving and on-site improvements, underground discharge piping to waste, and 8-inch water main which will connect to an existing 8-inch water main to CVWD's Nitrate Removal Treatment and ingress, egress and parking of motor vehicles by Tenant and Tenant's employees, representatives and agents, and for no other purposes, without the written consent of Landlord first being obtained.

2.2 Tenant acknowledges that Landlord shall not be held responsible for the design of the facilities on the Leased Premises. Tenant acknowledges that Landlord shall not be held liable and agrees to defend and hold Landlord harmless to the maximum extent permitted by law from all claims arising out of the design, maintenance and operation of Tenant's Facilities at the Leased Premises.

3. RENT

3.1 Landlord shall invoice Tenant on a monthly basis, pursuant to Section 3 of the MOU. The single monthly invoice shall include, among other components, the rent for the Leased Premises. The rent shall be in the amount as set forth in the Cost Analysis Study dated October 2014, prepared by Raftelis Financial Consultants attached hereto as Exhibit "C". The Cost Analysis Study, the study assumptions and the components shall be reviewed and adjusted every five (5) years from the date of this agreement.

3.2 Tenant shall pay Landlord within 30 calendar days after receiving the invoice following the first of each month.

4. MAINTENANCE AND REPAIRS

4.1 Tenant shall be responsible for maintaining the lighting and landscaping, including planting, trimming and irrigating said landscaping. Tenant acknowledges and agrees that Tenant shall conform to Landlord's reasonable standards, as well as ensure that all work done and any and all site improvements by Tenant is in accordance with the rules, regulations and laws of the City of Glendale, as well as with any applicable State and Federal rules, regulations and mandates.

4.2 Tenant shall be directly responsible for all utilities required by Tenant's use of the Leased Premises, including but not limited to electricity. The cost of any utilities provided by Landlord shall be paid by Tenant to Landlord as payment separate from rent. Tenant shall pay a monthly charge for electricity computed at the then-current public utility rate.

4.3 Tenant shall keep the Leased Premises free from trash and debris. Tenant shall maintain the paved surface of the Leased Premises.

5. ACCESS

5.1 By Landlord: Landlord reserves the right to enter and use the Leased Premises for the purpose of gaining access to Landlord's adjacent properties without interfering with Tenant's use of the Leased Premises.

5.2 By Tenant: At all times throughout the Term of this Lease Agreement, and at no additional charge to Tenant, Tenant and its employees, agents, contractors, and subcontractors, will have twenty-four (24) hour per day, seven (7) day per week right of access to and over Landlord's property, along Landlord's specified access routes, for the installation, repair, maintenance and operation of the Tenant Facilities and any utilities serving the Lease Property. Tenant must provide Landlord with at least 72 hours advance prior notice for any vehicular access if the vehicle or equipment: (1) has a gross vehicle weight in excess of 10,000 pounds; (2) has skid steering including track driven vehicles or equipment; (3) possesses outriggers or stabilizers; (4) needs to be transported by trailer; or (5) is not recognized by the Department of Motor Vehicles to be legally driven or operated across/over public roads or highways. Tenant is responsible for and shall reimburse Landlord for any and all damages to the access to Landlord's property caused by Tenant's activity on Landlord's Property.

6. COMPLIANCE WITH ALL LAWS

6.1 Tenant shall comply with all applicable requirements of federal, state and local laws, rules and to monitor and certify such compliance in accordance with requirements as may be established by Landlord.

6.2 Tenant's ability to use the Lease Property shall be dependent upon Tenant obtaining all the certificates, permits, and other approvals, which may be required from any federal, state, or local authorities. Landlord shall reasonably cooperate with Tenant, but at no expense to Landlord, in obtaining such approvals. If any application by Tenant for any such approval is finally denied or rejected, or if any such certificate, permit, license or approval expires, lapses or is otherwise withdrawn or terminated, or if due to technological changes or for any other reason, Tenant, in its sole discretion, determines that it will be unable to use the Lease Property for Tenant's intended purposes, then Tenant shall have the right to terminate this Lease in accordance with the applicable Sections herein.

7. SIGNS

Tenant shall consult with the Planning Division of the City of Glendale to determine what signs will be permitted. Only those signs permitted by ordinance may be erected on the Leased Premises.

8. TAXES

8.1 Tenant recognizes and understands that this lease may create a possessory interest subject to property taxation and that Tenant may be subject to the payment of property taxes levied on such interest, and Tenant agrees to pay all such taxes levied. Tenant bears the responsibility to determine the subject taxes. Landlord shall not be liable for Tenant's failure to pay such possessory property taxes.

8.2 Tenant shall also pay, before delinquency, all taxes assessed against any personal property of Tenant, which may be located in or upon the Leased Premises, including all facilities, furnishings, fixtures, equipment. Tenant shall not be liable to pay any taxes and assessments arising from fee simple ownership of the Leased Premises.

9. RIGHT OF INSPECTION

Landlord reserves the right, to its officers, agents or employees, to enter upon the Leased Premises, and every part thereof, at all reasonable times during regular business hours for the purpose of inspecting same.

10. INDEMNIFICATION

10.1 Tenant agrees to indemnify, defend and hold harmless, to the maximum extent permitted by law, Landlord and its officers, agents, employees and representatives, from and against any and all liability, suits, actions, proceedings, judgments, claims losses, liens, damages, injuries (whether in contract or in tort, including personal injury, accidental death or property damage, and regardless of whether the allegations are false, fraudulent or groundless), costs and expenses (including attorney's fees), litigation, arbitration, mediation, appeal expenses) which in whole or in part arise out of or are connected with, or which are alleged to have arisen out of or to have been connected with Tenant's use, occupancy, activities, events, or operations on, in or about the Leased Premises.

10.2 Tenant's obligation to indemnify, defend and hold harmless shall remain in effect and shall be binding upon Tenant whether such injury or damage shall accrue, or may be discovered, before or after the termination of this Lease.

11. INSURANCE

11.1 At its own expense, Tenant shall obtain, pay for and maintain during the term of the Lease Agreement an "occurrence" policy for Commercial General Liability (including Contractual Liability) which shall protect Tenant and Landlord from claims for injuries and damages. The policy shall add Landlord, its officers, agents and employees as additional named insureds under the policy in the following amounts:

COMMERCIAL GENERAL LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per occurrence for personal injuries, including accidental death, to any one person.

PROPERTY DAMAGE INSURANCE in an amount not less than One Million Dollars ($1,000,000); and subject to the above limits and combined single limit of insurance in an amount not less than One Million Dollars ($1,000,000).

BUSINESS AUTOMOBILE LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per occurrence for bodily injury (including accidental death) to any one person and One Million Dollars ($1,000,000) per occurrence for property damage, or Two Million Dollars ($2,000,000) combined single limit.

POLLUTION LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per claim and Two Million Dollars ($2,000,000) in aggregate.

Complete WORKERS' COMPENSATION INSURANCE meeting or exceeding the coverages and amounts that California law requires.

11.2 At all times, the insurance company issuing the policy shall be an "admitted" insured in the State of California; shall be domiciled within, and organized under the laws of, a state of the United States; and shall carry an A.M. Best & Company minimum rating of "A-"

11.3 All policies shall contain a "Separation of Insured" clause and a "Primary Coverage" clause for any loss arising out of or caused by Tenant's occupation or use of the Leased Premises. In addition, the policies shall contain a statement of obligation on the insurance carrier's part to notify Landlord, by registered mail, at lest thirty (30) days in advance of any policy cancellation, termination or reduction of the state limits.

11.4 Before signing this Lease Agreement, Tenant shall deliver to Landlord a "certificate of insurance" and an "additional insured endorsement", both documents countersigned by the insurance carrier or its authorized representative, on forms satisfactory to the City Attorney, which set forth the above provisions.

11.5 Thirty (30) days prior to each anniversary date of this Lease Agreement, each Tenant shall deliver to Landlord a renewal certificate of insurance and renewal additional insured endorsement, in conformance with the requirements set forth herein.

11.6 The countersigned certificate, along with the additional insured endorsement, shall state: "The City of Glendale, its officers, agents and employees are added as additional names insureds under this policy. This insurance is primary to the coverage of the City of Glendale. Neither the Landlord nor any of its insurers shall be required to contribute to any loss. The insurance shall apply separately to each insured. The issuing company shall mail thirty (30) days advance notice to the Landlord of any policy cancellation, termination or reduction of the stated limits."

11.7 Additionally, any deductibles or self-insured retentions shall be set forth on the certificate and shall be subject to Landlord's review and approval. Landlord reserves the right to modify its insurance requirements on an annual basis.

11.8 Tenant's failure to comply with the provisions of this Section shall constitute a material breach upon which Landlord may immediately terminate this Lease Agreement.

12. DEFAULT BY TENANT

12.1 The occurrence of any one or more of the following events shall constitute an "Event of Default" hereunder by Tenant.

1. The failure by Tenant to make the payment of rent or any other payment required to be made by Tenant hereunder when due, where such failure shall continue for a period of ten (10) days after written notice thereof is received by Tenant from Landlord.
2. The failure by Tenant to observe or perform any of the covenants or provisions of this Lease Agreement to be observed or performed by Tenant, other than as specified in Section 13(A) where such failure shall continue for a period of thirty (30) days after written notice thereof is received by Tenant from Landlord; provided, however, that it shall not be deemed an Event of Default by Tenant if Tenant shall commence to cure such failure within said thirty (30) day period and thereafter diligently prosecute such cure to completion.

12.2 If there occurs an Event of Default by Tenant, in addition to any and all other remedies available to Landlord at law or in equity; Landlord shall have the option to terminate this Lease Agreement and all rights of Tenant hereunder.

12.3 In addition, Landlord shall be entitled to immediate restraint by injunction of any violation of any of the covenants, conditions, or provisions of this Lease Agreement.

12.4 Should Tenant engage in activities which may cause or allow the Leased Premises to become a threat or danger to public welfare and safety, Landlord shall have the right, prior to a determination and authorization by a court of competent jurisdiction, to re-enter the Leased Premises and remove persons and personal property therefrom.

13. ASSIGNMENT AND SUBLETTING

13.1 Tenant shall not have the right to assign this Lease, or to sublet the whole or any portion of the Property without the prior written consent of the Landlord, which consent shall not be unreasonably withheld. No assignment or sublet shall release Tenant or change Tenant's primary liability to perform Tenant's obligations hereunder.

13.2 Tenant's rights hereunder shall not be subject to assignment by attachment, execution or proceedings under any Bankruptcy Act provision. Any such assignment or subletting shall be wholly void and of no force and effect without Landlord's prior written consent.

13.3 Any consent by Landlord to Tenant to assign this lease or sublet the whole or any portion of the Property, shall not be construed as consent to any other assignment or subletting, or as a waiver of Landlord's objection or right to object to any such assignment or subletting to which it has not consented.

14. EFFECT OF BANKRUPTCY

If at any time during the Lease term, in any judicial action or Court proceeding against either of the Tenant, a receiver or other officer or agent of the court is appointed to take charge of Tenant's interest under this Lease, and remain in possession of the Leased Premises for a period of more than twenty (20) days, or if Tenant shall be adjudicated bankrupt, or should any attempt to be made to sell Tenant's interest under this Lease by judicial sale, then Landlord shall have the right, to immediately terminate this Lease Agreement.

15. LANDLORD'S RIGHTS UPON TERMINATION

In the event of a termination or cancellation of this Lease Agreement for any cause or reason whatsoever, before the expiration of the term hereof, Landlord shall be entitled to remove Tenant from the Leased Premises and, except as otherwise hereinabove expressly provided, shall be entitled to retain any sum then held by Landlord as security pursuant to Paragraph 6 hereof, to cover damages and rents owed, pursuant to Section 1950.7 of the California Civil Code.

16 HOLDING OVER

Upon termination of this Lease Agreement, Tenant shall surrender the Leased Premises in good, clean, undamaged condition, wear and tear excepted. Any holding over by Tenant after the term of this Lease Agreement expires, with the consent of Landlord, shall create a month to month tenancy, which either party may terminate by giving the

other party written notice at least thirty (30) days before the intended termination date. Rent shall be at a rate equal to the rent for the immediately preceding month, and shall be payable in advance. In the event of a holding over, all other terms and conditions of this Lease shall remain in full force and effect.

17. NOTICE

Any notice to be provided to the Landlord and Tenant hereunder shall be provided in writing and unless otherwise provided herein, shall be deemed validly given on the date either personally delivered to the address indicated below or on the third (3rd) business day following deposit, postage prepaid, using certified mail, return receipt requested, in any U.S. Postal mailbox or at any U.S. Post Office. Notices shall also be allowed via electronic mail ("email"), and shall be deemed validly given on the date of transmission when sent by email. Should Landlord or Tenant have a change of address, the other party shall immediately be notified in writing of such change, provided, however, that each address for notice must include a street address and not merely a post office box. All notices shall be addressed as follows:

TENANTS:

CRESCENTA VALLEY WATER DISTRICT
ATTN: Dennis Erdman, General Manager
2700 Foothill Boulevard
La Crescenta, CA 91214-3516
Facsimile: (818) 248-1659
Email: derdman@cvwd.com

LANDLORD

CITY OF GLENDALE WATER & POWER
ATTN: Ramon Abueg, Chief Assistant General Manager
141 North Glendale Ave., 4th Level
Glendale, CA 91206-4496
Facsimile: (818) 552-2852
Email: rabueg@glendaleca.gov

18 MISCELLANEOUS PROVISIONS

A. WAIVER. Landlord's failure to exercise any of its rights resulting from a default or breach of covenant on the part of Tenant shall not be construed as a waiver thereof, nor shall any custom or practice which may grow up between the parties in the course of administering this Lease be construed to waiver or to lessen the right of Landlord to insist upon the performance by Tenant of any term, covenant or condition hereof, or to exercise any right given it resulting from any such default. A waiver of a particular breach or default shall not be deemed to be a wavier of the same or any other subsequent breach of default.

B. TIME OF ESSENCE. Time is of the essence of this Lease and of each provision.

C. NO PARTNERSHIP. This Lease Agreement shall not be construed to constitute any form or partnership or joint venture between Landlord and Tenant.

D. CONSTRUCTION

1. Section titles or captions contained in this Lease are inserted as a matter of convenience and for reference and in no way define, limit, extend or describe the scope of this Lease or any provision hereof.
2. Unless defined otherwise, the words used in this Lease shall be construed according to their plain meaning in the English language. The language used in this Lease shall not be interpreted strictly for or against either party.
3. If any provision of this Lease is capable of two constructions, one of which would render the provision void and the other of which would render the provision valid, then the provision shall have the meaning that renders it valid.
4. The singular includes the plural and vice versa, and the masculine includes the feminine and neuter, whenever the context so requires.

E. WARRANTEE. Landlord warrants and agrees that Landlord is seized of good and sufficient title to and interest in the Leased Premises and has full authority to enter into and execute this Lease Agreement and that there are no undisclosed liens, judgment or impediments of title on the Leased Premises that would affect this Lease Agreement. Landlord makes no representation or warranty whatsoever concerning the suitability of the Leased Premises for the purposes intended by Tenant. Tenant acknowledges that neither Landlord, nor any of Landlord's officers, agents and employees have made any representations concerning the suitability of the Leased Premises for the purposes intended by Tenant, nor is Tenant entering into this Lease Agreement in reliance upon any such representations.

F. RIGHT OF QUIET ENJOYMENT. Tenant shall have the right of quiet enjoyment of the Leased Premises.

G. GOVERNING LAW. This Lease Agreement and the performance hereon shall be governed, interpreted, construed and regulated by the laws of the State of California.

H. ENTIRE AGREEMENT. This Lease Agreement constitutes the entire agreement between the parties hereto pertaining to the subject matter hereof, fully supersedes any and all prior understandings, representations, warranties and agreements between the parties hereto, or any of them, pertaining to the subject matter hereof, and may be modified only by written agreement signed by all of the parties hereto.

I. BINDING POWER. Each person executing this Lease warrants and represents that he or she is duly authorized to execute this Lease Agreement on behalf of Landlord or Tenant.

J. SEVERABILITY. If any portion of this Lease Agreement is declared by a court of competent jurisdiction to be invalid or unenforceable, then such portion shall be deemed modified to the extent necessary in such court's opinion to render such portion enforceable and, as so modified, such portion and the balance of this Lease Agreement shall continue in full force and effect.

K. ATTORNEYS' FEES. In case suit shall be brought because of the breach or alleged breach of any covenant herein contained on the part of any party to be kept or performed, or for declaratory relief, the prevailing party or parties shall recover from the non-prevailing party or parties all costs and expenses incurred herein, including reasonable attorneys' fees and expenses incurred in enforcing any judgment.

L. FORCE MAJEURE. For the purposes of this Lease Agreement, "Force Majeure" means an unforeseen event or condition deemed by Landlord as calling for immediate action to avoid the threat of loss or injury of property and/or danger to public safety, including but not limited to, an act of God, labor dispute, civil unrest, epidemic, and/or natural disaster.

19. ENFORCEMENT AUTHORIZATION

The City Manager of Landlord, or his assigned representative, is hereby authorized to act on behalf of the City in all matters pertaining to this Lease, with the exception that a termination of the Lease by Landlord due to breach of any of the terms and conditions herein shall be approved by the Council of the City of Glendale.

IN WITNESS WHEREOF, the parties hereto have caused this Lease to be executed by their officers hereunto duly authorized on the day and year first above written.

LANDLORD:	**TENANT:**
CITY OF GLENDALE	CRESCENTA VALLEY WATER DISTRICT
By:_____	By: _____
Scott Ochoa	Dennis Erdman
City Manager	General Manager

EXHIBIT "A"
LEGAL DESCRIPTION

EXHIBIT "A"

CVWD Well Site
Legal Description

A portion of Lot 230 of Tract No. 2535 in the City of Glendale, County of Los Angeles, State of California, according to the map recorded February 3rd, 1914 as filed in Book 24, at Page(s) 72, and 73 of Maps in the office of the Recorder for said County; more particularly described as follows:

Beginning at the Northern most corner of said Lot 230;

Thence, along the Northeasterly line of said Lot and along the Southwesterly line of the Hermosa Avenue right-of-way (50 feet wide) as shown on said map of Tract No. 2535, South 53° 16' 50" East, 72.5 feet to the Eastern most corner of said Lot 230;

Thence, leaving said Southwesterly line of the Hermosa Avenue right-of-way, along the Southeasterly line of said Lot 230, South 36° 43' 10" West, 86.00 feet;

Thence, leaving the Southeasterly line of said Lot 230, along a line parallel with said Southwesterly line of the Hermosa Avenue right-of-way, North 53° 16' 50" West, 72.50 feet to the Northwesterly line of said Lot 230;

Thence, along the Northwesterly line of said Lot 230, North 36° 43' 10" East, 86.00 feet to the point of beginning;

Containing 6,235 square feet.

End Description

Prepared by: _____
Dan Hutchinson, LS 5139

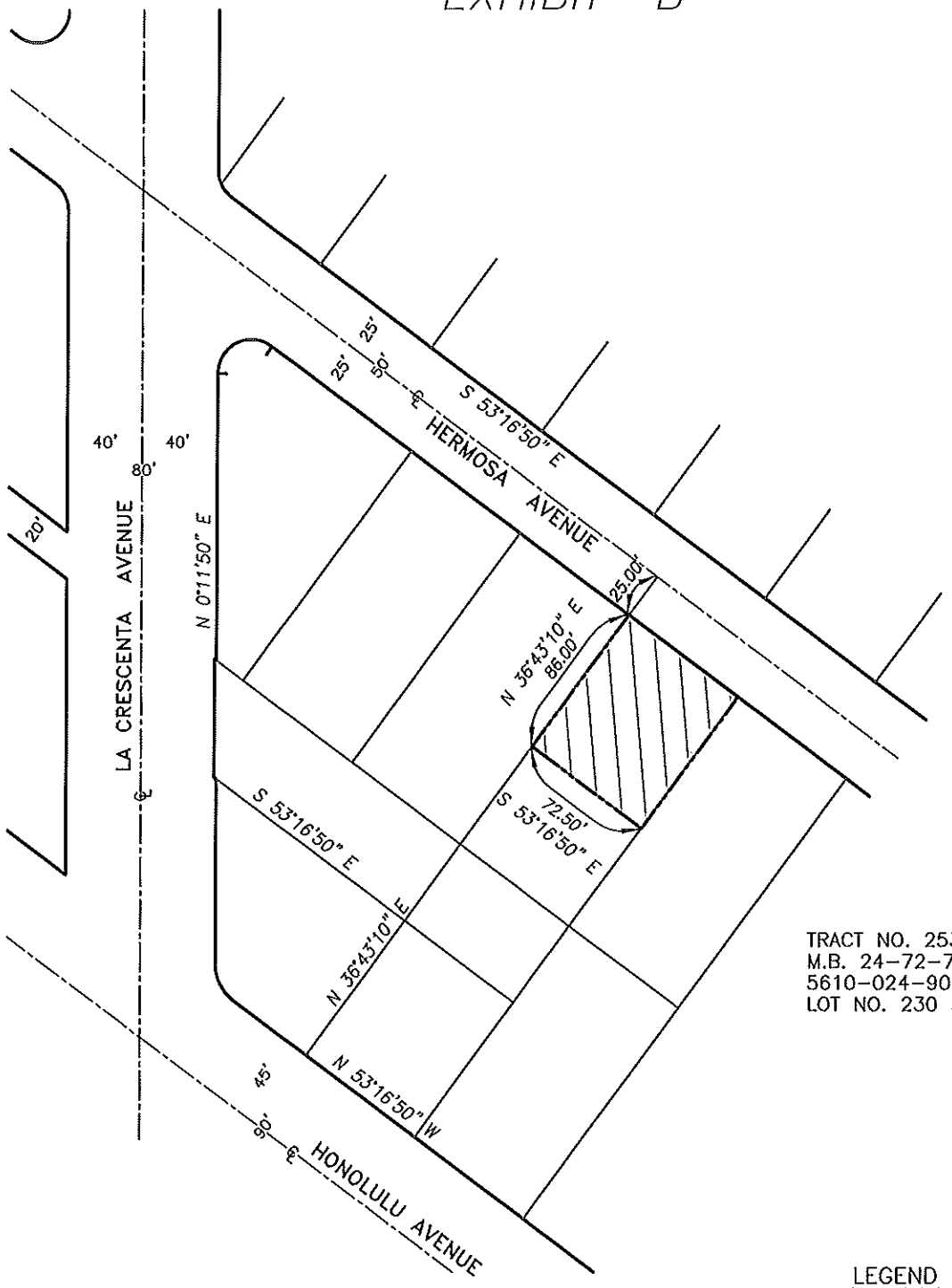
Date: DEC. 3RD, 2014



EXHIBIT "B"

MAP

EXHIBIT "B"



TRACT NO. 2535
M.B. 24-72-73
5610-024-905
LOT NO. 230 & 231

LEGEND

- LOT LINES
- R/W LINES
- STREET CENTERLINE
- EASEMENT BOUNDARY

CRESCENTA VALLEY WATER DISTRICT GUWD	SKETCH TO ACCOMPANY LEGAL DESCRIPTION	SHT. 1 OF 1 SHTS.
	CRESCENTA VALLEY WATER DISTRICT	11-19-2014
	ROCKHAVEN WELL	JAH

FNAME
REVDATE
USER

EXHIBIT "C"

Cost Analysis Study
Dated October 2014
Prepared by
Raftelis Financial Consultants

Table 1
Existing CVWD Water Supply Costs

Description			CY 2014	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15	CY 2030 16
Rockhaven Well Production	Production Capacity (GPM)	Annual Average Downtime																	
Average Annual Water Production (GPM)	400	25%	300																
Projected Rockhaven Water Production (AFY)			484	242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
FMWD Imported Water Costs (Base Case)	Inflation Rate	Actual 2013	CY 2014 Budgeted																
Existing FMWD Tier 1 Imported Water Supply Costs	5%	$847	$890	$935	$981	$1,030	$1,082	$1,136	$1,193	$1,252	$1,315	$1,381	$1,450	$1,522	$1,598	$1,678	$1,762	$1,850	$1,943
CVWD Power Costs for FMWD deliveries	6%	$145	$154	$163	$173	$183	$194	$206	$218	$231	$245	$260	$275	$292	$309	$328	$348	$368	$390
Total Unit Cost for FMWD deliveries ($/AF)		$992		$1,097	$1,154	$1,213	$1,276	$1,342	$1,411	$1,483	$1,560	$1,640	$1,725	$1,814	$1,908	$2,006	$2,110	$2,219	$2,333
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level				$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515	$1,128,973
Grand Total			$25,640,758																

Table 2
Rockhaven Well Future Construction Costs

Description		Cost
Rockhaven Well Project Capitalized Cost		
Transmission Pipe to Blending Plant (a)		$240,000
Well Equipment		
Pump & Motor		$90,000
Electrical		$90,000
Piping		$40,000
SCADA/Telemetry		$44,000
Building/Misc		$35,000
Site work		$25,000
Subtotal		$564,000
Construction Cost Multipliers		
Contingency	20%	$112,800
Engineering & Permitting	15%	$84,600
Soils Engineering	1%	$5,640
Construction Mgmt	10%	$56,400
CVWD Labor, Eqpt, Mtls		$21,560
Grand Total Capital Cost (2014)		**$845,000**
Rockhaven Well Site Costs (2013)		
Local Wellsite Labor		
Weekly	Hrs	10
Annual	Hrs	520
Burdened Labor Rate ($/hour)		$60
Annual Labor Cost		$31,200
Materials Cost at Wellsite ($/year)		$5,000
Total Annual Labor & Materials		**$36,200**

a. The transmission line is 1,200 ft. at $200/lf.

Table 3
Rockhaven Well Water Supply Alternative Analysis

Inputs | Conditional Output | Key Output | Cashflow input (paid to GWP) | Cashflow input (production costs)

Description	Amortization & Inflation Rates		CY 2014 Day 1	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15
Amortized Compensation Schedule for 2011 GWP Construction Costs at Rockhaven Well	2%	Period (Years) 50	CY 2011 Total $1,095,841	$711,426 $34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)	3%	25	$660,000	$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Groundwater Rights Lease from GWP																		
Projected Rate for Verdugo Basin GW Leasing ($/AF)	5%			$183	$193	$202	$212	$223	$234	$246	$258	$271	$285	$299	$314	$329	$346	$363
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484
CVWD Payment to GWP for Producing Adjudicated GW				$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Rockhaven Well Variable Incremental Production Costs		2013 Rate ($/AFY)		$2,664.02	$5,487.86	$5,052.52												
Power ($95 per AF)	6%	$95		$107	$113	$120	$127	$135	$143	$151	$161	$170	$180	$191	$203	$215	$228	$241
Treatment & Blending of Groundwater	3%	$220		$233	$240	$248	$255	$263	$271	$279	$287	$296	$305	$314	$323	$333	$343	$353
Other Miscellaneous O&M Costs	3%	$10		$11	$11	$12	$12	$12	$13	$13	$14	$14	$14	$15	$15	$16	$16	$17
Total Cost ($/AF)		$325		$351	$365	$379	$394	$410	$426	$443	$461	$480	$499	$520	$541	$563	$587	$611
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual O&M Costs for Production of Rockhaven Well Water				$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
Rockhaven Well Fixed O&M Costs	3%			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Cashflow for Rockhaven Well Water Supply (Alternative Case)																		
CVWD Repayment of GWP Construction Costs				$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)				$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
CVWD GW Projection Right Lease Payment to GWP			Well & Pipeline	$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Annual O&M Costs for Production of Rockhaven Well Water			Const. Cost -	$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
CVWD Production Costs for Rockhaven Well Water	Grand Total		Per Grant	$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Total Annual CVWD Costs of Operating Rockhaven Well			$150,000	$226,934	$368,433	$381,946	$396,050	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Grand Total 25 Yr. Expenditures for Rockhaven Well Water Supply		$14,533,308																
Comparison of 25 Year Water Supply Alternatives		Grand Total																
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level		$25,640,758		$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515
Less Annual CVWD Costs of Rockhaven Well Supply Alternative		$14,533,308	$150,000	$226,934	$368,433	$381,946	$396,050	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Net Annual O&M Savings of Rockhaven Well vs. Imported Supply		$11,107,449	-$150,000	$38,571	$189,916	$205,157	$221,288	$238,358	$256,420	$275,527	$295,736	$317,108	$339,707	$363,598	$388,853	$415,544	$443,751	$473,556
Discount Rate of Return for 25 Year Cashflow	8.50%	$11,107,449																
Annual Payments to GWP from CVWD		Grand Total																
Reimbursements for GWP Construction Costs at Well		$505,661		$17,437	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
Lease of Rockhaven Wellsite		$466,038		$13,250	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Lease of Groundwater Rights from GWP (Water)		$1,870,603		$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
		$2,842,302		$75,059	$154,555	$160,009	$165,720	$171,700	$177,962	$184,520	$191,388	$198,581	$206,114	$214,005	$222,270	$230,927	$239,997	$249,497
Rockhaven Production Payments to GWP ($/AF)			PRODUCTION	$310	$319	$331	$342	$355	$368	$381	$396	$410	$426	$442	$459	$477	$496	$515

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 255,994**	**$ 422,194**	**$ 437,989**	**$ 454,514**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		-$160,875	**$ 9,588**	**$ 136,318**	**$ 149,286**	**$ 163,013**
Well and Pipeline Construction Cost Subtotal		-$160,875				

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well			$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP			$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Annual Payments to GWP		-$160,875	**$ 132,783**	**$ 206,385**	**$ 214,063**	**$ 222,129**

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 55,920	$ 117,599	$ 123,656	$ 130,025
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 245,184**	**$ 399,460**	**$ 414,084**	**$ 429,377**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		-$845,000	**$ 20,398**	**$ 159,052**	**$ 173,191**	**$ 188,149**

Well and Pipeline Construction Cost	
Subtotal	-$845,000

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP	$ 55,920	$ 117,599	$ 123,656	$ 130,025
Annual Payments to GWP	**$ 121,972**	**$ 183,651**	**$ 190,158**	**$ 196,993**

Appendix C: CVWD Water Conservation Program

Crescenta Valley Water District 2020 Urban Water Management Plan

APPENDIX G

CRESCENTA VALLEY WATER DISTRICT

WATER CONSERVATION PROGRAM

CRESCENTA VALLEY WATER DISTRICT

APPENDIX G

WATER CONSERVATION PROGRAM

GENERAL STATEMENT

1. Due to the water supply conditions prevailing in the Crescenta Valley Water District (CVWD) and/or in the area from which CVWD obtains a portion of its water supply, the general welfare requires that:

   - The water resources available to the CVWD be put to the maximum beneficial use;
   - The waste or unreasonable use, or unreasonable method of use of water be prevented;
   - The conservation of such water be practiced with a view to the reasonable and beneficial use thereof in the interest of the customers of CVWD and for the public health and safety.

2. The purpose of this program is to provide water conservation regulations, in a phased approach, to minimize the effect of a shortage of water supplies on the customers of CVWD during various critical stages of a water shortage.

PHASE I –NORMAL WATER CONSERVATION

Phase I standard water conservation practices will be in effect at all times. The CVWD Board of Directors has adopted the following measures to reduce consumption and prohibit water waste for existing and new water users within CVWD in order to sustain water supply reliability.

Prohibited Use Applicable to Existing and New Customers

1. **Water hose usage:** Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.
2. **Overspray and runoff:** Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, streets, adjacent lands or into gutters shall not be permitted.
3. **Fountains, similar structures and swimming pools:** Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.
4. **Leaks:** Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.
5. **Irrigating times:** No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings.

6. **Hand Watering:** Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.

7. **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.

8. **Vehicle washing:** The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.

9. **Swimming pools:** Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.

10. **Construction water restrictions:** Water for construction purposes including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.

11. **Fire hydrants:** The use of potable water from fire hydrants shall be limited to firefighting related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.

12. **Drinking water upon request:** No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.

13. **Hotels/Motels:** Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about the city's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.

14. **Hotels/Motels:** Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.

15. **Reporting waste of water:** The District shall maintain a program for residents to report waste of water throughout the District boundaries. This will include an online submittal form, a dedicated phone number, and follow-up by District staff on all waste of water reports. Residents are requested to report any observed waste of water from surrounding properties or in the community and report to the District for follow-up.

16. **Pre-rinse spray valve**: Where applicable, restaurants must utilize water conserving nozzles.

17. **New Development (**new commercial and multi-family accounts):

    1) All new commercial and multi-family accounts are prohibited from water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-recirculating decorative water fountains.

    2) All landscape must be in accordance with the permitting agency's landscape ordinance. If the permitting agency does not have a landscape ordinance, the Department of Water Resources Model Landscape Ordinance will apply.

BE IT FURTHER RESOLVED, Crescenta Valley Water District urges the following water usage to all of its customers:

1. To reduce the amount of turf and install new drought tolerant landscaping, low-water using trees and plants, and efficient irrigation systems including but not limited to ET controllers, drip irrigation, and "high efficiency sprinkler heads".
2. To wash only full loads of dishes or clothes in automatic washers, and do not allow indoor faucets to run continuously.
3. To turn water system off when leaving property unoccupied for an extended period of time.
4. To use covers to minimize the evaporation of water from outdoor swimming pools, wading pools or spas when they are not in use.

WATER CONSERVATION ALERT SYSTEM

When a water conservation alert system is implemented by direction of the General Manager, the following measures to reduce water consumption will be required for all water users within CVWD.

a. Color Code **"Blue"** is defined as the Normal Water Conservation Alert, Foothill Municipal Water District can meet all Member Agency demands. Standard water conservation applies as defined in Appendix G of the Rules and Regulations.

b. Color Code **"Green"** is defined as an Increased Voluntary Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.

c. Color Code "Yellow" is defined as an Extraordinary Conservation Alert, when Metropolitan Water District of Southern California is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.

d. Color Code **"Orange"** is defined as a Rationing Conservation Alert, when Metropolitan Water District of Southern California has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as follows:

    1. Residential and commercial landscape irrigation is limited to no more than two (2) days per week on Tuesday and Saturday.
    2. Exemption: Public use areas owned and/or operated by School Districts are exempt from watering days, and public use areas greater than 4,000 square feet are exempt from watering days so long as best management practices are applied by all.
    3. The filling, refilling or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited. Exemptions: Commercial Repairs mandated by the Federal Virginia Graeme Baker Act, or adding water for the prevention of equipment failure is permissible, however, the District strongly urges that a cover be used to prevent evaporation and thereby reducing the frequency of refilling..
    4. The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited. Exemptions: Adding water for the prevention of equipment failure is permissible.

5. Vehicle washing is restricted to the use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle.

6. Fix leaks within 48 hours.

e. Color Code **"Red"** is defined as a Critical Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are required to minimize indoor water use and curtail all outdoor water use. Fix any leaks within 24 hours.

Notification of the Water Conservation Alert System status on any given day shall be visibly posted at the exterior of the District's Administration Office (2700 Foothill Blvd., La Crescenta) and other accessible locations throughout the District service area where allowed. At least one direct mailing shall be made to all water customer accounts, with notification and explanation of the alert system. Newspaper coverage will also be used to disseminate alert system status and water conservation updates.

APPENDIX G

Date	Revisions	Approved by Board	Initials
04/28/2010	Residential and commercial landscape irrigation has been increased from two (2) days per week to no more than three (3) days per week on Tuesday, Thursday and Saturday. Watering limits have been reduced to seven (7) minutes per watering station from (10) minutes per station.	04/27/2010	
07/11/12	1. Revise "Prohibited Use Applicable to **all** Customers" was revised to "Prohibited Use Applicable to **Existing and New** Customers" 2. Add the following: **17. New Development (**new commercial and multi-family accounts) 1) All new commercial and multi-family accounts are prohibited from water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-recirculating decorative water fountains. 2) All landscape must be in accordance with the permitting agency's landscape ordinance. If the permitting agency does not have a landscape ordinance, the Department of Water Resources Model Landscape Ordinance will apply.	07/10/12	
7/23/14	1. Revised Orange Alert from three (3) days per week to two (2) days per week, Tuesdays and Saturdays	7/23/2014	
4/7/15	1. Revise Appendix "G": **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray, and on days when it is raining. 2. Add the following: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.		

RESOLUTION NO. 681

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESCENTA VALLEY WATER DISTRICT ADOPTING A WATER CONSERVATION ALERT SYSTEM

WHEREAS, the Crescenta Valley Water District was established for the purpose of providing adequate and reliable potable water to its inhabitants at a reasonable cost; and

WHEREAS, the groundwater supply in the Verdugo Basin is utilized as the primary source of water for District customers; and

WHEREAS, consecutive years of below normal precipitation in the watersheds of the Verdugo Basin have severely reduced the groundwater production capacity and individual well reliability in the Verdugo Basin and hence the water supply available to the District; and

WHEREAS, the District's imported water supply connections with the Foothill Municipal Water District and the emergency water supply interconnection with the City of Glendale, both which provide a supplemental source of water for District customers, are limited in size and capacity, may be subjected to random mechanical failures, and are being subjected to increased demands; and

WHEREAS, the District's imported water supply may be subject to a reduced water allotment from the Foothill Municipal Water District should the Metropolitan Water District of Southern California put into effect their approved allocation plan; and

WHEREAS, the above limitations have created the possibility that the District may be unable to meet customer demand during periods of high water use such as hot weather; and

WHEREAS, the District's Phase I Voluntary Water Conservation Program has been only minimally successful in reducing water demand; and

WHEREAS, conservation of water by District customers will help the District supply water for customers and keep water in storage for fire protection during peak periods; and

WHEREAS, peak summer water demands are generally considered to be caused by outdoor water use and the District should place special emphasis on outdoor water conservation; and

WHEREAS, the District, through its public information program, should advise and alert its customers to the serious nature of the situation and the need for a reduction in demand by customers through the use of a conservation alert system; and

WHEREAS, the District has the power and authority, under Section 375 of the California Water Code, to adopt water conservation measures for activities within its service area; and

WHEREAS, given the current conditions, the District finds it necessary and beneficial to undertake the second phase of its water conservation program; and

NOW, THEREFORE, BE IT RESOLVED, that the General Manager is authorized to implement a color-coded water conservation alert system, as Phase II of the goal to reduce the risk and severity of water shortage; and

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District requires its customers to follow the alert system described below:

a. Color Code "Blue" is defined as the Normal Water Conservation Alert, Foothill Municipal Water District can meet all Member Agency demands. Standard water conservation applies as defined in Appendix G of the Rules and Regulations.

b. Color Code "Green" is defined as an Increased Voluntary Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.

c. Color Code "Yellow" is defined as an Extraordinary Conservation Alert, when Metropolitan Water District of Southern California is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.

d. Color Code "Orange" is defined as a Rationing Conservation Alert, when Metropolitan Water District of Southern California has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as further detailed in Appendix G of the District Rules and Regulations.

e. Color Code "Red" is defined as a Critical Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are requested to minimize indoor water use and curtail all outdoor water use as further detailed in Appendix G of the District's Rules and Regulations.

BE IT FURTHER RESOLVED, that the Board of Directors of the Crescenta Valley Water District authorize that Appendix G of the District's Rules and Regulations is amended to read as attached; and

BE IT FURTHER RESOLVED, that if critical water shortages continue to exist and if a water conservation alert system proves insufficient to accomplish the necessary conservation, the Crescenta Valley Water District will consider additional and more restrictive phases of water conservation to curtail water use. Likewise, should water supply conditions return to normal, the Crescenta Valley Water District will also consider ending this program at such time.

PASSED, APPROVED, AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on January 7, 2009, Resolution No. 681 was adopted by the following vote:

AYES: Directors

NOES: Directors None

ABSTAIN: Directors None

_____

ATTEST: President, Board of Directors
Crescenta Valley Water District

_____

Secretary of the Board of Directors

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, RON MITCHELL, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 681 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on January 7, 2009, and that the same has not been amended or repealed.

_____

Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: March 27, 2009 (S E A L)

RESOLUTION NO. 682

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESCENTA VALLEY WATER DISTRICT ADOPTING A WATER CONSERVATION PROGRAM (PHASE I)

WHEREAS, the Crescenta Valley Water District was established for the purpose of providing adequate and reliable potable water to its inhabitants at a reasonable cost; and

WHEREAS, the groundwater supply in the Verdugo Basin is utilized as the primary source of water for District customers; and

WHEREAS, consecutive years of below normal precipitation in the watersheds of the Verdugo Basin have severely reduced the groundwater production capacity in the Verdugo Basin and hence the water supply available to the District; and

WHEREAS, the District's imported water supply connections with the Foothill Municipal Water District, which provide a supplemental source of water for District customers, are limited in size and capacity and are being subjected to increased demands; and

WHEREAS, the District's imported water supply may be subject to a reduced water allotment from the Foothill Municipal Water District should the Metropolitan Water District of Southern California put into effect their approved allocation plan; and

WHEREAS, California has experienced an energy crisis which has resulted in extremely high energy costs; and

WHEREAS, the District is a user of significant quantities of energy to meet its system demands for the production, transmission, and distribution of water; and

WHEREAS, conservation of water by District customers will help relieve the problems caused by the shortage in supply and the increase in energy costs; and

WHEREAS, the District, through its public information program, should advise and alert its customers to the serious nature of the situation and the need for a reduction in demand by customers; and

WHEREAS, the District has the power and authority, under Section 375 of the California Water Code, to adopt water conservation measures for activities within its service area; and

WHEREAS, given the current conditions, the District finds it necessary and beneficial to undertake a phased water conservation program; and

NOW, THEREFORE, BE IT RESOLVED, that the General Manager is authorized to implement a water conservation program, as Phase I of the goal to reduce water use below pre-drought water usage, to reduce the risk and severity of water shortage; and

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District prohibits the following water usage to all of its customers:

Prohibited Use Applicable to ALL Customers

1. **Water hose usage:** Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.

2. **Overspray and runoff:** Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, street, adjacent lands or into gutters shall not be permitted.

3. **Fountains, similar structures:** Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.

4. **Leaks:** Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.

5. **Irrigating times: Irrigating times:** No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings. With the exception of drip irrigation systems or weather based irrigation controllers, residential timers shall not run for more than a 10 minutes per station.

6. **Hand Watering:** Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.

7. **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.

8. **Vehicle washing:** The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.

9. **Swimming pools:** Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.

10. **Construction water restrictions:** Water for construction purposes including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.

11. **Fire hydrants:** The use of potable water from fire hydrants shall be limited to firefighting, related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.

12. **Drinking water upon request:** No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.

13. **Hotels/Motels:** Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about the city's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.

14. **Hotels/Motels:** Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.

15. **Reporting waste of water:** The District shall maintain a program for residents to report waste of water throughout the District boundaries. This will include an online submittal form, a dedicated phone number, and follow-up by District staff on all waste of water reports. Residents are requested to report any observed waste of water from surrounding properties or in the community and report to the District for follow-up.

16. **Pre-rinse spray valve**: Where applicable, restaurants must utilize water conserving nozzles.

17. **New Development**. 1). Prohibit water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-re-circulating decorative water fountains, and address irrigation, landscape, and industrial, commercial, and other design deficiencies. 2). Enacts and enforces ordinances or establishes terms of service for water efficient design in new development, and supports local ordinances that establish permits for water efficient design in new development.

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District urges the following water conservation practices to all of its customers:

1. Reduce the amount of turf and install new drought tolerant landscaping, low-water using trees and plants, and efficient irrigation systems including but not limited to evapotranspiration (ET) controllers, drip irrigation, and “high efficiency sprinkler heads”.

2. Wash only full loads of dishes or clothes in automatic washers, and do not allow indoor faucets to run continuously.

3. Turn off water system when leaving property unoccupied for an extended period of time.

VIOLATIONS

For any customer of the District in violation of the provisions listed in the Waste of Water Ordinance:

First Violation: The District shall issue a written notice of the fact of such violation to the customer.

Second Violation: The District shall issue a written warning to the customer of the fact of such second violation with a statement of the possible penalties for the present violation for which the notice was written, the possible penalties for each subsequent violation should they occur, and a written copy of this resolution.

Third Violation: The District shall install a flow-restricting device of one gallon per minute (1gpm) capacity for services up to one and one-half inch size, and comparatively sized restrictors for larger service, on the service of the customer at the premises at which the violation occurred for a period of not less than forty-eight hours.

The charge for installing a flow-restricting device shall be based upon the size of the meter and shall not exceed $150.00.

The charge for removal of the flow-restricting device and restoration of normal service shall not exceed $100.00. Restoration of normal service will be performed during regular working hours on regular working days.

For any subsequent violation or any willful violation: The District shall either install a flow-restricting device, for a period of time not less than one week or discontinue water service to that customer at the premises at which the violation occurred.

The charge for installing a flow-restricting device shall be based upon the size of the meter and shall not exceed $200.00.

The charge for removal of the flow-restricting device and restoration of normal service shall not exceed $150.00. Restoration of normal service will be performed during regular working hours on regular working days.

Notice: The District shall give notice of each violation to the customer committing such violation as follows:

For the first violation: The District shall give written notice of the fact of such violation to the customer personally or by United States regular mail.

For the second violation: The District shall give written notice of the fact of such violation to the customer by United States certified mail, return receipt requested.

For any subsequent violations: If the penalty assessed is, or includes the installation of a flow-restrictor or the discontinuance of water service to the customer for any period of time whatsoever, notice of the fact of the violation shall be delivered fifteen (15) working days before the penalty is to be enacted, in the following manner:

- Personal delivery of written notice to the customer at their residence or place of business and obtain their signature of delivery.

- Return receipt delivery to customer at their residence or place of business.

All notices shall contain, in addition to the facts of the violation, a statement of the possible penalties for the present violation for which the notice was written and each subsequent violation, a statement of the anticipated date of the penalty, if any, will be enacted for the present violation, and a statement informing the customer of the customer's right to a hearing on the violation.

Hearing: Any customer against whom a restriction or limitation is levied has the right to a hearing and a right to appeal to the Board of Directors. Written request from customer to the District must be received within fifteen (15) working days of the date of notification of the violation. Before the hearing can be scheduled all existing plumbing fixtures in the structure must be retrofitted exclusively with water-conserving plumbing fixtures including low flush or high efficiency toilets, low flow showerheads, and aerators. A water audit will be used to verify installation.

Enactments of the appropriate penalty shall be deferred until the appeal is resolved.

If the appeal decision is NOT in favor of the customer, the determined penalty shall be enacted within ten (10) days after the customer is advised of the decision in writing through certified mail, return receipt requested.

Reservation of Rights: The rights of the District hereunder shall be cumulative to any other right of the District to discontinue service. All monies collected by the District pursuant to any of the penalty provisions of the chapter shall be deposited in the water revenue fund as reimbursement for the District's costs and expenses of administering and enforcing this ordinance.

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District finds that a program of voluntary measures to reduce consumption will assist in achieving the goal of conserving the water supply without causing unnecessary adverse economic consequences; and

BE IT FURTHER RESOLVED, that the Board of Directors of the Crescenta Valley Water District authorize that Section 8.07(c) and Appendix G of the District's Rules and Regulations are amended to read as attached; and

BE IT FURTHER RESOLVED, that if critical water shortages continue to exist and if current measures prove insufficient to accomplish the necessary conservation, the Crescenta Valley Water District will consider additional and more restrictive phases of water conservation to curtail water use. Likewise, should water supply conditions return to normal, the Crescenta Valley Water District will also consider ending this program.

PASSED, APPROVED, AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on April 7, 2015, amendments to Resolution No. 682 were adopted by the following vote:

AYES:

NOES: **None**

ABSENT: **None**

ATTEST:

President, Board of Directors
Crescenta Valley Water District

Secretary of the Board of Directors

STATE OF CALIFORNIA)
) **ss.**
COUNTY OF LOS ANGELES)

I, RON MITCHELL, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of the amendments to Resolution No. 682 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on April 7, 2015 and that the same has not been amended or repealed.

Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: April 7, 2015 **(S E A L)**

Date	Revisions	Approved by Board	Initials
04/07/2015	1. Revise Resolution 682: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray, and on days when it is raining. 2. Add the following: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.		

Appendix D: LA All-Hazards Mitigation Plan

Crescenta Valley Water District 2020 Urban Water Management Plan

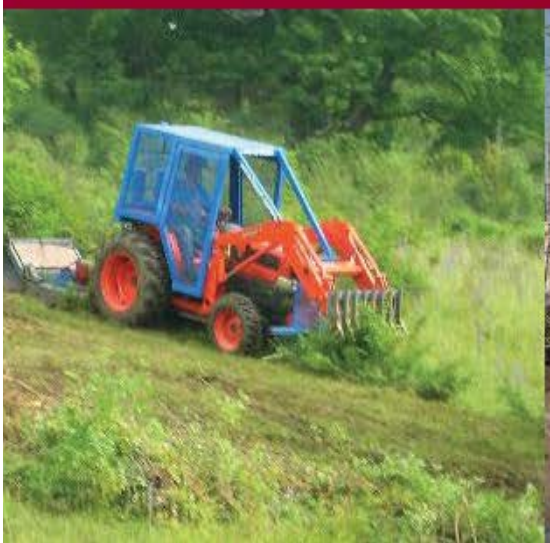
COUNTY OF LOS ANGELES

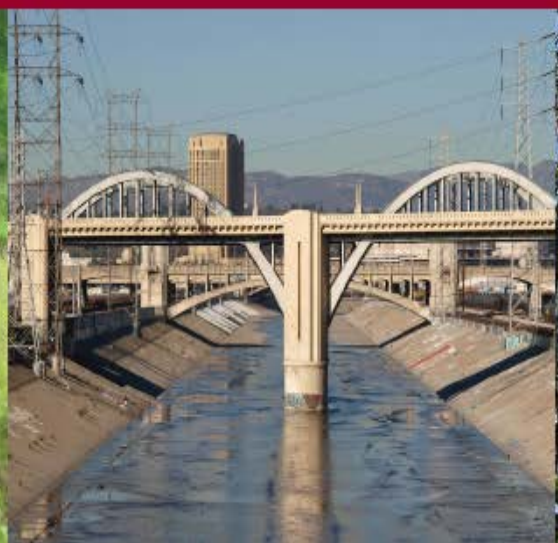
CHIEF EXECUTIVE OFFICE — OFFICE OF EMERGENCY MANAGEMENT

2014 APPROVED AHMP



All-Hazard Mitigation Plan







LETTER OF PROMULGATION

TO: OFFICIALS, EMPLOYEES, AND RESIDENTS OF LOS ANGELES COUNTY

Preservation of life and property is an inherent responsibility of local, State, and Federal government. The County of Los Angeles developed this All-Hazard Mitigation Plan to cover mitigation responsibilities of County departments as well as the unincorporated communities. The Hazard Mitigation Plan ensures the most effective allocation of resources for the maximum benefit and protection of the public in time of emergency.

While no plan can guarantee prevention of death and destruction, well-developed plans, carried out by knowledgeable and well-trained personnel, can minimize losses. The Hazard Mitigation Plan establishes the County's emergency policies and procedures in the event of a disaster. Because of the complex array of local governments, the plan could not reasonably address mitigation planning for each of the 88 cities, 94 school districts and over 100 other special districts covered by the law. The plan addresses all major natural, human-caused and technological disasters that fall within the responsibilities of County-owned and operated department facilities. Sheriff, Fire Department and Public Works provide contracted services to many of the 88 cities in Los Angeles County. Each of the individual cities and special districts are responsible for completion of their own mitigation plans.

The All-Hazard Mitigation Plan conforms to the requirements of FEMA Disaster Mitigation Act of 2000. FEMA published their requirements for all future hazard mitigation planning in February 2002. The State of California implemented the program in California in the summer and fall of 2003 with guidelines and training sessions. The law requires extensive documentation of the community, the region, its hazards, history and future plans.

The Los Angeles County Board of Supervisors gives its full support to the All-Hazard Mitigation Plan and urges all officials, employees, and residents, individually and collectively, to share in our commitment to the effective preparedness and response to disasters.

This letter promulgates the All-Hazard Mitigation Plan which becomes effective upon approval by the Los Angeles County Board of Supervisors.

Signed _____ Date: 2/24/14

Don Knabe, Chair
Los Angeles County Board of Supervisors

APPROVAL BY THE COUNTY OF LOS ANGELES EMERGENCY MANAGEMENT COUNCIL

The County of Los Angeles Emergency Management Council, created by Section 2.68.160 of the Emergency Ordinance, and comprised of key County departments, is responsible for overseeing the preparedness activities of County departments. This includes preparation of plans, emergency and disaster-related training of County employees, and related emergency preparedness activities.

The EMC has reviewed and approved the All-Hazard Mitigation Plan. Revisions to the All-Hazard Mitigation Plan will be submitted to the EMC for approval.

Signed _____ Date: 7/13/14

William T. Fujioka
Chief Executive Officer
Chairman, Emergency Management Council

ALL-HAZARD MITIGATION PLAN REVIEW

The All-Hazard Mitigation Plan will be reviewed every five years and as necessary for any updates.

Review Date	Nature of Update(s) (if any)	Page(s) Affected	Reviewer

Executive Summary

This is the second edition of the *County of Los Angeles All-Hazard Mitigation Plan*, and through completion of this plan the county continues its commitment to the reduction of risks through hazard mitigation planning. The County of Los Angeles has long been a nationwide leader in all phases of emergency management, including preparedness, response, mitigation, and recovery. In particular, the key public safety and emergency management departments—Sheriff, Fire, Health Services, Public Works, and the Chief Executive Office (CEO) Office of Emergency Management (OEM)—have been proactive in their planning efforts to reduce damage and losses from disasters. The County of Los Angeles Board of Supervisors has supported innumerable mitigation programs such as the following:

- Asbestos abatement in various county-owned and -operated buildings (completed in 2007)
- Development of a special program to enhance the awareness of school boards and superintendents to the vulnerability of schools and issues of child safety (completed in 2007)
- Enhancing the Los Angeles Immunization Network (LINK) registry to support data management needs of mass vaccinations/prophylaxis situations
- Additional modules to support the receipt, storage, and staging of the Strategic National Stockpile inventory management system and other medical assets within the county (completed in 2010)
- Design, construction, and equipping of drinking well 27-7 located in the Antelope Valley (to be used as a secondary source of water supply, and as an important alternative source in case of any damage to the AVEK Aqueduct—Antelope Valley's primary source of water supply; completed in 2008)

The Los Angeles region is subject to a wide range of destructive hazards, including earthquakes, floods, wildfires, human-caused events, and technological emergencies. Since 2005, when the first mitigation plan was prepared by the county, the region was named in four federal disaster declarations—the 2005 Severe Storms declaration, the 2007 Severe Freeze, the 2008 Sayre Fire, and the 2009 Station Fire.

The larger events were the fires, with the Sayre Fire burning 11,262 acres and destroying 600 structures, including 480 mobile homes and 9 single-family homes. The 2009 Station Fire burned 160,000 acres and destroyed 209 structures, including 89 homes.

With a large urban population and vulnerability to a wide range of hazards, the county's long-standing commitment to all-hazard mitigation strategies plays a significant role in reducing threats to life and property.

In addition to these programs, the full list of mitigation programs can be found in Table 10-1: Mitigation Actions Matrix.

FOREWORD

OVERVIEW

The Los Angeles County All-Hazard Mitigation Plan consists of eleven (11) sections and an appendix. Each component has a specific purpose, as stated below.

SECTION 1 – INTRODUCTION SUMMARY

This section contains the formal language outlining the purpose, plan goals, definitions, and legal authorities

SECTION 2 – HAZARD MITIGATION PLANNING PROCESS

This section explains the process the Hazard Mitigation Planning Advisory Committee used in sharing data, updating and developing mitigation strategies, and devising implementation programs. It details the processes used to inform citizens, businesses, and adjacent jurisdictions of the planning project, and the methods used to solicit public input.

This section also contains minutes and supporting documentation for the Hazard Mitigation Planning Advisory Committee, department-specific meetings, town hall meetings, and special district workshops

SECTION 3 – COMMUNITY PROFILE

This section includes an in-depth overview of the demographics and other community features of Los Angeles County. It contains a list of critical department facilities that would play an important role during a major disaster.

SECTION 4 – RISK ASSESSMENT

This section provides an overview of the risk and vulnerability assessment process. The five steps involved in risk and vulnerability assessment are as follows: (1) hazard identification; (2) profiling hazard events; (3) vulnerability assessment/inventory of existing assets; (4) risk analysis; and (5) assessing vulnerability/analyzing development trends. Information is also included on the vulnerability of critical facilities to the identified hazards. In addition, land use categories are assessed for vulnerability to the identified hazards.

SECTION 5 – EARTHQUAKE HAZARD

This section addresses the various earthquake hazards throughout the county. While they do not occur on a very regular basis, the potential impact of earthquakes is very large. This section addresses the various faults in the region and what their impact might be.

SECTION 6 – FLOOD HAZARD

This section addresses the various flood hazards throughout the county. They include dam failure, urban flooding, and riverine flooding. Tsunamis are discussed separately in Section 8.

SECTION 7 – WILDFIRE

This section addresses the fire hazards present throughout the county. In recent years the County of Los Angeles has been severely affected by wildfire events. Maps have been included to show the impact wildfires have had on the county.

SECTION 8 – TSUNAMI

This section addresses the tsunami hazard throughout the county. The impact of tsunamis has not been large in the past; however, with recent events like the 2011 Japan earthquake, more attention is needed on the topic.

SECTION 9 - NON-SIGNIFICANT HAZARDS

The Hazard-Specific Analysis also includes a summary of hazards posing a less significant threat. The summary includes information on the history, hazard causes, hazard characteristics, and hazard assessment. The Non-Significant Hazards included in this chapter are: Drought, Landslide, Windstorm, Terrorism and Weapons of Mass Destruction (WMD), Infrastructure Loss – Utility, Data/Telecommunications, Biological and Health Emergencies, Water/Wastewater Emergency, Civil Unrest, Large Venue Structure Fires (Conflagrations), Transportation Incidents, Hazardous Materials, Radiological Incidents/Accidents, Explosion, and Agricultural Loss.

SECTION 10 – MITIGATION STRATEGIES

This section is a catalog of strategies for mitigation of each of the significant hazards identified in Section 4: Risk Assessment.

The strategies listed include the general description of the strategy, the organization/department responsible for the strategy, the implementation timeline, the cost, the goals and hazards addressed, and the overall ranking. Sample strategies include seismic protection projects, flood hazard reduction projects, security projects, technological protection, economic loss protection projects, public information projects, medical and biological preparedness, and identification of other potential projects through feasibility studies.

SECTION 11 – PLAN MAINTENANCE

This section contains the detailed guidelines to be employed to keep the plan current, ensure it is circulated, and maintain continuity in the public input process. It also lists what needs to be done to prepare the plan for its five-year update and submission to FEMA for approval.

Any disaster plan must be periodically reviewed and kept up to date. The Office of Emergency Management will maintain the plan through annual updates, completed in collaboration with the Hazard Mitigation Planning Advisory Committee. FEMA requires the plan to be submitted every five years for re-approval, which must include a progress report on the implementation of the disaster strategies. This maintenance process will ensure that the plan, when resubmitted every five years, reflects the contemporary status of the hazard mitigation program for the County of Los Angeles. The plan will need to be updated following a major disaster in the county in order to include any new mitigation strategies the county may consider implementing with post-disaster grants.

APPENDIX

A - Jurisdictional Guide to Updating Hazard Mitigation Plans. This is a significant addition to the 2014 Plan. It is standalone document contains helpful hints and guidance for Los Angeles County cities and special districts in their efforts to update their own Local Hazard Mitigation Plans. The Guide is presented in four parts: Introduction, Potential Mitigation Action Items, Insights on Plan Approval, and the Master Map Resource Directory.

B - The completed FEMA Plan Review Tool for the 2014 County of Los Angeles All-Hazard Mitigation Plan.

Credits

Special Thanks

Hazard Mitigation Planning Advisory Committee:

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- ✓ Don Knabe, 4th District
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FEMA Content Requirements

In an effort to assist both the readers and reviewers of this document, the jurisdiction has inserted the FEMA Review Tool citations directly into the planning document. Following is an example of such a citation:

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
ELEMENT A: PLANNING PROCESS | A2
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

Section 1: Introduction Summary

Table of Contents

Section 1 – Introduction Summary 1

Background Of The Plan 1

Hazard Mitigation Planning Process 3

Public Input 4

Scope 4

Definition of Hazard Mitigation 5

Plan Organization 5

Section 1 – Introduction 5

Section 2 – Hazard Mitigation Planning Process 5

Section 3 – Community Profile 6

Section 4 – Risk Assessment 6

Hazard-Specific Analysis 6

Section 5 – Earthquake Hazard 6

Section 6 – Flood Hazard 7

Section 7 – Wildfire Hazard 7

Section 8 – Tsunami 7

Section 9 – Non-Significant Hazards 7

Section 10 – Mitigation Strategies 7

Section 11 – Plan Maintenance 7

Appendices 8

Summary of Changes 8

Section 1 – Introduction Summary

Background Of The Plan

The Los Angeles region is subject to a wide range of destructive hazards, including earthquakes, floods, wildfires, human-caused events, and technological emergencies. Since 2005, when the first mitigation plan was prepared by the county, the region was named in four federal disaster declarations—the 2005 Severe Storms declaration, the 2007 Severe Freeze, the 2008 Sayre Fire, and the 2009 Station Fire. The larger events were the fires, with the Sayre Fire burning 11,262 acres and destroying 600 structures, including 480 mobile homes and 9 single-family homes. The 2009 Station Fire burned 160,000 acres and destroyed 209 structures, including 89 homes.

With a large urban population and vulnerability to a wide range of hazards, the county's long-standing commitment to all-hazard mitigation strategies plays a significant role in reducing threats to life and property.

The 2014 update to the *All-Hazard Mitigation Plan* complies with the Disaster Mitigation Act (DMA) 2000 regulations, as well as the July 2008 implementation guidelines. The plan has been approved by California Office Governor's of Emergency Services (Cal OES) and preliminarily approved by FEMA. Once the Emergency Management council (EMC) approves the plan, FEMA will grant final approval.

If an approved plan is not on file and implemented, the county could lose eligibility for federal pre-disaster mitigation grants and other federal grants. As one example of mitigation grant funding, Public Works received $1 million in funding to install security upgrade measures for sites that were assigned a rating of H (high) for risk. The project includes the following upgrades: site hardening; physical security upgrades and access control systems; electronic monitoring devices such as digital video cameras, motion sensors, and microwave and infrared detectors; and intrusion detection equipment on doors, hatches, and vault lids (completed in 2010).

County Mission

The following mission statement—which was unanimously endorsed by every Los Angeles County department head, and approved by the board in conjunction with the other plan revisions—was developed through the collaborative process.

"To enrich lives through effective and caring service."

The mission statement clearly defines the noblest purpose of public service—to enrich lives—and how the County of Los Angeles, a public service organization, intends to meet that goal—through effective and caring service. With adoption of the mission statement and the plan revisions, the county's strategic plan appropriately focuses on current programmatic and organizational issues and concerns.

Section 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 USC, as amended by Section 102 of the Disaster Mitigation Act of 2000, required all state, tribal nations, and local governments (including special districts) to develop comprehensive mitigation plans as a condition of eligibility for future post-disaster mitigation grants (after November 4, 2004). Additional guidance, entitled "Local Multi-Hazard Mitigation Planning Guidance," was issued by FEMA on July 1, 2008. The purpose of the document was to provide local governments with guidance on ways to effectively meet the DMA 2000 regulations. The guidance document includes implementation examples, as well as suggestions on conducting a plan update process. Additional guidance from FEMA was published in March 2013 entitled "Local Mitigation Planning Handbook". Amendments were made to the 2014 *All-Hazard Plan* to comply with the 2013 FEMA Handbook.

This plan is the second compilation of past, present, and future mitigation strategies and programs for the County of Los Angeles. Information contained in the plan provides a framework and a rich repository of resource information to support future mitigation grant applications for any county department.

The plan will be shared in electronic format with all local governments within the Los Angeles County operational area to encourage their participation in the county's planning process, and to assist the local governments with their own mitigation planning activities.

Table 1-1: Historical Significant Disaster Events – Los Angeles County
(Source: http://www.peripresdecusa.org/mainframe.htm)

Declaration Number	Date	Type	Disaster Description	Constant 2009 $	President
15	02/05/1954	F	Flood & Erosion	2,919,889	Eisenhower
82	04/04/1958	F	Heavy Rainstorms & Floods	11,900,833	Eisenhower
119	11/16/1961	R	Fire (Los Angeles County)	3,092,659	Kennedy
122	03/06/1962	F	Floods (Ventura)	6,215,723	Kennedy
145	02/25/1963	F	Floods	4,655,890	Kennedy
161	12/21/1963	K	Flood Due To Breach In Baldwin Hills Dam	10,843,389	Johnson
253	01/26/1969	F	Severe Storms & Flooding	486,759,889	Nixon
295	09/29/1970	R	Forest & Brush Fires	56,579,451	Nixon
299	02/09/1971	E	San Fernando Earthquake	977,106,616	Nixon
547	02/15/1978	F	Coastal Storms, Mudslides & Flooding	278,475,770	Carter
615	02/21/1980	F	Severe Storms, Mudslides & Flooding	232,588,076	Carter
635	11/27/1980	R	Brush & Timber Fires	21,711,861	Carter
677	02/09/1983	A	Coastal Storms, Floods, Slides & To	248,201,681	Reagan
739	07/18/1985	R	Grass, Wildlands, & Forest Fires	13,414,884	Reagan
799	10/07/1987	E	Earthquake & Aftershocks	84,496,279	Reagan
812	02/05/1988	F	Severe Storms, High Tides & Flooding	8,638,508	Reagan
872	06/30/1990	R	Fires	9,316,642	G.H.W. Bush
894	02/11/1991	S	Severe Freeze	20,417,715	G.H.W. Bush
935	02/25/1992	F	Rain/Snow/Wind Storms, Flooding, Mud	73,687,791	Clinton
942	05/02/1992	R	Fire During A Period Of Civil Unrest	218,046,140	Clinton
979	02/03/1993	F	Severe Winter Storm, Mud & Land Slides	296,796,569	Clinton
1005	10/28/1993	R	Fires, Mud/Landslides, Flooding, So	118,253,406	Clinton
1008	01/17/1994	E	Northridge Earthquake	9,812,355,873	Clinton
1044	01/10/1995	W	Severe Winter Storms, Flooding, Land	364,727,101	Clinton
1046	03/12/1995	W	Severe Winter Storms, Flooding Land	230,588,324	Clinton
1203	02/09/1998	W	Severe Winter Storms, And Flooding	492,282,766	Clinton

Declaration Number	Date	Type	Disaster Description	Constant 2009 $	President
1577	02/04/2005	W	Severe Storms, Flooding, Debris Flows, And Mudslides	319,020,087	G. W. Bush
1585	04/14/2005	W	Severe Storms, Flooding, Landslides, Mud And Debris Flows	92,772,575	G. W. Bush
1689	03/13/2007	G	Severe Freeze	10,872,037	G. W. Bush
1731	10/24/2007	R	Wildfires	220,940,365	G. W. Bush
1810	11/18/2008	R	Wildfires	39,755,514	G. W. Bush

KEY:

A: Tsunami
E: Earthquake
F: Flood
G: Freezing
K: Dam/Levee Break
R: Fire
S: Snow*(Category added in 1999)
W: Severe Storms

Hazard Mitigation Planning Process

ELEMENT A: PLANNING PROCESS | A2

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

The process for developing the *2014 County of Los Angeles All-Hazard Mitigation Plan* started with identifying members for the Hazard Mitigation Planning Advisory Committee. Each team member represented different county departments and specific divisions within those departments with a role in mitigation efforts. The Hazard Mitigation Planning Advisory Committee met over a period of 10 months, and identified characteristics and consequences of natural, technological, and human-caused hazards with significant potential to affect the county.

Hazard mitigation strategies and goals were developed by understanding the risk posed by the identified hazards. The group also determined hazard mitigation activities and priorities, to include scenarios for both present and future conditions. The final *All-Hazard Mitigation Plan* will be implemented through various projects, changes in day-to-day county operations, and continued hazard mitigation development.

Through a series of meetings—including Hazard Mitigation Planning Advisory Committee, department-specific, town hall, and special district workshops—mitigation actions items were developed and updated. Two Hazard Mitigation Planning Advisory Committee meetings were conducted, and the following seven departments participated in department-specific meetings:

- Chief Executive Office – Information Technology Service Geographic Information Systems (ITS-GIS) (2 meetings)
- Chief Executive Office – Office of Emergency Management (1 meeting)
- Fire Department (1 meeting)

- Internal Services Department (2 meetings)
- Regional Planning Department (1 meeting)
- Public Health Department (2 meetings)
- Public Works Department (3 meetings)

A total of seven Town Hall Meetings and seven Special District Meetings were conducted throughout the county.

Public Input

ELEMENT A: PLANNING PROCESS | A3
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

The plan will be available to the public through different venues that will engage the public, involve them in ongoing planning and evaluation, and facilitate communication. The Hazard Mitigation Planning Advisory Committee recognizes that community involvement increases the likelihood that hazard mitigation will become a standard consideration in the county's evolution.

The Hazard Mitigation Planning Advisory Committee posted a public notice on its Web site and held a meeting/presentation to introduce hazard mitigation. The resources and information cited in the mitigation plan provide a strong local perspective and help identify strategies and activities to make the County of Los Angeles more disaster resistant.

Scope

FEMA implemented the Disaster Mitigation Act of 2000 and published their requirements for all future hazard mitigation planning in February 2002. The State of California implemented the program in California in the summer and fall of 2003, with guidelines and training sessions. The law requires extensive documentation of the community, the region, its hazards, its history, and future plans. Examples include the following:

- Formation of a stakeholder group responsible for writing, updating, and implementing the mitigation plan. It's critical that progress and changes in strategy be tracked in order to provide project continuity during each plan update. The county chose to establish a Hazard Mitigation Planning Advisory Committee made up of representatives from departments with significant roles in the county's mitigation efforts. As when it was first established during the 2005 planning process, the committee is tasked with assessing the probability of a range of hazards, prioritizing the hazards, collecting the history and documentation of disaster events, and documenting past, present, and future mitigation strategies. The Hazard Mitigation Planning Advisory Committee is led by the CEO's Office of Emergency Management (OEM).
- The DMA 2000 regulations include the following specific documentation requirements:
    - Adoption by the local governing body
    - Documentation of the planning process, including opportunities for public input

- A risk assessment, including identification and profiling of hazards and an assessment of vulnerability
- A mitigation strategy, identifying past, present, and future mitigation actions
- Documentation of the plan maintenance process

This plan is for the County of Los Angeles, and covers mitigation responsibilities of county departments as well as the unincorporated communities. Because of the complex array of local governments, the plan could not reasonably address mitigation planning for each of the 88 cities and 93 school districts and 59 other special districts covered by the law. The plan addresses all major natural, human-caused, and technological disasters that fall within the responsibilities of county-owned and -operated department facilities. Sheriff, Fire Department, and Public Works provide contracted services to many of the 88 cities in Los Angeles County. The individual cities and special districts are responsible for completion of their own mitigation plans.

Definition of Hazard Mitigation

Hazard mitigation is any sustained action taken to eliminate or reduce long-term risk to human life, property, and the environment posed by a hazard.

Hazard mitigation planning is the process of developing a sustained course of action taken to reduce or eliminate long-term risk to people and property from both natural and technological hazards and their effects. The planning process includes establishing goals and recommendations for mitigation strategies.

Hazard mitigation may occur during any phase of a threat, emergency, or disaster. Mitigation can and may take place during the preparedness (before), response (during), and recovery (after) phases. The process of hazard mitigation involves evaluating a hazard's impact and identifying and implementing actions to minimize or eliminate the impact.

Plan Organization

The plan has been formulated to meet the requirements of federal law, and to serve as a reference document and basis for hazard mitigation projects and grant applications for the county's hazard mitigation programs. This document will also assist the cities and special districts within the county by providing a base of hazard and geographic information required to prepare their own mitigation plans.

The plan is divided into eleven sections and an Appendix:

Section 1 – Introduction Summary

This section contains the formal language outlining the purpose, plan goals, definitions, and legal authorities.

Section 2 – Hazard Mitigation Planning Process

This section explains the process the Hazard Mitigation Planning Advisory Committee used in sharing data, updating and developing mitigation strategies, and devising implementation programs. It details the processes used to inform citizens, businesses, and adjacent jurisdictions of the planning project, and the methods used to solicit public input.

This section also contains minutes and supporting documentation for the Hazard Mitigation Planning Advisory Committee, department-specific meetings, town hall meetings, and special district workshops.

Section 3 – Community Profile

This section includes an in-depth overview of the demographics and other community features of Los Angeles County. It contains a list of critical department facilities that would play an important role during a major disaster.

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This section provides an overview of the risk and vulnerability assessment process. The five steps involved in risk and vulnerability assessment are as follows: (1) hazard identification; (2) profiling hazard events; (3) vulnerability assessment/inventory of existing assets; (4) risk analysis; and (5) assessing vulnerability/analyzing development trends. Information is also included on the vulnerability of critical facilities to the identified hazards. In addition, land use categories are assessed for vulnerability to the identified hazards.

Sections 5–9 are detailed assessments of the hazards posing high, moderate, and low risks by region, according to the results of the Calculated Priority Risk Index (CPRI). CPRI is a FEMA-recommended ranking system that allows different hazards to be compared to each other.

The high, moderate, and low risk hazards and their relative priority are summarized in the chart below.

Table 1-2: CPRI Totals

Board of Supervisorial District	Earthquake	Flood	Wildfire	Tsunami	CPRI Total
Board of Supervisorial District 1	3.25	2.55	1.45	N/A	30.90
Board of Supervisorial District 2	3.25	2.55	1.45	N/A	30.00
Board of Supervisorial District 3	3.25	2.55	3.15	2.5	33.30
Board of Supervisorial District 4	3.25	3	1.75	2.5	33.25
Board of Supervisorial District 5	3.25	3	3.15	N/A	32.15

Hazard-Specific Analysis

The following sections provide a hazard-specific analysis of each of the four chronic hazards is addressed in this plan. Chronic hazards occur with some regularity, and most may be predicted through historic evidence and scientific methods. The chronic hazards addressed in the plan include Earthquake, Flood, Wildfire, and Tsunami.

Section 5 – Earthquake Hazard

This section addresses the various earthquake hazards throughout the county. While they do not occur on a very regular basis, the potential impact of earthquakes is very large. This section addresses the various faults in the region and what their impact might be.

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This section addresses the various flood hazards throughout the county. They include dam failure, urban flooding, and riverine flooding. Tsunamis are discussed separately in Section 8.

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This section addresses the tsunami hazard throughout the county. The impact of tsunamis has not been large in the past; however, with recent events like the 2011 Japan earthquake, more attention is needed on the topic.

Section 9 – Non-Significant Hazards

The Hazard-Specific Analysis also includes a summary of hazards posing a less significant threat. The summary includes information on the history, hazard causes, hazard characteristics, and hazard assessment. The Non-Significant Hazards included in this chapter are: Drought, Landslide, Windstorm, Terrorism and Weapons of Mass Destruction (WMD), Infrastructure Loss – Utility, Data/ Telecommunications, Biological and Health Emergencies, Water/Wastewater Emergency, Civil Unrest, Large Venue Structure Fires (Conflagrations), Transportation Incidents, Hazardous Materials, Radiological Incidents/Accidents, Explosion, and Agricultural Loss.

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This section is a catalog of strategies for mitigation of each of the significant hazards identified in Section 4: Risk Assessment. The strategies listed include the general description of the strategy, the organization/department responsible for the strategy, the implementation timeline, the cost, the goals and hazards addressed, and the overall ranking. Sample strategies include seismic protection projects, flood hazard reduction projects, security projects, technological protection, economic loss protection projects, public information projects, medical and biological preparedness, and identification of other potential projects through feasibility studies.

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Appendix

A - Jurisdictional Guide to Updating Hazard Mitigation Plans. This is a significant addition to the 2014 Plan. It is standalone document contains helpful hints and guidance for Los Angeles County Cities and Special Districts in their efforts to update their own Local Hazard Mitigation Plans. The Guide is presented in four parts: Introduction, Potential Mitigation Action Items, Insights on Plan Approval, and the Master Map Resource Directory.

B - The final FEMA Plan Review Tool for the 2014 County of Los Angeles All-Hazard Mitigation Plan is also included in the Appendix.

Summary of Changes

As part of the 2014 Plan Update process, the Hazard Mitigation Planning Advisory Committee conducted an extensive review and analysis of every section from the 2005 Plan. At the completion of the process, the Hazard Mitigation Planning Advisory Committee determined there was a need to further expand on the concepts contained within the 2005 Plan. This required several amendments to several sections, as well as the addition of entirely new sections and topics.

For the 2014 Plan, the Hazard Mitigation Planning Advisory Committee incorporated FEMA's regulatory changes dated July 2008 and the Local Hazard Mitigation Handbook dated March 2013. There were numerous revisions to the document format including graphic enhancements (e.g., County logos, text boxes, photographs, graphics, reorganization of electronic format, and web references). The history of hazard events since the 2005 Plan was updated throughout the document and the Hazard Mitigation Planning Advisory Committee eliminated redundant or unnecessary data and content.

Listed below, by section, are the amendments contained within this document.

Section 1: Introduction Summary

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. To enhance the Executive Summary, in order to provide further clarification for the reader, the Hazard Mitigation Planning Advisory Committee:

- ✓ Added Agencies that Provided Support Material
- ✓ Revised the name of the Hazard Vulnerability Analysis Section to Risk Assessment
- ✓ Reviewed and chose to leave the 2005 "Mission Statement" as it was adopted
- ✓ Moved the Plan Development and Adoption Timeline to Planning Process and replaced with updated table
- ✓ Moved Legal Authority to Planning Process

Section 2: Planning Process

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee reaffirmed its commitment to public participation and opted to bring that content to the core of the 2014 Plan. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Added Hazard Mitigation Planning Advisory Committee Timeline and Hazard Mitigation Planning Advisory Committee Level of Participation Tables to better define the effort involved in the planning process
- ✓ Updated the list of meetings that they had been involved in for the 2014 Plan
- ✓ Updated the roster for the Hazard Mitigation Planning Advisory Committee, Adjunct contributors and participants
- ✓ Added a Point of Contact to provide readers with an easy access to the individual, assigned by the county, with the responsibility for facilitating the maintenance of the Plan
- ✓ Updated:
  - o Media releases
  - o Questionnaire and Results
  - o Public announcement flyer
  - o Hazard Mitigation Planning Advisory Committee Meeting Minutes

Section 3: Community Profile

The Hazard Mitigation Planning Advisory Committee decided to rename this section from Section 3: Demographics and Statistics as it was called in the 2005 Plan and rename it to Section 3: Community Profile. The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee also confirmed the information contained in this section for accuracy and made the following amendments:

- ✓ Updated the History section
- ✓ Added data sources as available
- ✓ Added detailed climate charts
- ✓ Updated the population and demographic data
- ✓ Updated information in general data
- ✓ Updated information about the structure of the County and its Cities and Unincorporated areas
- ✓ Updated Maps
- ✓ Updated the Critical Facilities Table
- ✓ Updated Transportation Data

Section 4: Risk Assessment

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee applied the Calculated Priority Risk Index (CPRI) method to the 2014 Plan in an effort to better compare the hazards identified by the Hazard Mitigation Planning Advisory Committee as posing a “significant” threat to the community. The Hazard Mitigation Planning Advisory Committee decided the break up the CPRI Utilizing the CPRI, the Hazard Mitigation Planning Advisory Committee decided that the natural hazards (Earthquake, Flooding, Wildfire, Flooding, and Tsunami) were the most significant threats facing the County. After further analysis, the Hazard Mitigation Planning Advisory Committee decided to combine the lower threat hazards into a Non-Significant Hazards chapter. The specific hazard sections were broken out into their own sections in order to improve the layout of the plan.

Additional categories to the updated plan are listed below:

- ✓ Added Major Disaster Declarations in Los Angeles County Table
- ✓ Added CPRI Index Table which describes the different rankings
- ✓ Added a Chart depicting the CPRI rankings for all districts
- ✓ Added individual CPRI Tables for each District within the County
- ✓ Added a Vulnerability: Location, Extent, and Probability for County of Los Angeles to better describe the hazards
- ✓ Added County of Los Angeles Critical Facilities Vulnerable to Hazards Table
- ✓ Added Proximity of Structure Types to Hazards
- ✓ Moved and Updated the Los Angeles County Disasters Since 1950 Table
- ✓ Added the Key Code for the hazards addressed in the CPRI

Section 5: Earthquake Hazards

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The historical information was updated by adding earthquake events since the 2005 Plan adoption and included new earthquake studies and findings. Additional topics on *Impacts of Earthquakes on Los Angeles County, Severity* were added to more specifically define what Supervisorial District members can expect from an earthquake event. Also, the Hazard Mitigation Planning Advisory Committee:

- ✓ Updated Significant Regional Earthquake Events (greater than M4)
- ✓ Added Maps for the Calexico and Chino Hills Earthquake Events
- ✓ Removed the Updated Fault Parameters table and replaced it with Earthquake Probable Events Map
- ✓ Updated the Earthquake Hazard Map for Los Angeles County
- ✓ Updated the California Faults map and the Southern California Earthquake Map
- ✓ Added a list of faults within close proximity to the Supervisorial District
- ✓ Added Principal Active Faults in Los Angeles County Table
- ✓ Added Historical Earthquakes near Los Angeles County
- ✓ Updated the Historic Earthquake Epicenters Map
- ✓ Added California Area Earthquake Probabilities Map
- ✓ Added Seismic Hazards and county-Operated Critical Facilities Maps for all Supervisorial Districts
- ✓ Added Seismic Hazards and Public Schools Maps for all Supervisorial Districts
- ✓ Updated Earthquake Fault Zones Index Maps
- ✓ Added ShakeMaps for Hector Mine, Northridge, Whittier Narrows, San Andreas (1857 Rupture), Santa Monica, Palos Verdes, Newport-Inglewood, Whittier, Raymond, Elsinore, San Joaquin Hills, Puente Hills, Chino Hills, and San Andreas Faults
- ✓ Updated Los Angeles County Seismic Hazards Map
- ✓ Added Liquefaction maps for the County from the old Landslide Section
- ✓ Added Shake Intensity Maps for all of the Districts
- ✓ Added Shake Intensity Map and Public Schools for all of the Supervisorial Districts

- ✓ Updated the HAZUS run
- ✓ Added HAZUS – Debris Total for Los Angeles County Map
- ✓ Added HAZUS –General Building Stock Damage for Los Angeles County

Section 6: Flood Hazards

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee also added topics on *Impacts of Flooding on Los Angeles County* and *Severity* to more specifically define what County residents can expect from a flooding event. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Updated the major rivers table
- ✓ Updated Historical Records of Large Floods in Los Angeles County
- ✓ Added Tropical Cyclones of Southern California
- ✓ Added information about flood mapping capabilities of DPW's website
- ✓ Updated the "Floodway and Floodplain Schematic"
- ✓ Added information on how to obtain specific FIRM Maps
- ✓ Updated Federal Flood Disaster Declarations and focused on Los Angeles County
- ✓ Updated County of Los Angeles Flood Map
- ✓ Updated information on Repetitive Loss Properties
- ✓ Added Los Angeles County Flood Zones and County-Operated Critical Facilities Maps for each Supervisorial District
- ✓ Added Los Angeles County Flood Zones and Public Schools Maps for all Supervisorial Districts
- ✓ Added Dam Inundation Areas and County-Operated Critical Facilities Maps for all Supervisorial Districts
- ✓ Added Dam Inundation Areas and Public Schools Maps for all Supervisorial Districts
- ✓ Added information on urbanization and storm water pertaining to flooding hazards
- ✓ Added Flood Zone and Public Schools Maps

Section 7: Wildfire Hazards

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee added historical information on Southern California fires since the 2005 Plan and added more descriptions on "*Why are Wildfires are a Threat to Southern California?*". Topics were added on *Impacts of Wildfire on Los Angeles County, Severity*, and *Local Conditions* to more specifically define what County residents can expect from a Wildland / Urban Fire event. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Updated Why are Wildfires a Threat to Los Angeles County
- ✓ Added information from the CAL FIRE Plan 2010
- ✓ Updated Local and State Responsibility Zones for Los Angeles County Maps
- ✓ Added Very High Fire Hazard Severity Zones and County-Operated Facilities for all Supervisorial Districts
- ✓ Added Very High Fire Hazard Severity Zones Maps and Public Schools for all Supervisorial Districts

- ✓ Added link to the 2010 Strategic Fire Plan
- ✓ Added Percent of Fires by Cause Chart
- ✓ Updated 20 Largest California Wildfires by Structure
- ✓ Updated 20 Largest California Wildfires by Acreage
- ✓ Added Acreage Burned in Los Angeles County 2004-2010 chart
- ✓ Added Station Fire impacted Areas Map
- ✓ Added various updated information about the 2007 wildfires
- ✓ Added information about topography
- ✓ Added the "Statewide Map of Wildfire Threat" map
- ✓ Added information about brush management
- ✓ Added *A Homeowner's Guide to Fire Safe Landscaping* handout

Section 8: Tsunami Hazards

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. Based on updated information and updated maps, the Hazard Mitigation Planning Advisory Committee raised the risk rating to "High", explaining the addition of this section. Topics were added on Impacts of Wildfire on Los Angeles County, Severity, and Local Conditions to more specifically define what County residents can expect from a Tsunami event. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Updated Why Are Tsunamis a Threat to the County of Los Angeles
- ✓ Added Tsunami Hazard Area Map
- ✓ Updated Tsunami Events in California, 1930-2010
- ✓ Added information about the 2011 Japan Tsunami
- ✓ Added updated tsunami maps
- ✓ Updated the analysis

Section 9: Non-Significant Hazards

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The remaining hazards that were not considered high according to the CPRI Ranking system were clustered into one chapter called Non-Significant Hazards. All of the information about these hazards can now be found within this chapter. The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Vulnerability Analysis section, to this section.

Drought

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Analysis section to this section. The Planning Committee decided to change the drought rating from High as it was in the 2005 Plan to low based on the CPRI for drought. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Updated drought statistics
- ✓ Added Why Is Drought a Threat to the County of Los Angeles
- ✓ Updated Palmer Drought Index Map

Landslides

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Analysis section, to this section. The Planning Committee decided to change the landslide rating from moderate as it was in the 2005 Plan to low based on the CPRI for landslide. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Added Historical Landslides in Southern California
- ✓ Moved the liquefaction maps to the Earthquake section of the document
- ✓ Added information about Sinkholes and Subsidence

Windstorm Hazards

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Analysis section, and combined the Tornado Section, from the 2005 Plan, into this section. The Hazard Mitigation Planning Advisory Committee also added topics on *Impacts of Windstorm in the County of Los Angeles* and *Severity* to more specifically define what County residents can expect from a windstorm event. In addition, the Hazard Mitigation Planning Advisory Committee:

- ✓ Added Wind Events in Los Angeles County: 50MPH or Greater
- ✓ Added National Weather Service Query Results for Tornado Events in Los Angeles County from 1950 to 2009
- ✓ Added information regarding tornados

Terrorism and Weapons of Mass Destruction

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Analysis section, and combined the Weapons of Mass Destruction (WMD) section into this section. The Planning Committee decided to change the terrorism and weapons of mass destruction rating from high as it was in the 2005 Plan to low based on the CPRI for terrorism and weapons of mass destruction.

Infrastructure Loss – Utility, Data/Telecommunications

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Utility Loss, from the 2005 Plan – Hazard Analysis section, and renamed it Infrastructure Loss – Utility, Data/Telecommunications into this section. The Planning Committee decided to change the Infrastructure Loss – Utility, Data/Telecommunications rating from high as it was in the 2005 Plan to low based on the CPRI for Infrastructure Loss – Utility, Data/Telecommunications. In addition, the Hazard Mitigation Planning Advisory Committee added:

- ✓ Updated Power Transmission Lines in California Map
- ✓ Added information about data security breaches
- ✓ Added suggestions about securing data/telecommunications

Biological and Health Emergencies

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Biological and Health Emergencies, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Biological and Health Emergencies rating from high as it was in the 2005 Plan to low based on the CPRI for Biological and Health Emergencies.

In addition, the Hazard Mitigation Planning Advisory Committee added:

- ✓ Information on The Department of Public Health
- ✓ Updated the Summary of West Nile Virus Activity in California
- ✓ Updated West Nile Virus Activity in California Counties Map

Water/Wastewater Emergency

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Water/Wastewater Emergency, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Water/Wastewater Emergency rating from high as it was in the 2005 Plan to low based on the CPRI for Water/Wastewater Emergency. In addition, the Hazard Mitigation Planning Advisory Committee added:

- ✓ Added information about the 6 watersheds serving the county
  - o Added Tables and Maps for each watershed
- ✓ Updated Groundwater Contamination as a result of Leaking Underground Storage Tanks graphic

Civil Unrest

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Civil Unrest, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Civil Unrest rating from high as it was in the 2005 plan to low based on the CPRI for Civil Unrest. In addition, the Hazard Mitigation Planning Advisory Committee added:

Dam Failure Hazards

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information, from the 2005 Plan – Hazard Vulnerability Analysis section, to this section. The Hazard Mitigation Planning Advisory Committee also added topics on Impacts of Dam Failures in Los Angeles County to more specifically define what County residents can expect from a dam failure event.

Large Venue Structure Fires

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Large Venue Structure Fires, from the 2005 Plan – Hazard Vulnerability Analysis section into this section. The Planning Committee decided to change the Large Venue Structure Fires rating from moderate as it was in the 2005 Plan to low based on the CPRI for large venue structure fire. In addition, the Hazard Mitigation Planning Advisory Committee added information about the 2008 Universal Studios Fire.

Transportation Incidents

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Transportation Incidents, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Transportation Incidents rating from high as it was in the 2005 Plan to low based on the CPRI for Transportation Incidents. In addition, the Hazard Mitigation Planning Advisory Committee added information about the most recent air and rail incidents.

Hazardous Materials

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Hazardous Materials, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Hazardous Materials rating from high as it was in the 2005 Plan to low based on the CPRI for Hazardous Materials. In addition, the Hazard Mitigation Planning Advisory Committee updated information about the hazard.

Radiological Incidents/Accidents

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Radiological Incidents/'Accidents, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Radiological Incidents/'Accidents rating from high as it was in the 2005 Plan to low based on the CPRI for Radiological Incidents/'Accidents. In addition, the Hazard Mitigation Planning Advisory Committee added information about the 2011 Japan nuclear disaster.

Explosion

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information for Explosion, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Explosion rating from high as it was in the 2005 Plan to low based on the CPRI for Explosion.

Agricultural Loss

The Hazard Mitigation Planning Advisory Committee moved the hazard specific information Agricultural Loss, from the 2005 Plan – Hazard Analysis section into this section. The Planning Committee decided to change the Agricultural Loss rating from high as it was in the 2005 Plan to low based on the CPRI for Agricultural Loss. In addition, the Hazard Mitigation Planning Advisory Committee updated charts and tables throughout the section.

The Hazard Mitigation Planning Advisory Committee decided to remove the following hazards from the plan due to their exceptionally low occurrence: Severe Weather, Volcano, and Special Events.

Section 10: Mitigation Strategies

The Hazard Mitigation Planning Advisory Committee removed data and information including charts and tables that are not required by FEMA in an effort to streamline the Mitigation Plan. The planning team also moved Section 5: Strategies from the 2005 Plan and changed the title to Section 10: Mitigation Strategies. The Hazard Mitigation Planning Advisory Committee reviewed and analyzed this section of the plan and subsequently added, updated or made the following changes:

- ✓ Reformatted the Mitigation Strategies into the Mitigation Actions Matrix
- ✓ Added the following topics:
  - o Overview of Mitigation Strategy
  - o Planning Approach
  - o Goals
  - o FEMA Mitigation Measure Categories
  - o County of Los Angeles General Plan
- ✓ Updated the Mitigation Strategies:
  - o The action items themselves were updated including appropriate coordinating organization, timeline, and plan goals addressed

- Columns were added for priority ranking (low, medium, and high)
- A column was added for comments pertaining to the status of the action item (New, Revised, Completed, Deleted, and Deferred)
- Extreme care was taken in documenting any changes or other substantive information pertaining to the status of each mitigation action item

✓ Reaffirmed the plan goals and definitions from the 2005 All-Hazard Mitigation Plan

✓ Created a table listing the goals, policies, and projects from the General Plan and indicated alignment with the Hazard Mitigation Planning Goals

The Hazard Mitigation Planning Advisory Committee also made considerable revisions to the topic entitled "How are the Mitigation Action Items Organized?" These revisions included new sources of data including priority ranking and status. This document also provides a framework for identification and coordination of Hazard Mitigation strategies developed in Los Angeles County with other plans; especially those developed by District departments, divisions and offices as well as those plans developed in order to file for Federal disaster assistance, as required by P.L. 106-390 (as amended) of the Disaster Mitigation Act of 2000.

Section 11: Plan Maintenance

The Hazard Mitigation Planning Advisory Committee removed data and information including charts, tables, and maps that are not required by FEMA in an effort to streamline the Mitigation Plan. The Hazard Mitigation Planning Advisory Committee reviewed the content of this section and agreed to leave the content as written with the following amendments:

✓ Updated the composition of the list of Hazard Mitigation Planning Advisory Committee members and added contact information for all members

✓ Designated the Los Angeles County OEM as the responsible agency for updates to the plan

✓ Designated the Los Angeles County OEM as the convener to facilitate the Hazard Mitigation Planning Advisory Committee meetings

Appendix

✓ A - The Hazard Mitigation Planning Advisory Committee added the Jurisdictional Guide to Updating Hazard Mitigation Plans. This standalone document contains helpful hints and guidance for Los Angeles County Cities and Special Districts in their efforts to update their own Local Hazard Mitigation Plans. The Guide is presented in four parts: Introduction, Potential Mitigation Action Items, Insights on Plan Approval, and a Master Map Resource Directory.

✓ B – Completed FEMA Plan Review Tool for 2014 County of Los Angeles All-Hazard Mitigation Plan.

Section 2: Hazard Mitigation Planning Process

Section 2 – Hazard Mitigation Planning Process 1

Review and Incorporation of Existing Information 1

Plan Development and Approval Timeline 2

Plan Adoption 12

Plan Approval 12

Point of Contact 12

Plan Maintenance 13

Pulbic Input 13

Legal Authority 14

Federal Laws 14

State Laws 14

Los Angeles County Identified Mitigation Constraints 15

Hazard Mitigation Planning Advisory Committee 16

Hazard Mitigation Planning Advisory Committee Functions 16

Hazard Mitigation Planning Advisory Committee Tasks 17

Outisde Agency Involvement 17

Hazard Mitigation Planning Advisory Committee Agenda (12/7/10) 18

Hazard Mitigation Planning Advisory Committee Agenda (5/23/11) 20

Handouts were Distributed at Special District Workshops and Town Hall Meetings 22

Hazard Mitigation Planning Advisory Committee Meeting Sign-In Sheet (12/8/10) 23

Hazard Mitigation Department-Specific Meeting Minutes 28

Hazard Mitigation Planning Public Participation Web Site Announcement 33

Town Hall Invitation 34

Town Hall Meeting Sign-in Sheets 35

Special District Invitation 46

Special District Invitee List 47

Special District Workshop Sign-in Sheets 50

Chief Executive Office Letter of Adoption 62

FEMA Letter of Conditional Approval 63

FEMA Letter of Final Approval 64

Section 2 – Hazard Mitigation Planning Process

Review and Incorporation of Existing Information

ELEMENT A: PLANNING PROCESS | A4
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

This section contains a detailed listing of documentation used to develop this plan. Each of the documents in the plan development resource list was reviewed. Incorporation of information from these existing plans, studies, reports, and technical documents were based on their applicability and timeliness. The incorporation of information from existing specific mitigation plans and studies was used to enhance the relevance of sections of this plan. Selected documents have been footnoted throughout the plan where a specific reference is incorporated.

Plan Development Resource List

County of Los Angeles General Plan (Draft 2014)

A Road Map to Fire Safety (2009)

Brush Management Plant ID Guide

County of Los Angeles Floodplain Management Plan (2009)

Citizens Guide to County Services (2010)

Table 2-1: Plan Development and Approval Timeline is a chronicle of the intensive activities involved in developing the plan.

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

Plan Development and Approval Timeline

Table 2-1: Plan Development and Approval Timeline

	Dec 2010	Jan 2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May-Dec	Jan 2013	Feb-Oct	Nov	Jan 2014	Feb-May	June
Conduct initial meeting with county OEM project manager – Confirm scope of work and discuss project logistics	X																							
Update hazard information contained in the 2005 HMP and prepare recommendations on streamlining plan	X																							
Conduct Hazard Mitigation Planning Advisory Committee Meeting #1 – Kickoff Meeting	X																							
Conduct department-specific planning meetings		X	X	X	X	X																		
Create department-specific mitigation actions matrix						X																		

	Dec 2010	Jan 2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May-Dec	Jan 2013	Feb-Oct	Nov	Jan 2014	Feb-May	June
Prepare first draft HMP for submission to grant authority	X	X	X	X	X	X																		
Prepare working draft HMP and distribute to Hazard Mitigation Planning Advisory Committee in advance of Meeting #2	X	X	X	X	X	X																		
Conduct Hazard Mitigation Planning Advisory Committee Meeting #2						X																		
Incorporate changes into the draft HMP and send to Cal OES/FEMA for conditional approval (pending results of special district workshops, town hall meetings, and CEO adoption)											X													
Develop and conduct town hall meetings on the HMP draft– 7					X	X																		

	Dec 2010	Jan 2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May-Dec	Jan 2013	Feb-Oct	Nov	Jan 2014	Feb-May	June
deliveries																								
Incorporate input from town hall meetings into the HMP draft							X																	
Develop and conduct special district workshops on the HMP draft – 7 deliveries					X	X																		
Incorporate input from special district workshops into the HMP draft							X																	
Prepare final HMP draft									X	X	X	X	X	X	X									
Submit final the HMP draft to Cal OES and FEMA for approval																X								
Review requested revisions and resubmit to FEMA																X								
Resubmit final draft plan to FEMA																X								

	Dec 2010	Jan 2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May-Dec	Jan 2013	Feb-Oct	Nov	Jan 2014	Feb-May	June
Receive conditional plan approval from FEMA																					X			
Submit Plan to EMC for adoption																							X	
Receive FEMA approval																								X

Table 2-2: Hazard Mitigation Planning Advisory Committee Level of Participation

	Cpt. Angus Alexander	Margaret Ayala	John Cvjetkovic	Cpt. D Chetwood	Connie Chung	Michael Contreras	Yvette Countee	Ana DeLaTorre	Barbara Engleman	Anush Gambaryan	Luis Gomez	Robert Held	Ken Kondo	Margaret Carlin	Sherryl Jones	Ron Lacayo	Cpt. Daniel Martin	Emily Montanez	Linda Estrada	Enrique Orta	Edward Ramos	Anne Russet	Susan Tae	Michael Takeshita	Pablo Valadez	Martin Zimmerman	WHS	EPC
Participate in initial meeting with County OEM project manager – Confirm scope of work and discuss project logistics							X																				X	X
Update hazard information contained in the 2005 HMP and prepare recommendations on streamlining plan																												X
Participate in Hazard Mitigation Planning Advisory Committee Meeting #1 – Kickoff meeting	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Participate in department-specific planning meetings					X	X	X				X		X	X		X		X	X			X			X			X
Create department-specific mitigation actions matrix					X	X	X				X		X	X		X		X	X			X			X			X

	Cpt. Angus Alexander	Margaret Ayala	John Cvjetkovic	Cpt. D Chetwood	Connie Chung	Michael Contreras	Yvette Countee	Ana DeLaTorre	Barbara Engleman	Anush Gambaryan	Luis Gomez	Robert Held	Ken Kondo	Margaret Carlin	Sherryl Jones	Ron Lacayo	Cpt. Daniel Martin	Emily Montanez	Linda Estrada	Enrique Orta	Edward Ramos	Anne Russet	Susan Tae	Michael Takeshita	Pablo Valadez	Martin Zimmerman	WHS	EPC
Meeting about HAZUS Maps and loss estimates														X														X
Prepare first HMP draft for submission to grant authority							X																					X
Prepare Working HMP Draft and distribute to Hazard Mitigation Planning Advisory Committee							X																					X
Participate in Hazard Mitigation Planning Advisory Committee Meeting #2			X				X						X	X													X	X
The Hazard Mitigation Planning Advisory Committee reviewed the working draft	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Incorporate changes into the HMP draft and send to Cal OES/FEMA for conditional approval																												X

	Cpt. Angus Alexander	Margaret Ayala	John Cvjetkovic	Cpt. D Chetwood	Connie Chung	Michael Contreras	Yvette Countee	Ana DeLaTorre	Barbara Engleman	Anush Gambaryan	Luis Gomez	Robert Held	Ken Kondo	Margaret Carlin	Sherryl Jones	Ron Lacayo	Cpt. Daniel Martin	Emily Montanez	Linda Estrada	Enrique Orta	Edward Ramos	Anne Russet	Susan Tae	Michael Takeshita	Pablo Valadez	Martin Zimmerman	WHS	EPC
Identify locations and process invitations for town hall meetings																										X	
Develop and conduct town hall meetings on the HMP draft – 7 deliveries							X																				X
Incorporate input from town hall meetings into HMP draft																											X
Prepare final HMP draft																											X
Finalize graphics and technical editing																										X	
Prepare and submit supporting documentation for CEO approval							X																				X
Present final HMP draft to CEO for adoption of updated hazard mitigation plan							X																				

	Cpt. Angus Alexander	Margaret Ayala	John Cvjetkovic	Cpt. D Chetwood	Connie Chung	Michael Contreras	Yvette Countee	Ana DeLaTorre	Barbara Engleman	Anush Gambaryan	Luis Gomez	Robert Held	Ken Kondo	Margaret Carlin	Sherryl Jones	Ron Lacayo	Cpt. Daniel Martin	Emily Montanez	Linda Estrada	Enrique Orta	Edward Ramos	Anne Russet	Susan Tae	Michael Takeshita	Pablo Valadez	Martin Zimmerman	WHS	EPC
Incorporate CEO revisions into the final HMP draft							X X																					X
Submit final HMP draft mitigation plan to FEMA for approval							X																					
Process FEMA-requested revisions							X																					X
Submit Final Plan to EMC for adoption							X																					
Receive FEMA approval							X																					

Plan Adoption

The 2005 All-Hazard Mitigation Plan was adopted by the Board of Supervisors, demonstrating the county's commitment to meeting mitigation goals and objectives. Governing body approval legitimizes the plan and authorizes responsible agencies to execute their responsibilities.

In the 2005 All-Hazard Mitigation Plan, the Chief Executive Officer for the County of Los Angeles was granted authority to adopt future revisions and updates to the mitigation plan. However, due to changes in FEMA regulations, the 2014 Plan was presented to the County's Emergency Management Council for adoption on February 13, 2014.

Plan Approval

The 2014 County of Los Angeles All-Hazard Mitigation Plan was submitted to Cal OES and FEMA for a joint review. FEMA issued a conditional approval on November 20, 2013. FEMA issued a final approval on March 3, 2014.

Point of Contact

To request information or provide comments regarding this mitigation plan, please contact:

Contact Name	Yvette Countee
Email	YCountee@ceooem.lacounty.gov
Mailing Address	1275 North Eastern Avenue Los Angeles, CA 90022
Telephone Number	(323) 980-2253

Plan Maintenance

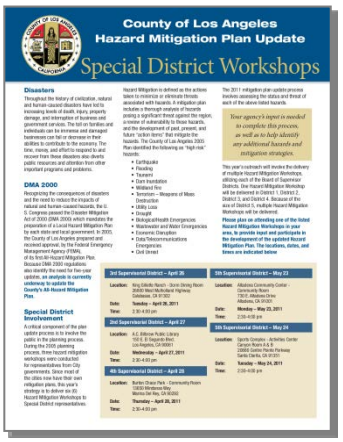
Mitigation Planning is an ongoing process involving changes as new hazards occur, as the area develops, and as more is learned about hazards and their impacts. The Hazard Mitigation Planning Advisory Committee will monitor changing conditions, help implement mitigation activities, annually review the plan to determine if County goals are being met, and provide an update to Cal OES and FEMA every five years. In addition, the Hazard Mitigation Planning Advisory Committee will review After-Action Reports generated after any disaster that impacts the County, and revise the mitigation plan, as needed.

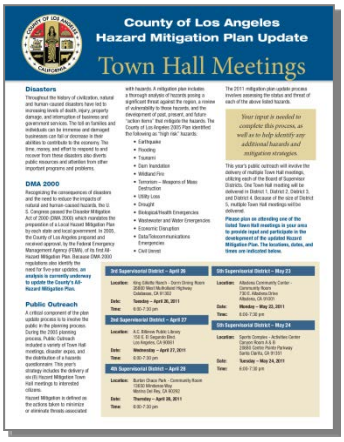
Public Input

ELEMENT A: PLANNING PROCESS | A3
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

The Plan was available to the public through different venues which engaged the public and involved them in the ongoing planning, evaluation, and facilitated communication. The Hazard Mitigation Planning Advisory Committee recognizes that community involvement increases the likelihood that hazard mitigation will become a standard consideration in the County's evolution. The project approach included Hazard Mitigation Planning Advisory Committee meetings with County staff, Department-specific Meetings, Special District Workshops, and Town Hall Meetings. In total, seven Special District Workshops were conducted and invitations sent out to all special districts within Los Angeles County. A total of seven town hall meetings were conducted with invitations sent out via Board of Supervisor Districts.

The Hazard Mitigation Planning Advisory Committee did post a public notice on the County website. The resources and information cited in the Mitigation Plan provide a strong local perspective and help identify strategies and activities to make the County of Los Angeles more disaster resistant.







Legal Authority

Federal Laws

Federal legislation has historically provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve this planning process (Public Law 106-390). The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, DMA 2000 establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at the state, tribal nation, and local government levels. It identifies requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and tribal nation mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and capabilities of the individual communities.

FEMA prepared an interim final rule, published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206), which establishes planning and funding criteria for states, tribal nations, and local communities.

The plan update also reflects the guidelines provided in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008 and FEMA's *Local Hazard Mitigation Handbook* dated March 2013. Compliance with the above-mentioned regulations makes the county eligible for funding and technical assistance from state and federal hazard mitigation programs.

State Laws

California has many laws and programs relating to hazard mitigation, the most effective of which include the following:

- California Earthquake Hazards Reduction Act of 1986
- Caltrans Seismic Retrofit Program
- California Fire Alliance
- California Earthquake Authority's Seismic Retrofit Program
- National Flood Insurance Program (NFIP), administered by the California's Department of Water Resources
- State planning law and California's Office of Planning and Research general plan guidance documents
- California Department of Insurance's Residential Retrofit Program
- The following are state laws and executive orders related to hazard mitigation:

- Executive Order W-18-19
- Executive Order W-9-91
- Health & Safety Code §19211
- Health & Safety Code §19181
- Public Resources Code §2621, et seq. (the Alquist-Priolo Earthquake Fault Zoning Act)

Los Angeles County Identified Mitigation Constraints

The committee identified a list of issues that exist in Los Angeles County that can be considered constraints to mitigation planning implementation (from the perspective of the participating Advisory Committee members):

- Legal constraints - A legal constraint has already been identified in the restrictions imposed by the GIS data licenses; they may prevent sharing mapping and data exchange throughout the county, with all jurisdictions included under this law.
- Economic constraints - Fee-based agencies may be restrained from participating in the planning process due to lack of funds to pay for their involvement.
- Budget constraints
- Land ownership constraints
- State and federal influences
- Sheer size of population and area served
- Sensitivity of information needed to complete the plan:
    - How to utilize the information and still fulfill planning requirements.
    - Any data brought before the committee that is sensitive must be presented as sensitive data and marked “not to be shared outside of the committee.” (It is the responsibility the committee to be sure the data is identified as sensitive.)
- Building and code restrictions
- Cultural demands and barriers
- Interpretation of law

Hazard Mitigation Planning Advisory Committee

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

NAME	AGENCY
Yvette Countee, County Project Manager	Office of Emergency Management
John Cvjetkovic	Department of Public Social Services
Cpt. D Chetwood	Fire Department
Connie Chung	Department of Regional Planning
Michael Contreras	Department of Public Health
Cpt. Angus Alexander	Fire Department/Lifeguard
Margaret Ayala	Department of Mental Health
Ana DeLaTorre	Department of Mental Health
Barbara Engleman	Department of Mental Health
Anush Gambaryan	Department of Parks and Recreation
Luis Gomez	Department of Health Services
Robert Held	Public Library
Sherryl Jones	Cal OES
Ron Lacayo	Department of Public Works
Cpt. Daniel Martin	Fire Department
Linda Estrada	Internal Services Department
Enrique Orta	Department of Parks and Recreation
Edward Ramos	Public Library
Anne Russet	Department of Regional Planning
Susan Tae	Department of Regional Planning
Michael Takeshita	Fire Department/Forestry Division
Pablo Valadez	Fire Department
Martin Zimmerman	Chief Executive Office

Hazard Mitigation Planning Advisory Committee Functions



In November of 2003, the Los Angeles County Office of Emergency Management formed a Hazard Mitigation Planning Advisory Committee that was drawn from county agencies, representatives from Los Angeles County Departments, and state representatives. Town Hall meetings were held for the community at large.

It was recognized when forming this committee that the Hazard Mitigation Planning Advisory Committee would need to be more active in the future for mitigation strategy identification and implementation.

In accordance with local and state laws, the Los Angeles County Office of Emergency Management is the lead agency and chair responsible for coordinating the efforts of the Los Angeles County Hazard Mitigation Planning Advisory Committee in formulating and supporting the Los Angeles County hazard mitigation strategy identification and plan promulgation and maintenance.

Operationally the Hazard Mitigation Planning Advisory Committee met as a group. They also discussed the information and mitigation strategies with the departments separately.

Hazard Mitigation Planning Advisory Committee Tasks

- Coordinate multi-hazard mitigation planning tasks and activities with the Office of Emergency Management to develop an all-hazards disaster mitigation plan and support the Office of Emergency Management's oversight of the planning process.
- Prioritize mitigation strategies based on disaster events and changes in capabilities.
- Maintain department-specific lists of critical facilities for properties owned or operated by the County of Los Angeles.
- Select highest and best mitigation recommendations and develop those recommendations for further action by the County of Los Angeles.
- Integrate the plan with all phases of comprehensive emergency management planning.
- Provide for the implementation of Hazard Mitigation Planning Advisory Committee decisions.
- Prioritize tasks and risks for implementing mitigation strategies.
- Encourage, coordinate, and provide a method for the implementation of public input, and provide guidance and training for local governments seeking to develop a DMA 2000 plan as required.
- Establish Hazard Mitigation Planning Advisory Committee tasks, to include at least the following:
    - Determine implementation ability and constraints for proposed hazard mitigation planning steps and development of strategies.
    - Bring forward community concerns through private and public input.
    - Identify implementation resources.
    - Provide for the update of the hazard mitigation plan on a scheduled basis.
    - Evaluate and provide the guidance to carry out mitigation activities.
    - Assist in implementation of funding identification and procurement of mitigation reduction resources.

Outside Agency Involvement

ELEMENT A: PLANNING PROCESS | A2
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2)

A variety of external agencies and individuals provided data and expertise during plan development. The agencies were informed of the availability of the draft mitigation plan. Any comments received have been

incorporated into the final document. See Special District Workshop invitations, list of invitees, and sign-in sheets at the end of Section 2 – Hazard Mitigation Planning Process.

Hazard Mitigation Planning Advisory Committee Agenda (12/7/10)

Hazard Mitigation Planning Advisory Committee Meeting

December 7, 2010

Agenda

1. Introductions
    a. Facilitator: Carolyn Harshman
    b. Willdan Staff
    c. Participants
2. Overview to Hazard Mitigation Planning Process
    a. Disaster Mitigation Act of 2000
3. History of Major Disasters in the United States
    a. Review of cause and damages
4. Hazards Posing Significant Threats in Los Angeles County
    a. Earthquake
    b. Flooding
    c. Wildfire
    d. Tsunami
5. Calculated Priority Risk Index
    a. Introduction to CPRI Index
    b. Initial Hazard Ratings
6. Steps Ahead
    a. Updating Mitigation Strategies

COUNTY OF LOS ANGELES

CHIEF EXECUTIVE OFFICE — OFFICE OF EMERGENCY MANAGEMENT







2011 All Hazard Mitigation Plan

Planning Advisory Committee Meeting
Facilitator, Carolyn Harshman

December 7, 2010

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Hazard Mitigation Planning Advisory Committee Agenda (5/23/11)

Hazard Mitigation Planning Advisory Committee Meeting

May 23, 2011

Agenda

1. Introductions
    a. Facilitator: Carolyn Harshman
    b. Willdan Staff
    c. Participants
2. Status of Hazard Mitigation Planning Process
    a. Department-Specific Meetings
3. Draft Mitigation Strategies
    a. Department-Specific Mitigation Actions
        i. Gathered, Updated, and Reviewed
4. Updated Hazard Analysis
    a. Earthquake
    b. Flooding
    c. Wildfire
    d. Tsunami
5. Steps Ahead
    a. Review of Draft Plan
    b. Approval Process
        i. Submit Draft to Cal EMA/FEMA for Conditional Approval
        ii. Submit Final to CEO for Adoption

COUNTY OF LOS ANGELES

CHIEF EXECUTIVE OFFICE — OFFICE OF EMERGENCY MANAGEMENT







2011 All-Hazard Mitigation Plan

Planning Advisory Committee Meeting
Facilitator, Carolyn Harshman

May 23, 2011

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Handouts were Distributed at Special District Workshops and Town Hall Meetings

ELEMENT A: PLANNING PROCESS | A3

A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

County of Los Angeles Hazard Mitigation Plan Update

DMA 2000

The Disaster Mitigation Act of 2000 (DMA 2000) mandates the preparation of a Local Hazard Mitigation Plan by each state and local government. The County of Los Angeles wrote its first All-Hazard Mitigation Plan in 2005. This planning effort is focused on the update of information pertaining to hazards, demographics, land use development, mapping, and mitigation activities.



Mitigation

Mitigation is defined as the actions taken to minimize or eliminate threats associated with hazards.

Simply put, mitigation includes actions taken to avoid the need for an emergency response.

As an example, proactive cleaning of storm drains in advance of heavy rains prevents blockage at a critical time of need.

Mitigation Measure Categories

FEMA has identified six "mitigation measure categories", including:

Prevention



Property Protection



Public Education and Awareness



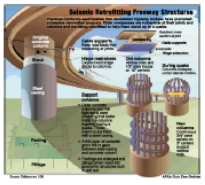
Natural Resource Protection



Emergency Services



Structural Projects



Hazards

The hazards identified for the County of Los Angeles were compared using a weighted system that analyzes Probability, Magnitude/ Severity, Warning Time, and Duration. The highest risk hazards for County of Los Angeles are Earthquake, Flooding, and Wildfire. Although other hazards may pose a focused and immediate threat to an isolated part of the region, the focus of the updated mitigation plan is on hazards that are so large in scope that the County government's ability to respond effectively is significantly impacted.

Public Input

Any public planning effort would be incomplete without adequate opportunities for public input. During this plan update, a total of fourteen Hazard Mitigation Workshops will be conducted for participation from the general public and representatives from Special Districts.

Staying in Touch

Updated information, access to the Draft Updated Plan, web links, and other resources pertaining to hazard mitigation will be posted on the County of Los Angeles, Office of Emergency Management website at http://lacoa.org.

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Questions about the Plan Update

Ms. Yvette Countee, Program Manager
Los Angeles County Office of Emergency Management
(323) 980-2253 | YCountee@ceooem.lacounty.gov

Hazard Mitigation Planning Advisory Committee Meeting Sign-in Sheet 12-8-10

ELEMENT A: PLANNING PROCESS | A1

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

LAST	FIRST	AGENCY	EMAIL	PHONE
Hazard Mitigation Planning Advisory Committee Members				
Alexander	Cpt. Angus	LACOFD/Lifeguard	Aalexand@fire.lacounty.gov	(310) 386-4057
Cvjetkovic	John	DPSS	johncvjetkovic@dpss.lacounty.gov	(562) 345-7729
Chetwood	Cpt. D	Fire	dchetwood@fire.lacounty.gov	Not provided
Chung	Connie	Planning	cchung@planning.lacounty.gov	(213) 974-6417
Contreras	Michael	Public Health	micontreras@ph.lacounty.gov	(210) 250-8681
Countee	Yvette	OEM	Ycountee@ceooem.lacounty.gov	(323) 980-2253
DeLaTorre	Ana	DMH	ADelaTorre@dmh.lacounty.gov	(213) 305-3238
Engleman	Barbara	DMH	BEngleman@dmh.lacounty.gov	(213) 216-8811
Gambaryan	Anush	Parks	agambaryan@parks.lacounty.gov	(213) 738-3011
Gomez	Luis	DHS	lugomez@dhs.lacounty.gov	(323) 594-1029

LAST	FIRST	AGENCY	EMAIL	PHONE
Held	Robert	Library	Bheld@library.lacounty.gov	(562) 879-0601
Jones	Sherryl	Cal-EMA	Sherryl.jones@calema.ca.gov	(562) 795-2973
Lacayo	Ron	Public Works	rlacayo@dpw.lacounty.gov	(626) 458-7313
Martin	Cpt. Daniel	Fire	dmartin@fire.lacounty.gov	(213) 393-5987
Montanez	Emily	ISD	emontanez@isd.lacounty.gov	(323) 267-3558
Orta	Enrique	Parks	eorta@parks.lacounty.gov	(213) 738-3011
Ramos	Edward	Library	eramos@library.lacounty.gov	(562) 940-4116
Russet	Anne	Planning	arusset@planning.lacounty.gov	(213) 974-6417
Tae	Susan	Planning	stae@planning.lacounty.gov	(213) 974-6433
Takeshita	Michael	Fire Dept. Forestry Division	mtakeshi@fire.lacounty.gov	(818) 890-5758
Valadez	Pablo	Fire	pvaladez@fire.lacounty.gov	(323) 881-2323
Zimmerman	Martin	CEO	mzimmerman@ceo.lacounty.gov	(213) 974-1326
Consultants				
Harshman	Carolyn	Emergency Planning Consultants	epc@pacbell.net	(858) 483-4626

LAST	FIRST	AGENCY	EMAIL	PHONE
Sutter	Russ	Willdan Homeland Solutions	rsutter@willdan.com	
Curtis	Whitney	Willdan Homeland Solutions	wcurtis@willdan.com	

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Committee Meeting
Location: 1275 N. Eastern Ave. Los Angeles, CA 90063
Time: 10:00-11:30 AM Date: Monday, May 23, 2011

Signature	LAST	FIRST	AGENCY	EMAIL	PHONE
	Lacayo	Ron	Public Works	rlacayo@dpw.lacounty.gov	(626) 458-7313
	Martin	Cpt. Daniel	Fire	dmartin@fire.lacounty.gov	(213) 393-5987
	Montanez	Emily	ISD	emontanez@isd.lacounty.gov	(323) 267-3558
	Orta	Enrique	Parks	eorta@parks.lacounty.gov	(213) 738-3011
	Ramos	Edward	Library	eramos@library.lacounty.gov	(562) 940-4116
AR	Russet	Anne	Planning	arusset@planning.lacounty.gov	(213) 974-6417
	Tae	Susan	Planning	stae@planning.lacounty.gov	(213) 974-6433
	Takeshita	Michael	Fire Dept. Forestry Division	mtakeshi@fire.lacounty.gov	(818) 890-5758
	Valadez	Pablo	Fire	pvaladez@fire.lacounty.gov	(323) 881-2323
	Zimmerman	Martin	CEO	mzimmerman@ceo.lacounty.gov	(213) 974-1326
	Kondo	Ken	CEO OEM	kkondo@ceooem.lacounty.gov	213 792-5128
	Carlin	Margaret	CEO OEM / ITS	mcarlin@ceooem.lacount.gov	213-980-2295

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Committee Meeting
Location: 1275 N. Eastern Ave. Los Angeles, CA 90063
Time: 10:00-11:30 AM Date: ~~Monday,~~ May ~~23~~, 2011
Tuesday, 24

Signature	LAST	FIRST	AGENCY	EMAIL	PHONE
Planning Advisory Committee Members					
	Alexander	Cpt. Angus	LACOFD/Lifeguard	Aalexand@fire.lacounty.gov	(310) 386-4057
John Cvjetkovic	Cvjetkovic	John	DPSS	johncvjetkovic@dpss.lacounty.gov	(562) 345-7729
	Chetwood	Cpt. D	Fire	dchetwood@fire.lacounty.gov	Not provided
	Chung	Connie	Planning	cchung@planning.lacounty.gov	(213) 974-6417
	Contreras	Michael	Public Health	micontreras@ph.lacounty.gov	(210) 250-8681
	Countee	Yvette	OEM	Ycountee@ceooem.lacounty.gov	(323) 980-2253
	DeLaTorre	Ana	DMH	ADelaTorre@dmh.lacounty.gov	(213) 305-3238
	Engleman	Barbara	DMH	BEngleman@dmh.lacounty.gov	(213) 216-8811
	Gambaryan	Anush	Parks	agambaryan@parks.lacounty.gov	(213) 738-3011
	Gomez	Luis	DHS	lugomez@dhs.lacounty.gov	(323) 594-1029
	Held	Robert	Library	Bheld@library.lacounty.gov	(562) 879-0601
	Jones	Sherryl	Cal-EMA	Sherryl.jones@calema.ca.gov	(562) 795-2973

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Hazard Mitigation Department-Specific Meeting Minutes

County of Los Angeles Hazard Mitigation Plan Update 2011

I.S.D. (Department)

2/16/11 (Date)

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
RICHARD BAGDASARIAN	ISD
CESAR MENCHACA	ISD - FOS - A&I
Tom Adamson	ISD- EMSD + A&I
Greg Dollinger (for Robert Aragon)	ISD - Telecomm Systems Mgmt.
Linda Estrada	EMSD - ISD
LUIS ENRIQUEZ	ISD- FOS - M&O

Emergency Planning Consultants

County of Los Angeles Hazard Mitigation Plan Update 2011

ISD (Department)

3/17/11 (Date)

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
RICHARD BAGDASARIAN	ISD EMSD
BRIAN ROBERTS	ISD / ENERGY
STEVE DUTTON	ISD / OPERATIONS DIV.
SUSAN DAVIS	ISD / OPERATIONS DIV
CESAR MENCHACA	ISD / FOS / A&I
Tom Adamson	ISD / FOS / A&I
Greg Dollinger	ISD / ITS
Linda Estrada	ISD-EMSD
Tim Harshman	Emergency Planning Consultants

Emergency Planning Consultants

County of Los Angeles Hazard Mitigation Plan Update 2011

PUBLIC HEALTH (Department)

2/14/11 (Date)

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
MIKE CONTRERAS	PUBLIC HEALTH
Michael Rogers	Public Health
Anthony Arakelian	Public Health

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County of Los Angeles Hazard Mitigation Plan Update 2011

PUBLIC WORKS (Department)

2/15/11 (Date)

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
RON LACAYO	LAC DPW
Bill Bird	LACO. DPW Road Maint.
RAY SALEHPOUR	" " "
George De La O	LACDPW, Watershed Management Division
Steven Ross	LACDPW, Flood Maintenance Division
VINCE Yu	LACDPW, ARCHITECTURAL ENGINEERING DIV

Emergency Planning Consultants

County of Los Angeles Hazard Mitigation Plan Update 2011

PUBLIC WORKS (Department)

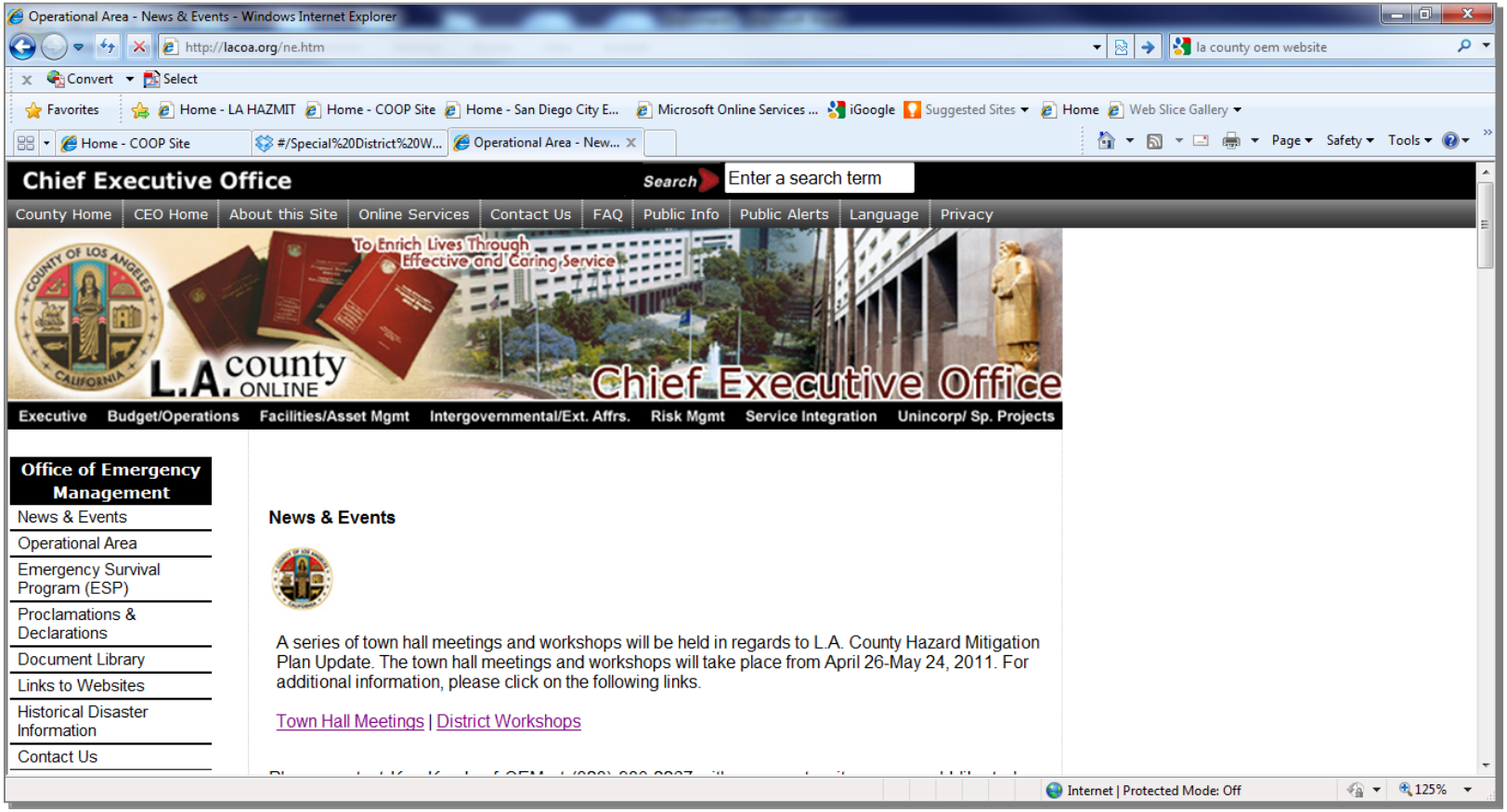
MARCH 16, 2011 (Date)

Name	Department
CAROLYN HARSHMAN	EMERGENCY PLANNING CONSULTANTS
RON LACAYO	LA County DPW
Tim Harshman	Emergency Planning Consultants

Emergency Planning Consultants

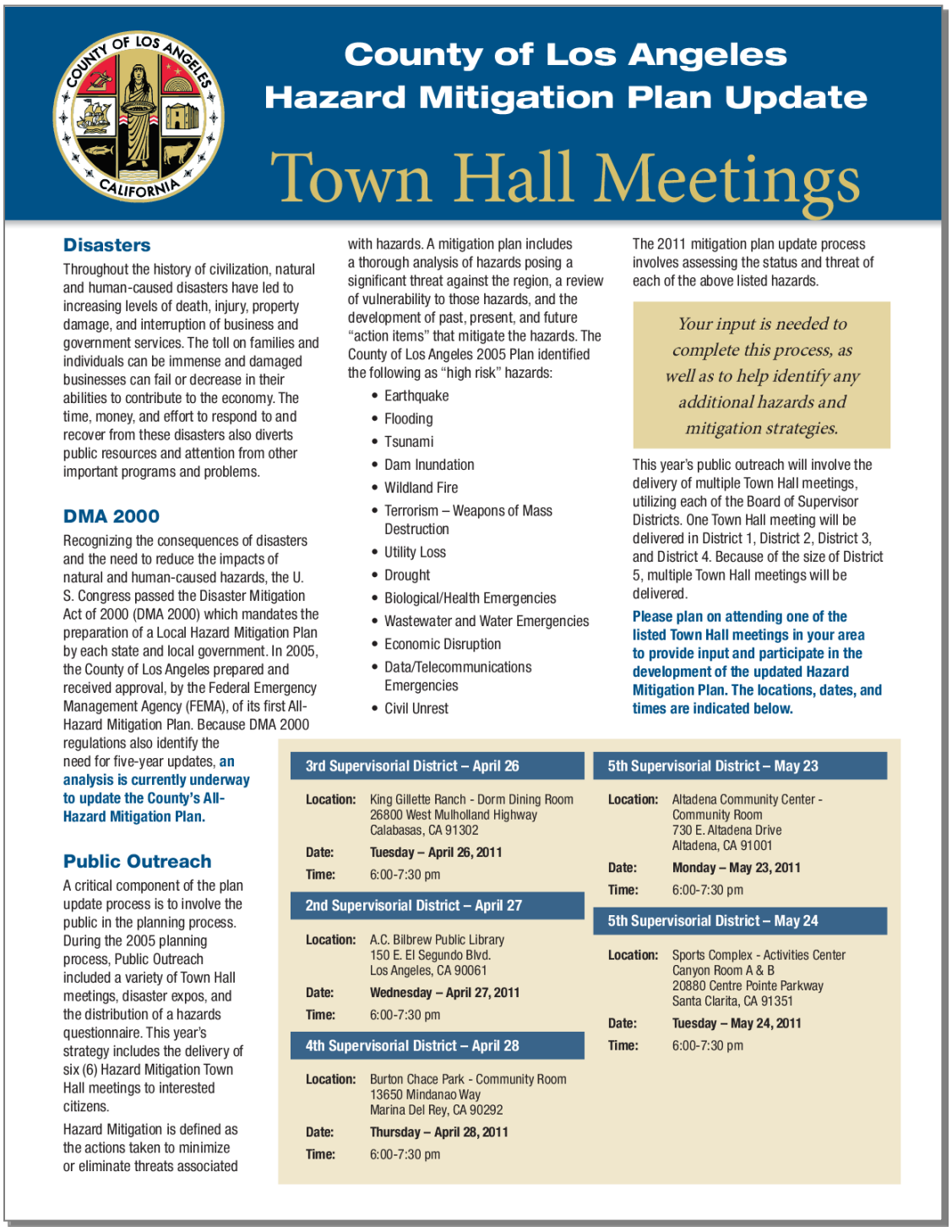
Hazard Mitigation Planning Public Participation Website Announcement

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
ELEMENT A: PLANNING PROCESS | A3
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))



Town Hall Invitation

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))



County of Los Angeles Hazard Mitigation Plan Update

Town Hall Meetings

Disasters

Throughout the history of civilization, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense and damaged businesses can fail or decrease in their abilities to contribute to the economy. The time, money, and effort to respond to and recover from these disasters also diverts public resources and attention from other important programs and problems.

DMA 2000

Recognizing the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards, the U. S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) which mandates the preparation of a Local Hazard Mitigation Plan by each state and local government. In 2005, the County of Los Angeles prepared and received approval, by the Federal Emergency Management Agency (FEMA), of its first All-Hazard Mitigation Plan. Because DMA 2000 regulations also identify the need for five-year updates, **an analysis is currently underway to update the County's All-Hazard Mitigation Plan.**

Public Outreach

A critical component of the plan update process is to involve the public in the planning process. During the 2005 planning process, Public Outreach included a variety of Town Hall meetings, disaster expos, and the distribution of a hazards questionnaire. This year's strategy includes the delivery of six (6) Hazard Mitigation Town Hall meetings to interested citizens.

Hazard Mitigation is defined as the actions taken to minimize or eliminate threats associated with hazards. A mitigation plan includes a thorough analysis of hazards posing a significant threat against the region, a review of vulnerability to those hazards, and the development of past, present, and future "action items" that mitigate the hazards. The County of Los Angeles 2005 Plan identified the following as "high risk" hazards:

- Earthquake
- Flooding
- Tsunami
- Dam Inundation
- Wildland Fire
- Terrorism – Weapons of Mass Destruction
- Utility Loss
- Drought
- Biological/Health Emergencies
- Wastewater and Water Emergencies
- Economic Disruption
- Data/Telecommunications Emergencies
- Civil Unrest

The 2011 mitigation plan update process involves assessing the status and threat of each of the above listed hazards.

Your input is needed to complete this process, as well as to help identify any additional hazards and mitigation strategies.

This year's public outreach will involve the delivery of multiple Town Hall meetings, utilizing each of the Board of Supervisor Districts. One Town Hall meeting will be delivered in District 1, District 2, District 3, and District 4. Because of the size of District 5, multiple Town Hall meetings will be delivered.

Please plan on attending one of the listed Town Hall meetings in your area to provide input and participate in the development of the updated Hazard Mitigation Plan. The locations, dates, and times are indicated below.

3rd Supervisorial District – April 26

Location: King Gillette Ranch - Dorm Dining Room
26800 West Mulholland Highway
Calabasas, CA 91302
Date: **Tuesday – April 26, 2011**
Time: 6:00-7:30 pm

2nd Supervisorial District – April 27

Location: A.C. Bilbrew Public Library
150 E. El Segundo Blvd.
Los Angeles, CA 90061
Date: **Wednesday – April 27, 2011**
Time: 6:00-7:30 pm

4th Supervisorial District – April 28

Location: Burton Chace Park - Community Room
13650 Mindanao Way
Marina Del Rey, CA 90292
Date: **Thursday – April 28, 2011**
Time: 6:00-7:30 pm

5th Supervisorial District – May 23

Location: Altadena Community Center - Community Room
730 E. Altadena Drive
Altadena, CA 91001
Date: **Monday – May 23, 2011**
Time: 6:00-7:30 pm

5th Supervisorial District – May 24

Location: Sports Complex - Activities Center
Canyon Room A & B
20880 Centre Pointe Parkway
Santa Clarita, CA 91351
Date: **Tuesday – May 24, 2011**
Time: 6:00-7:30 pm

Town Hall Meeting Sign-in Sheets

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: *Diamond X Ranch* at King Gillette Ranch
Time: 6:00 pm – 7:30 pm Date: Tuesday, April 26, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL
SUTTER	RUSSELL	WILLDAN	714 940-6370	RSUTTER@WILLDAN.COM
TANE	LELAND	CHP WEST VALLEY	(818) 888-0980	LTANE@CHP CA.GOV,
DAVIS	BRAD	CITY OF MALIBU	310.456-2489	BDAVIS@MALIBUCITY.ORG

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1 of 5

Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: *Diamond X Ranch* at King Gillette Ranch
Time: 6:00 pm – 7:30 pm Date: Tuesday, April 26, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL
HARSHMAN	CAROLYN	EMERGENCY PLANNING CONSULTANTS	858-483-4626	ETC@PACBELL.NET
YOUNG	WALT	25345 MULHEAU RD HIDDEN HILLS, CA 91302	(310)985-5231	WALT.YOUNG@MICA.CA.GOV
PERSHING	Timothy	26600 Agoura RD. 3RD BOS	8-880-9416	Tpershing@Bos.LaCounty.gov
Goldfarb	Rebecca		310-804-1983	rebecca.goldfarb@verizon.net
FORD	David		818-585-9149	David.A.Ford@sce.com

Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update

Town Hall Meeting

Location: A.C. Bilbrew Public Library

Time: 6:00 pm – 7:30 pm Date: Wednesday, April 27, 2011

attendees

LAST	FIRST	ADDRESS	PHONE	EMAIL

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1 of 5

Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update

Town Hall Meeting

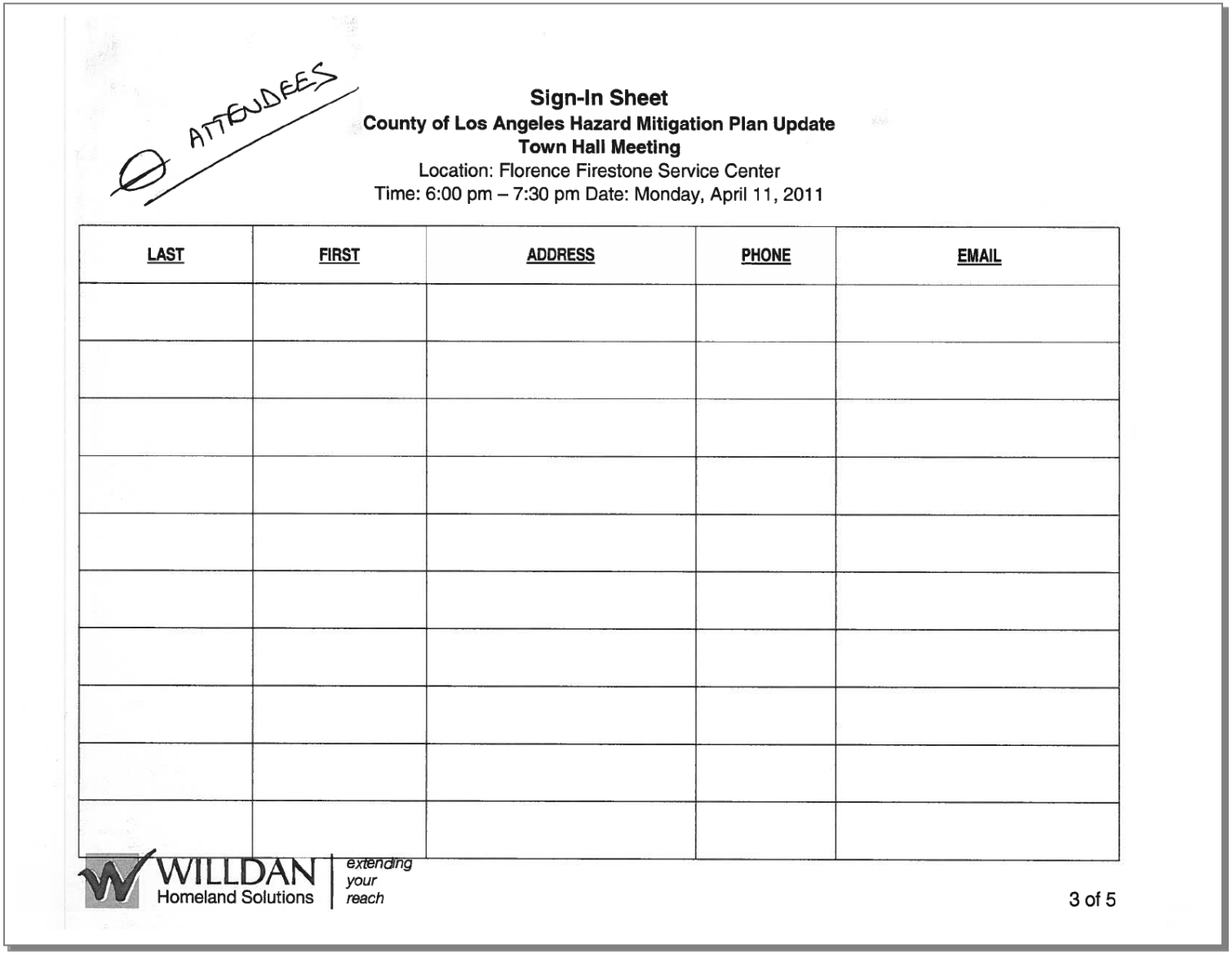
Location: ~~A.C. Bilbrew Public Library~~ Burton Chace Park

Time: 6:00 pm – 7:30 pm Date: Thursday, April 28, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL
SUTTER	RUSSELL	WILLDAN	(714) 940-6370	RSUTTER@WILLDAN

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3 of 5



0 ATTENDEES

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: Florence Firestone Service Center
Time: 6:00 pm – 7:30 pm Date: Monday, April 11, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL

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3 of 5



Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: Larry Chimbole Cultural Center
Time: 6:00 pm – 7:30 pm Date: Tuesday, April 12, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL
WEATHERBIE	LORI	9950 CIMA MESA RD JUNIPER HILLS	661-944-1331	MIKEW@GNET.COM
HARSHMAN	CAROLYN	EMERGENCY PLANNING CONSULTANTS	858-483-4626	EPC@TIMEREL.NET
Bunge	Nell	48303 20TH ST W SP50 LANCASTER	948-1323	nellbunge@msn.com
COSNEY	JOE	48303 20TH ST W #204 LANCASTER	661 723-7822	joshc204@aol.com
Anderson	Dennis	17404 Sierra Hwy	661-267-2708	danderson6@yahoo.com

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1 of 5

Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: Larry Chimbole Cultural Center
Time: 6:00 pm – 7:30 pm Date: Tuesday, April 12, 2011

LAST	FIRST	ADDRESS	PHONE	EMAIL
Vegos	Tamara	10820 Cima Mesa LITTLEROCK	9441262	cvths@antelecom.net
WHISLER	LYNN	29828 104th ST E	944-1883	whisle49@aol.com
HOLMES	DAMON	1233 RANCHO VISTA BL SUITE #900, PALMDALE 93551	213-570-3999	DAMON HOLMES@FOREST CITY.NET

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: Altadena Community Center—Community Room
730 E. Altadena Drive Altadena, CA 91001
Time: 6:00-7:30 PM Date: Monday, May 23, 2011

LAST	FIRST	~~DEPARTMENT & TITLE~~ ADDRESS	PHONE	EMAIL
SEITZ	CAROLYN	PO BOX 265 ALTADENA 91003-0265	626 3451033	cmseitz@mindspring.com
Vinci	Margaret	375 San Pedro Pl. Pasadena		mvinci@gps.caltech.edu
Diamond	Dick	937 12th St.	213 627-6148	
BENTON	BARBARA	3208 CRESTFORD DR. (6)	794268	
Zack	Michele	2485 Maneuso	626/798-9687	
Rundberg	Holly	3504 McNally Ave	626-296-8449	hollyrundberg@sbcglobal.net

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: Altadena Community Center—Community Room
730 E. Altadena Drive Altadena, CA 91001
Time: 6:00-7:30 PM Date: Monday, May 23, 2011

LAST	FIRST	~~DEPARTMENT & TITLE~~ ADDRESS	PHONE	EMAIL
Weissman	Brittney	927 Waldo Ave Pasadena, CA 91101	818 687-6057	bweissman@ph.lacounty.gov
Buennagel	Al + Jean			
Comfort	Melody	2405 ~~Santa~~ Rosa	(626) 791-	comfortcottage2405@yahoo.com
Comfort	Dale	Altadena, CA 91001	1446	
Marsh	Jutti	NE Los Angeles	323-893-5033	juttimarsh@earthlink.net

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Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update

Town Hall Meeting

Location: George A. Caravalho Santa Clarita Sports Complex—Activities Center
Canyon Room A & B, 20880 Centre Pointe Parkway Santa Clarita, CA 91351
Time: 6:00-7:30 PM Date: Tuesday, May 24, 2011

LAST	FIRST	~~DEPARTMENT & TITLE~~ HOME ADDRESS	PHONE	EMAIL
LARGE	BOB	PO BOX 949 LAKE HUGHES 93532	724-0150	CEDAR91@VERIZON.NET

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Town Hall Meeting
Location: George A. Caravalho Santa Clarita Sports Complex–Activities Center
Canyon Room A & B, 20880 Centre Pointe Parkway Santa Clarita, CA 91351
Time: 6:00-7:30 PM Date: Tuesday, May 24, 2011

Home Address

LAST	FIRST	~~DEPARTMENT & TITLE~~	PHONE	EMAIL
Elliott	William	President Leona Valley Town Council	661-270-9017	William.Elliott@lmco.com

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Special District Invitation

ELEMENT A: PLANNING PROCESS | A1

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

County of Los Angeles Hazard Mitigation Plan Update

Special District Workshops

Disasters

Throughout the history of civilization, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense and damaged businesses can fail or decrease in their abilities to contribute to the economy. The time, money, and effort to respond to and recover from these disasters also diverts public resources and attention from other important programs and problems.

DMA 2000

Recognizing the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards, the U. S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) which mandates the preparation of a Local Hazard Mitigation Plan by each state and local government. In 2005, the County of Los Angeles prepared and received approval, by the Federal Emergency Management Agency (FEMA), of its first All-Hazard Mitigation Plan. Because DMA 2000 regulations also identify the need for five-year updates, **an analysis is currently underway to update the County's All-Hazard Mitigation Plan.**

Special District Involvement

A critical component of the plan update process is to involve the public in the planning process. During the 2005 planning process, three hazard mitigation workshops were conducted for representatives from City governments. Since most of the cities now have their own mitigation plans, this year's strategy is to deliver six (6) Hazard Mitigation Workshops to Special District representatives.

Hazard Mitigation is defined as the actions taken to minimize or eliminate threats associated with hazards. A mitigation plan includes a thorough analysis of hazards posing a significant threat against the region, a review of vulnerability to those hazards, and the development of past, present, and future "action items" that mitigate the hazards. The County of Los Angeles 2005 Plan identified the following as "high risk" hazards:

- Earthquake
- Flooding
- Tsunami
- Dam Inundation
- Wildland Fire
- Terrorism – Weapons of Mass Destruction
- Utility Loss
- Drought
- Biological/Health Emergencies
- Wastewater and Water Emergencies
- Economic Disruption
- Data/Telecommunications Emergencies
- Civil Unrest

The 2011 mitigation plan update process involves assessing the status and threat of each of the above listed hazards.

Your agency's input is needed to complete this process, as well as to help identify any additional hazards and mitigation strategies.

This year's outreach will involve the delivery of multiple Hazard Mitigation Workshops, utilizing each of the Board of Supervisor Districts. One Hazard Mitigation Workshop will be delivered in District 1, District 2, District 3, and District 4. Because of the size of District 5, multiple Hazard Mitigation Workshops will be delivered.

Please plan on attending one of the listed Hazard Mitigation Workshops in your area, to provide input and participate in the development of the updated Hazard Mitigation Plan. The locations, dates, and times are indicated below

3rd Supervisorial District – April 26

Location: King Gillette Ranch - Dorm Dining Room
26800 West Mulholland Highway
Calabasas, CA 91302

Date: **Tuesday – April 26, 2011**

Time: 2:30-4:00 pm

2nd Supervisorial District – April 27

Location: A.C. Bilbrew Public Library
150 E. El Segundo Blvd.
Los Angeles, CA 90061

Date: **Wednesday – April 27, 2011**

Time: 2:30-4:00 pm

4th Supervisorial District – April 28

Location: Burton Chace Park - Community Room
13650 Mindanao Way
Marina Del Rey, CA 90292

Date: **Thursday – April 28, 2011**

Time: 2:30-4:00 pm

5th Supervisorial District – May 23

Location: Altadena Community Center - Community Room
730 E. Altadena Drive
Altadena, CA 91001

Date: **Monday – May 23, 2011**

Time: 2:30-4:00 pm

5th Supervisorial District – May 24

Location: Sports Complex - Activities Center
Canyon Room A & B
20880 Centre Pointe Parkway
Santa Clarita, CA 91351

Date: **Tuesday – May 24, 2011**

Time: 2:30-4:00 pm

Special District Invitee List

ELEMENT A: PLANNING PROCESS | A2

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

ABC Unified School District
Acton–Agua Dulce Unified School District
Alhambra Unified School District
Altadena Library District
Antelope Valley East Kern Water Agency
Antelope Valley Health Care District
Antelope Valley Mosquito Vector Control District
Antelope Valley Union High School District
Arcadia Unified School District
Artesia Cemetery District
Athens-Woodcrest-Olivita Garbage Disposal District
Azusa Unified School District
Baldwin Park Unified School District
Bassett Unified School District
Beach Cities Health Care District
Bellflower Unified School District
Belvedere Garbage Disposal District
Beverly Hills Unified School District
Bonita Unified School District
Bradbury Estates Community Services District
Burbank Unified School District
Calabasas School District
California American Water Co.
CalPoly Pomona Police Department
Castaic Union School District
Centinela Valley Union High School District
Charter Oak Unified School District
Cities-Special Library Tax District
Claremont Unified School District
Compton Creek Mosquito Abatement District
Compton School Police
Compton Unified School District
Covina Valley Unified School District
Culver City Unified School District
Downey Cemetery District
Downey Unified School District
Duarte Unified School District
East Whittier City School District
Eastside Union School District
El Monte City School District
El Monte Union High School District
El Rancho Unified School District
El Segundo Unified School District
Firestone Garbage Disposal District
Garvey School District

Glendale Unified School District
Glendora Unified School District
Gorman Joint School District
Greater Los Angeles County Vector Control District
Hacienda La Puente Unified School District
Hawthorne School District
Hermosa Beach City School District
Inglewood Unified School District
Keppel Union School District
La Cañada Unified School District
Lancaster Cemetery District
Lancaster School District
Las Virgenes Unified School District
Lawndale School District
Lennox Garbage Disposal District
Lennox School District
Little Lake Cemetery District
Little Lake City School District
Long Beach Unified School District
Los Angeles County Metropolitan Transportation Authority
Los Angeles County Office of Education
Los Angeles County West Vector Control District
Los Angeles Department of Water and Power
Los Angeles Unified School District
Los Nietos School District
Lowell Joint School District
Lynwood Unified School District
Malibu Garbage Disposal District
Malibu Mesa Community Service District
Manhattan Beach Unified School District
Mesa Heights Garbage Disposal District
Miraleste Recreation and Park District
Monrovia Unified School District
Montebello Unified School District
Montrey Unified School District
Mountain View School District (Los Angeles County)
Newhall School District
Norwalk La Mirada Unified School District
Palmdale School District
Palos Verdes Area Unified School District
Palos Verdes Library District
Palos Verdes Peninsula Unified School District
Paramount Unified School District
Pasadena Unified School District
Point Dume Community Services District
Pomona Unified School District
Redondo Beach Unified School District
Resource Conservation District
Ridgecrest Ranchos Recreation and Park District
Rosemead School District
Rowland Unified School District
San Gabriel County Water District
San Gabriel Unified School District
San Gabriel Valley Mosquito Abatement District

San Gabriel Valley Municipal Water District
San Marino Unified School District
Sanitation Districts
Santa Monica Mountains Resource Conservation District
Santa Monica-Malibu Unified School District
Sativa-Los Angeles County Water District
Saugus Union School District
So. Cal Edison
South Montebello Irrigation District
South Pasadena Unified School District
South Whittier School District
Southern California Gas Co.
Sativa-Los Angeles County Water District
Sulphur Springs School District
Temple City Unified School District
Three Valleys Municipal Water District
Torrance Unified School District
Upper San Gabriel Valley Municipal Water District
Valley County Water District
Walnut Park Garbage Disposal District
Walnut Valley Unified School District
Walnut Valley Water District
Water Replenishment District of Southern California
West Basin Municipal Water District
West Covina Unified School District
West Valley County Water District
Westfield Recreation and Park District
Westside Union School District
Whittier City School District
Whittier Union High School District
William S. Hart Union High School District
Wiseburn School District

Special District Workshop Sign-in Sheets

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: *Diamond X Ranch* at King Gillette Ranch
Time: 2:30 pm – 4:00 pm Date: Thursday, April 26, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Curtis	Whitney	WILLDAN	(714) 264-2530	wcurtis@willdan.com
Danaei	Shawn	Public Works	(310) 779-0863	sdanaei@dpw.lacounty.gov
Brant	Rhonda	LVUSD	818-853-5535	rbrant@lvusd.org
Overton	Rob	Pepperdine Univ.	310-506-4397	robert.overton@pepperdine.edu
Hartman	Carolyn	EPC	858-483-4625	EPC@pacbell.net

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3 of 5

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: *Diamond X Ranch* at King Gillette Ranch
Time: 2:30 pm – 4:00 pm Date: Thursday, April 26, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Sutter	Russell	WILLDAN - Corps	714 940-6370	RSutter@WILLDAN.com
Lippman	David	Las Virgenes MWD	818 2512100	dlippman@lvmwd.com
Dingman	Brett	LVMWD	818 251-2330	bdingman@LVMWD.com
Weber	Jon	Pepperdine	310 506 4996	jonathan.weber@pepperdine.edu
Cosentino	Lauren	Pepperdine	310-506 6244	lauren.cosentino@pepperdine.edu
Grycan	Maria	LACoFD	310 456-7123	mgrycan@fire.lacounty.gov
Counter	Yvette	OEM	323 980-2253	yCounter@CEDOEM.LACounty.gov

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: A.C. Bilbrew Public Library
Time: 2:30 pm – 4:00 pm Date: Wednesday, April 27, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Edmonds	Larry	LA County DCFS	213 351-5536	
Sutter	Russell	Willdan	714 940-6370	RSutter@willdan.com
Bagmanian	Angela	LA County CSS	310	ABagmanian@css.lacounty.gov
Orta	Enrique	LA County Dept. Parks+Rec	(213) 738-3011	eorta@parks.lacounty.gov
Hamilton	Sandi	LA County CSS	310 217-5650	shamilton@css.lacounty.gov
Jones	Carl	LA County SDA	2137749342	cjg@gmail.com
Harshman	Carolyn	EPC	858 483-4626	EPC@pacbell.net
Guidry	Valerie	Community	323 754-2087	valguidry22@gmail
Russell	Anne	Regional Planning	213/974-6417	arussell@planning.lacounty.gov

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2 of 5

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: A.C. Bilbrew Public Library
Time: 2:30 pm – 4:00 pm Date: Wednesday, April 27, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Curtis	whitney	Willdan Homeland	714 864 2530	wcurtis@willdan.com
Counter	Hyette	OEM	323 980 2253	HCounter@lacoem.com
Chan	Debora	Lawndale Elementary School District	310-973-1300 ext 1297	Debora_Chan@lawndale.k12.ca.us
Gonzalez	Sandra	CSS/East rancho dominguez	310 603 7401	
RGuiday	JOSEPH			
Fisher	Ron	Second District	(323) 586-6523	rfisher@bos.lacounty.gov
~~Gray~~ Robinson	Gray	CSS/Florence Firestone Community Center	(323) 586-6502	grobinson@css.lacounty.gov
Weathersby	Deborah	Probation	323 586-6401	Deboral.weathersby@lacounty.gov
Burton	Susan	A New Way of Life	323 563-3575	
DRAPER	S.	GARDNER HOUSE	323 833 3126	

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Burton Chace Park Community Room
Time: 2:30 pm – 4:00 pm Date: Thursday, April 28, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
SUTTER	RUSSELL	WILLDAN	(714) 940-6370	RSUTTER@WILLDAN.COM
HARSHMAN	CAROLYN	EPC	858 483-4626	EPC@PACBELL.NET

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Burton Chace Park Community Room
Time: 2:30 pm – 4:00 pm Date: Thursday, April 28, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Harkins	Brandy	Beach Cities Health District	310 374 3426 x120	brandy.harkins@bchd.org

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Florence Firestone Service Center
Time: 2:30 pm – 4:00 pm Date: Monday, April 11, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Lun	Khai	Los Angeles County Sanitation Districts	562-908-4288	KLun@lacsd.org

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1 of 5

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Larry Chimbole Cultural Center
Time: 2:30 pm – 4:00 pm Date: Tuesday, April 12, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
Counter	Yvette	LACO/OEM	323 980-2253	ycounter@CEOOEM.lacounty.gov
FEITMAN	KAMIKA	AVH	661 949 5565	DAMIS.FEITMAN@AVHOSPITAL.org
Merrill	Kenneth	USAF ASC DET 1/ATO-EM	661 272-6721	Kenneth.merrill@edwards.af.mil
HATUSHMAN	CAROLYN	EMERGENCY PLANNING CONSULTANTS	858 483-4626	EPC@PACBELL.NET
JOHNSON	MARILYN	AVUHSD	661 - 948-7655	- Filling in for Jan Umedema jmedema@avhsd.org
MCKAUGHAN	Chuck	D. of the AIR FORCE Plant 42	661 456 2365	charles.mckaughan@edwards.af.mil
Heffernan	Chuck	City of Palmdale PW	661 267-5300	cheffernan@cityofpalmdale.org
Hughes	TIM	AIRFORCE PLANT 42 ASC DET 1	661 - 272 - 6759	timothy.hughes@edwards.af.mil
KAPELLA	BILL	LOCKHEED	661 572 2230	BILL.KAPELLA@LMCO.COM

Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Larry Chimbole Cultural Center
Time: 2:30 pm – 4:00 pm Date: Tuesday, April 12, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
SUTTER	RUSSELL	WILLDAN	714 940-6370	RSUTTER@WILLDAN..COM
Curtis	Whitney	willdan	714 864.2530	wcurtis@willdan.com
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JEFFERSON	KERRY	VEOLIA TRANSPORTATION	(661) 729-2247	KJEFFERSON@VEOLIATRANS

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1 of 5

Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update

Special District Workshop

Location: Larry Chimbole Cultural Center

Time: 2:30 pm – 4:00 pm Date: Tuesday, April 12, 2011

LAST	FIRST	DEPARTMENT/AGENCY	PHONE	EMAIL
AMBROSE	ANNE	CITY OF PALMDALE	661-267-5181	aambrose@cityofpalmdale.org

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Sign-In Sheet

County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: Altadena Community Center—Community Room
730 E. Altadena Drive Altadena, CA 91001
Time: 2:30-4:00 PM Date: Monday, May 23, 2011

ATTENDEES

LAST	FIRST	DEPARTMENT & TITLE	PHONE	EMAIL

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Sign-In Sheet
County of Los Angeles Hazard Mitigation Plan Update
Special District Workshop
Location: George A. Caravalho Santa Clarita Sports Complex—Activities Center
Canyon Room A & B, 20880 Centre Pointe Parkway Santa Clarita, CA 91351
Time: 2:30-4:00 PM Date: Tuesday, May 24, 2011

LAST	FIRST	DEPARTMENT & TITLE	PHONE	EMAIL
Carpenter	Kathy	Antelope Valley Surgery Center QA/PACU charge Nurse	(661)940-1112	kathleena.carpenter@scasurgery.com
Dean	Brandon	LAC DPH Em. Prep & Response	323 820 8773	bdean@ph.lacounty.gov
DIAS	CAROLYN	Palmdale School Dist	661 266 7294	csdias@palmdalesd.org
Atilano	Elizabeth	Ins Assc R.S.K.mgmt/Ins Broker	661-948-5041	eatilano@insuranceassc.com
NUZZI	Donna	City of Santa Clarita	661-250-372	dnuzzi@santaclarita.com
~~Elliott~~	~~William~~	~~President Lebec Valley Jc~~	~~661 [illegible]~~	~~william.elliott@lusd.com~~
~~ELLIOTT~~	~~PAMELA~~		~~(661) 270-9017~~	~~PAMELA@LESTELLEDERAL.COM~~

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Board of Supervisors Letter of Promulgation

ELEMENT E: PLAN ADOPTION | E1
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

LETTER OF PROMULGATION

TO: OFFICIALS, EMPLOYEES, AND RESIDENTS OF LOS ANGELES COUNTY

Preservation of life and property is an inherent responsibility of local, State, and Federal government. The County of Los Angeles developed this All-Hazard Mitigation Plan to cover mitigation responsibilities of County departments as well as the unincorporated communities. The Hazard Mitigation Plan ensures the most effective allocation of resources for the maximum benefit and protection of the public in time of emergency.

While no plan can guarantee prevention of death and destruction, well-developed plans, carried out by knowledgeable and well-trained personnel, can minimize losses. The Hazard Mitigation Plan establishes the County's emergency policies and procedures in the event of a disaster. Because of the complex array of local governments, the plan could not reasonably address mitigation planning for each of the 88 cities, 94 school districts and over 100 other special districts covered by the law. The plan addresses all major natural, human-caused and technological disasters that fall within the responsibilities of County-owned and operated department facilities. Sheriff, Fire Department and Public Works provide contracted services to many of the 88 cities in Los Angeles County. Each of the individual cities and special districts are responsible for completion of their own mitigation plans.

The All-Hazard Mitigation Plan conforms to the requirements of FEMA Disaster Mitigation Act of 2000. FEMA published their requirements for all future hazard mitigation planning in February 2002. The State of California implemented the program in California in the summer and fall of 2003 with guidelines and training sessions. The law requires extensive documentation of the community, the region, its hazards, history and future plans.

The Los Angeles County Board of Supervisors gives its full support to the All-Hazard Mitigation Plan and urges all officials, employees, and residents, individually and collectively, to share in our commitment to the effective preparedness and response to disasters.

This letter promulgates the All-Hazard Mitigation Plan which becomes effective upon approval by the Los Angeles County Board of Supervisors.

Signed _____ Date: 2/24/14

Don Knabe, Chair
Los Angeles County Board of Supervisors

Emergency Management Council Approval

APPROVAL BY THE COUNTY OF LOS ANGELES EMERGENCY MANAGEMENT COUNCIL

The County of Los Angeles Emergency Management Council, created by Section 2.68.160 of the Emergency Ordinance, and comprised of key County departments, is responsible for overseeing the preparedness activities of County departments. This includes preparation of plans, emergency and disaster-related training of County employees, and related emergency preparedness activities.

The EMC has reviewed and approved the All-Hazard Mitigation Plan. Revisions to the All-Hazard Mitigation Plan will be submitted to the EMC for approval.

Signed _____ Date: 7/13/14

William T. Fujioka
Chief Executive Officer
Chairman, Emergency Management Council

FEMA Letter of Conditional Approval

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

November 20, 2013

Yvette Countee
Project Manager
Office of Emergency Management
1275 North Eastern Avenue
Los Angeles, CA 90022

Dear Ms. Countee:

We have completed our review of the *County of Los Angeles All-Hazard Mitigation Plan*, and have determined that this plan is eligible for final approval pending its adoption by the County of Los Angeles.

Formal adoption documentation must be submitted to the Regional office by the Jurisdiction within one calendar year of the date of this letter, or the entire plan must be updated and resubmitted for review. We will approve the plan upon receipt of the documentation of formal adoption.

If you have any questions regarding the planning or review processes, please contact Juliette Hayes, Community Planner at (510) 627-7211, or by email at juliette.hayes@fema.dhs.gov.

Sincerely,

Sally Ziolkowski, Director
Mitigation Division

cc: Kirby Everhart, California State Hazard Mitigation Officer
Jose Lara, State of California, Mitigation Planning

www.fema.gov

FEMA Letter of Final Approval

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

March 3, 2014

Yvette Countee
Project Manager
Office of Emergency Management
1275 North Eastern Avenue
Los Angeles, CA 90022

Dear Ms. Countee:

We have completed our final review of the *County of Los Angeles All-Hazard Mitigation Plan*, officially adopted by the Board of Supervisors of the County of Los Angeles on February 24, 2014, and found the plan to be in conformance with Title 44 Code of Federal Regulations (CFR) Part 201.6 *Local Mitigation Plans.*

The approval of this plan ensures Los Angeles County continued eligibility for project grants under FEMA's hazard mitigation assistance programs, including Hazard Mitigation Grant Program, Pre-Disaster Mitigation and Flood Mitigation Assistance grant programs. All requests for funding, however, will be evaluated individually according to the specific eligibility, and other requirements of the particular program under which applications are submitted. Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at *www.fema.gov/business/nfip/crs.shtm* or through your local floodplain manager.

FEMA's approval of the *County of Los Angeles All-Hazard Mitigation Plan* is for a period of five years, effective starting the date of this letter. Prior to March 3, 2019, Los Angeles County is required to review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval in order to continue to be eligible for mitigation project grant funding. The enclosed plan review tool provides additional recommendations to incorporate into the plan when Los Angeles County undertakes its identified plan maintenance process.

If you have any questions regarding the planning or review processes, please contact Juliette Hayes, Community Planner at (510) 627-7211, or by email at juliette.hayes@fema.dhs.gov.

Sincerely,

Sally Ziolkowski, Director
Mitigation Division

Enclosure

cc: Kirby Everhart, California State Hazard Mitigation Officer
Jose Lara, Cal OES, Chief

www.fema.gov

Section 3:

Community Profile

Table of Contents

Section 3 – Community Profile 1

Why Plan for Hazards in the County of Los Angeles? 1

History 1

Gold Rush and Growth 2

Incorporation 2

Immigrants 2

Ethnic Influences 3

Railroads and Growth 3

Black Gold 3

Agriculture 4

Harbors and Trade 5

Motion Pictures and Television 5

Public Works Projects 5

Geology and Hydrology 6

Geology 6

Topography 10

Water Resources 11

Water Sources 11

Major Surface Water 11

Groundwater 12

Recycled Water 12

Watersheds 12

Watershed Management 12

Hillside Regulation 13

Redevelopment 15

Mineral and Energy Resources 16
Oil and Natural Gas Resources *16*
Energy Resources *16*
General Data 18
Municipal Governments (Incorporated Cities) 20
General Population 22
State and Local Stakeholders *27*
Public and Community Stakeholders *27*
Transportation 30
Major Transportation Routes *32*
Railways *34*
Metrolink *36*
Airports *39*
Mass Transit *40*
Metropolitan Transit Authority (MTA) Light Rail Lines 41
Ports and Harbors 43
Ports, Harbors, and Piers, Los Angeles County *43*
Climate 46
Local Meteorology *46*
Snow in Los Angeles County *49*
The Warming of Los Angeles *50*
Rainfall Record *50*
Seasonal Extremes *50*
Agriculture 51
Environmental Management 54
Los Angeles County Sanitation Districts *54*
Wastewater Management System *55*

Outlying Systems 56

Solid Waste Management System 55

Energizing Southern California through Recovery Facilities 58

Recycling and Materials Recovery/Transfer Facilities 58

Tracking the Future with Waste-By-Rail 59

Energy Recovery 60

Energy Efficiency in Wastewater 60

Unincorporated Areas 61

Administrative Body 63

County of Los Angeles Planning Areas 68

Antelope Valley Planning Area 68

Coastal Islands Planning Area 71

East San Gabriel Valley Planning Area 73

Gateway Planning Area 75

Metro Planning Area 77

San Fernando Valley Planning Area 81

Santa Clarita Valley Planning Area 83

Population and Demographics 89

Santa Monica Mountains Planning Area 85

South Bay Planning Area 87

West San Gabriel Valley Planning Area 90

Westside Planning Area 93

Existing Land Use Development 95

Capability Assessment 101

Department of Public Works (DPW) Contracted Services 101

Benefit-cost Review 103

Existing Institutions, Plans, Policies, and Ordinances 103

Administrative and Technical Capacity *104*

Legal and Regulatory Capability *104*

Fiscal Resources *105*

Emergency Responsibilities **143**

Internal Services Department *143*

Administration and Finance Service (AFS) *143*

Facilities Operations Services (FOS) *143*

Information Technology Services (ITS) *143*

Purchasing and Central Services (P&CS) *144*

Emergency Responsibilities *144*

Disaster Management Areas **145**

Health Care **149**

Hospitals *149*

Section 3 – Community Profile

Why Plan for Hazards in the County of Los Angeles?

Hazards affect residents, businesses, property, the environment, and the economy of Los Angeles County. Earthquake, flood/storm, wildfire/urban fire, landslide, dam failure, windstorm, terrorism, drought, and technological and human-caused hazards have exposed Los Angeles County to the financial and emotional costs of recovering after disasters, whether natural, technological, or human-caused. The risk associated with hazards increases as more people move into areas affected by hazards.

The inevitability of hazards, and the growing population and activity within the county, create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying the risks posed by hazards, and developing strategies to reduce the impact of a hazard event, can assist in protecting the life and property of citizens and communities. Local residents and businesses can work together with the county to create a hazard mitigation plan that addresses the potential impacts of hazard events.

History

The area comprising present-day Los Angeles County was first settled by small groups of Native Americans for centuries before the first European contact in 1769 when Gaspar de Portola and a group of missionaries camped on what is now the banks of the Los Angeles River.

In September 1771, Father Junipero Serra and a group of Spaniards founded the San Gabriel Mission as the center of the first “community” in an area inhabited by small bands of Gabrielino Indians. Ten years later the Pobladores, a group of 11 families recruited from Mexico by Capt. Rivera y Moncada, traveled from the San Gabriel Mission to a spot selected by Alta California Gov. Felipe de Neve to establish a new pueblo. The settlement was named El Pueblo de la Reyna de Los Angeles (The Pueblo of the Queen of the Angels). In its early years, the town was a small, isolated cluster of adobe-brick houses and random streets carved out of the desert, and its main product was grain. Over time, the area became known as the Ciudad de Los Angeles, “City of Angels.”

In September 1797, the Franciscan monks established the San Fernando Mission Rey de Espana in the northern San Fernando Valley.

Although the Spanish government placed a ban on trading with foreign ships, American vessels began arriving in the early 1800s, and the first English-speaking inhabitant settled in the area in 1818. He was a carpenter named Joseph Chapman, who helped build the church facing the town’s central plaza, a structure that still stands. California was ruled by Spain until 1822, when Mexico assumed jurisdiction. As a result, trade with the United States became more frequent. The ocean waters off the coast of California were important for whaling and seal hunting, and a number of trading ships docked at nearby San Pedro to buy cattle hides and tallow. By the 1840s, Los Angeles was the largest town in Southern California.

After a two-year period of hostilities with Mexico beginning in 1846, the area came under U.S. control. The Treaty of Cahuenga, signed in 1847, ended the war in California, followed by the Treaty of Guadalupe Hidalgo in 1848 adding Los Angeles and the rest of California to American territory.

Gold Rush and Growth

The annexation of California and the discovery of gold brought adventurers and immigrants alike by the thousands to the West with dreams of "hitting pay dirt." Contrary to popular belief, California's Gold Rush began in the hills southwest of the Antelope Valley in 1842, when Francisco Lopez, stopping for lunch while searching for stray cattle, pulled some wild onions and found flakes of gold clinging to their roots. The canyon was named Placeritas, meaning "Little Placers," and today is called Placerita Canyon. Gold rushers soon flocked to the canyon and took an estimated $100,000 of gold from the region before heading north to the more exciting and well-known discovery at Sutter's Mill in 1848. A subsequent gold strike in the mountains to the north of Los Angeles provided the town with a booming market for its beef, and many prospectors settled in the area after the Gold Rush.

Mining changed the region's history in profound ways, as gold seekers settled permanently in the Antelope Valley during the 1850s and 1860s. The area further grew during the Civil War (1860-1865), as gold, silver, and copper were extracted from the Soledad Canyon region and Fremont's Pass was enlarged to facilitate and speed up ore shipments.

After the Civil War ended, there was a large immigration into the Los Angeles area. Several large Mexican ranches were divided into many small farms, and such places as Compton, Downey, Norwalk, San Fernando, Santa Monica and Pasadena sprang into existence.

During its history, the size of the County has changed substantially. Originally it was 4,340 square miles along the coast between Santa Barbara and San Diego, but grew to 34,520 square miles, sprawling east to the Colorado River. Today, with 4,084 square miles, it is slightly smaller than its original size. The County was divided up three times: Kern County received a large slice in 1851; San Bernardino County split off in 1853; and Orange County was established in 1889.

Incorporation

On Feb. 18, 1850, the County of Los Angeles was established as one of the 27 original counties, several months before California was admitted to the Union. The people of Los Angeles County on April 1, 1850 asserted their newly won right of self-government and elected a three-man Court of Sessions as their first governing body. A total of 377 votes were cast in this election. In 1852 the Legislature dissolved the Court of Sessions and created a five-member Board of Supervisors. In 1913 the citizens of Los Angeles County approved a charter recommended by a board of freeholders which gave the County greater freedom to govern itself within the framework of state law.

In 1850, Los Angeles was statutorily declared to be the county seat for the County of Los Angeles. Later that year, Los Angeles was incorporated as the County's first city; today there are 88 cities. Los Angeles had a reputation as one of the toughest towns in the West. "A murder a day" only slightly exaggerated the town's crime problems, and suspected criminals were often hanged by vigilante groups. Lawlessness reached a peak in 1871, when, after a Chinese immigrant accidentally killed a white man, an angry mob stormed into the Chinatown district, murdering 16 people. After that, civic leaders and concerned citizens began a successful campaign to bring law and order to the town.

Immigrants

Los Angeles and its surrounding territories were built by immigrants. The village of Los Angeles was a fairly cosmopolitan place early on. By the 1850s, the Spanish-speaking Californios and Indians, Anglo Americans and former slaves of African descent were joined by settlers who included English, French, Basques, Spaniards, Mexicans, Germans, and Chinese. During the late 1800s and early 20th Century, foreign immigration to Los Angeles County was varied but continued to be steady. The new immigrants arrived from Europe, Asia, and Central and South America.

Distinctive ethnic communities of Japanese, Chinese, Russians, and East European Jews had developed throughout the county by the 1930s. These ethnic influences contributed to Los Angeles' cultural, economic and social dynamism.

When the Immigration Act of 1965 opened the door to new immigrants, it initiated dramatic changes in the area. According to the U.S. Census, by 2000, 36.2 percent of the residents of Los Angeles County were foreign-born—more than triple the 11.3 percent figure of 1970.

The 2000 census showed the area was home to 4.2 million people of Latino/Hispanic origin—only Mexico City had a larger number. A survey taken by the Los Angeles Unified School District that year counted more than 130 different languages represented among school-age children. By 2000, Los Angeles became the nation's major immigrant port of entry, supplanting New York City.

Ethnic Influences

People of African descent were prominent in the first Spanish settlement of Los Angeles in 1781. Twenty-six of the 44 original settlers (pobladores) were black or mixed ancestry (mulattos). Most came from Sinaloa, Mexico, where two-thirds of the residents were people of mixed African and Spanish heritage. Pio Pico, the last Mexican governor of California, was of African-Mexican descent. The number of blacks was eclipsed by new immigrants in the early American years. Only about a dozen of the 1,600 county residents listed in the 1850 census were black. During the next 80 years the influx of blacks grew, and by 1930 Los Angeles was home to the largest black community on the Pacific Coast.

The first Chinese-Americans in the city were laborers recruited in China by Chinese contractors and unknowingly brought to Los Angeles in 1850. By 1870 their numbers grew to more than 4,000. The Chinese dominated the agricultural business as growers, vendors and market proprietors. Others worked swinging picks and shovels laying the tracks for the Southern Pacific railroad, including carving out the San Fernando railroad tunnel through the mountains. During this time the Chinese endured racial hatred due in part to intense economic rivalries with whites, which resulted in the Chinese Exclusionary Acts in the 1880s.

Mexican-Americans—people largely of mixed Spanish and Indian descent—came to Southern California under the flag of Spain, having been recruited from Sonora and Sinaloa in New Spain (Mexico) beginning in 1781. Although their numbers were small, their language and culture prevailed over those of the local Indian inhabitants. Mexico ruled California from 1822, when Mexican rebels overthrew Spanish rule, until the end of the Mexican-American War in 1848. The Mexicans remained in the majority after the war but lost political and social dominance. Their numbers increased markedly after the Mexican revolution in 1910.

Railroads and Growth

The coming of the railroads changed everything. The Southern Pacific completed its Los Angeles route in 1880, followed by the Santa Fe Railroad six years later. With a huge investment in their new coast-to-coast rail lines and large Los Angeles land holdings, the railroads set forth a long-term plan for growth. Southern California citrus farming was born. Tourism and the building of towns were promoted to attract investors, to raise land values, and to increase the value of railroad shipments.

In the late 1860s there was a population boom as the marketing to "Go West" caught on. Thousands of tourists and land speculators hurried to Los Angeles County. Lots were bought, sold and traded, and an almost instantly created industry of real estate agents transacted more value in land sales than the county's entire value of only a few years before. The boom proved to be a speculative frenzy that collapsed abruptly in 1889. Many landowners went broke.

People in vast numbers abandoned the Los Angeles area, sometimes as many as 3,000 a day. This flight prompted the creation of the chamber of commerce, which began a worldwide advertising campaign to attract new citizens.

The county as a whole, however, benefited. The build-up had created several local irrigation districts and numerous civic improvements. In addition, the Los Angeles population had increased from about 11,000 in 1880 to about 60,000 in 1890.

Black Gold

In 1850 the first salable petroleum in California was the oil found at Pico Canyon near San Fernando. But the real boom began in the 1890s, when Edward L. Doheny discovered oil at 2nd Street and Glendale Boulevard in downtown Los Angeles. His find set off a "second black gold rush" that lasted several years. Los Angeles became a center of oil production in the early 20th Century. By 1897 the area had 500 derricks, and in 1910 the area near Santa Monica Boulevard and Vermont Avenue was an unruly oil shantytown. Drilling activity in the county reached new heights in the 1920s when major finds were made in Whittier, Montebello, Compton, Torrance, and Inglewood. The largest strikes were in Huntington Beach in 1920, and Santa Fe Springs and Signal Hill in 1921. These three huge fields upset national oil prices and glutted existing storage facilities. By the turn of the century almost 1,500 oil wells operated throughout Los Angeles. Oil production has continued down to the present throughout the Los Angeles Basin; between 1952 and 1988 some 1,000 wells pumped 375 million barrels of oil from these pumps.

Agriculture

In the early 1900s, agriculture became an important part of the economy. The growth in the City of Los Angeles necessitated the annexation of the large San Fernando Valley. For about a half century between San Fernando's 1874 founding and the 1920s, the community was considered an "agricultural gem" set in the San Fernando Valley. An ample and reliable water supply was coupled with a coastal valley climate, in which the community's elevation of about 1,100 feet—along with its receiving about 12 inches of rain a year—made it ideal for growing crops.

Cattle ranching was common in the area when missionaries arrived in the late 1700s, but during the next 100 years the landscape became dotted with wheat plantings and fruit trees, whose growth was also aided by the irrigation systems in place from the mission's heyday. By the 1920s, fruit and especially citrus cultivation was San Fernando's biggest industry.

The price of land for orange and lemon groves went as high as $5,000 an acre—as much as eight times more than the cost of other land—and the city had at least four packing houses with annual shipments of nearly 500 rail cars of oranges and lemons.

Olives also flourished in the Mediterranean-like climate, and the 2,000-acre Sylmar olive grove—then the world's largest—produced 50,000 gallons of olive oil and 200,000 gallons of ripe olives. Other crops grown in the County included alfalfa, apricots, asparagus, barley, hay, beans, beets, cabbage, citrus, corn, lettuce, melons, peaches, potatoes, pumpkins, squash, tomatoes, and walnuts. The area also had excellent dairy farms, including the world's largest Guernsey herd in the 1920s. The agricultural output led to other industries such as canning companies, a fruit growers association, and fruit preservers. The agricultural land gave way to development following World War II.

Harbors and Trade

The San Pedro harbor became operational in the late 1840s and became the principal harbor for the trade in the county. The first steamer to visit San Pedro was the Goldhunter in 1849. The construction of a railroad from Los Angeles to the harbor in 1869 gave a fresh impetus to the development of agricultural resources in the county. Later in 1911 the Long Beach harbor was established and the port at San Pedro was also added to give Los Angeles a position in the international trade market.

Motion Pictures and Television

In 1853 one adobe hut stood on the site that became Hollywood. The first motion picture studio in Hollywood proper was Nestor Film Company, founded in 1911 by Al Christie for David Horsley in an old building on the southeast corner of Sunset Boulevard and Gower Street. By 1930 the motion picture industry was in full swing. The county's good weather and picturesque locals lent itself to the production of the silent films and "talkies."

In the 1950s, the advent of television led to the opening of numerous television stations. Movie attendance fell to half its previous level during this time as audiences stayed home to be entertained in their own living rooms. Hollywood's yearly output in the 1930s had averaged 750 feature films; in the 1950s it was down to about 300 and still falling, despite efforts to win back audiences by installing new stereo sound systems, building wide screens, and employing new such visual techniques as 3-D. By the early 1970s the television and movie industries became interdependent with much crossover from one medium to the other. Today, each medium has found its niche. The Hollywood film has retained its position as the ultimate entertainment, but television has become the major disseminator of popular culture. Los Angeles has remained firmly in charge of American image-making.

Large manufacturing concerns began opening factories during that time, and the need for housing created vast areas of suburban neighborhoods and the beginnings of the area's massive freeway system. The Depression and the Midwestern drought of the 1930s brought thousands of people to California looking for jobs.

Public Works Projects

In order to sustain future growth, the County needed new sources of water. The only local water in Los Angeles was the intermittent Los Angeles River and groundwater replenished by the area's minimal rain. Legitimate concerns about water supply were exploited to gain backing for a huge engineering and legal effort to bring more water to the city and allow more development.

Approximately 250 miles northeast of Los Angeles in Inyo County, near the Nevada state line, a long slender desert region known as the Owens Valley had the Owens River, a permanent stream of fresh water fed by the melted snows of the eastern Sierra Nevadas.

Sometime between 1899 and 1903, Los Angeles Times founder Harrison Gray Otis and his son-in-law successor, Harry Chandler, engaged in successful efforts at buying up cheap land on the northern outskirts of Los Angeles in the San Fernando Valley. At the same time they enlisted the help of William Mulholland, chief engineer of the Los Angeles Water Department, and J.B. Lippencott, of the United States Reclamation Service. Lippencott performed water surveys in the Owens Valley for the Reclamation Service while secretly receiving a salary from the City of Los Angeles. He succeeded in persuading Owens Valley farmers and mutual water companies to pool their interests and surrender the water rights to 200,000 acres of land to Fred Eden, Lippencott's agent and a former mayor of Los Angeles. Eden then resigned from the Reclamation Service, took a job with the Los Angeles Water Department as assistant to Mulholland, and turned over the Reclamation Service maps, field surveys and stream measurements to the city. Those studies served as the basis for designing the longest aqueduct in the world.

By July 1905, Chandler's L.A. Times began to warn the voters of Los Angeles that the county would soon dry up unless they voted bonds for building the aqueduct. Artificial drought conditions were created when water was run into the sewers to decrease the supply in the reservoirs and residents were forbidden to water their lawns and gardens. On Election Day the people of Los Angeles voted for $22.5 million worth of bonds to build an aqueduct from the Owens River and to defray other expenses of the project. With this money, and with a special act of Congress allowing cities to own property outside their boundaries, the city acquired the land that Eden had acquired from the Owens Valley farmers and started to build the aqueduct, which opened November 5, 1913.

To accommodate its growing population, the County instituted a number of large engineering projects, including the construction of the Hoover Dam, which channeled water to the County from the Colorado River and provided electricity from hydroelectric power. The area's excellent weather made it an ideal location for aircraft testing and construction, and World War II brought hundreds of new industries to the area, boosting the local economy. By the 1950s, Los Angeles County was a sprawling metropolis. It was considered the epitome of everything new and modern in American culture—a combination of super highways, affordable housing, and opportunity for everyone.

Today more than 10.4 million people call Los Angeles County home, residing in 88 cities and approximately 140 unincorporated areas. It continues to be an industrial and financial giant, and is one of the most cultural and ethnically diverse communities in the world. (Source: County of Los Angeles Public Information Office Web Site)

Geology and Hydrology

Geology

The point where the Los Angeles and Rio Hondo Rivers merge in the City of South Gate is a geologic center for the Los Angeles Basin. It is approximately the location of where the sand, silt, and clay of the Los Angeles Basin extend the deepest. In fact, the mixture of sediment beneath this location extends more than 30,000 feet downward before hitting solid rock (about as deep as Mount Everest is high). It is the center of a tremendous sand-filled hole whose walls are formed by the San Gabriel, Santa Monica, and Santa Ana Mountains and the Palos Verdes Peninsula (which was once an island). When earthquakes occur, this huge "bowl of sediment" amplifies the motion in unpredictable ways (which is why one city block is hard hit by a temblor and a neighboring block escapes serious damage). It would be similar to shaking a bowl of jelly.

About 15 million years ago, the Los Angeles Basin was under water. As surrounding mountain ranges (including the San Gabriel and Santa Monica ranges) shifted in a clockwise spiral, the underlying crust stretched and cracked and released molten rock from below. The crust thinned and "collapsed," forming an immense geologic "bowl." Sand, silt and clay from the sea and ancient rivers poured into the bowl. Microorganisms also poured into this hole, piling high in huge layers. These layers would eventually become the oilfields of Los Angeles.

About 5 million years ago, the crust ceased to stretch and the bowl began to shrink. The hole filled in and seismic activity started pushing the contents upward. Rock that once lay at the ocean floor was being forced to the surface. Sediment also continued to flow from the mountains onto this growing mound. As it rose above sea level, this pile of sediment began forming what we now call the Los Angeles Basin. In effect, Los Angeles has not been "falling into the sea," as popularly believed, but rather rising from the ocean.

Table 3-1: Land and Water Area of Los Angeles County (updated 2011)
(Source: California Dept. of Water Resources)

Area	Acres	Square Miles	Square Kilometers
Land	2,598,400	4,060.87	10,517.61
Water	443,100	691.45	1,790.85
Total	3,041,480	4,752.32	12,308.46

Islands

Los Angeles County's two islands, **Santa Catalina** and **San Clemente**, are part of the eight-island group called the Channel Islands. The group extends from San Miguel in the north off the coast of Santa Barbara to San Clemente, 160 miles to the south. Los Angeles County's own Santa Catalina, the most populated and visited of the islands, is the third largest of the group (75 square miles).

At one time, the islands were home to an abundance of sea otter, sea lions, and seals. Fur trappers, however, saw to their decimation during the 19th century.

Los Angeles County's own San Clemente, San Miguel, and San Nicolas islands have been under U.S. Navy administration since shortly before World War II. These islands were used as bombing and missile test ranges. Only San Nicolas continues to be used for that purpose.

Table 3-2: Channel Islands (north to south) (updated 2011)

Island	Acres	County
San Miguel	8,960	Santa Barbara
Santa Rosa	53,760	Santa Barbara
Santa Cruz	61,440	Santa Barbara
Anacapa	717	Ventura
Santa Barbara	640	Santa Barbara
San Nicolas	14,080	Ventura
Santa Catalina	48,000	Los Angeles
San Clemente	35,840	Los Angeles

Table 3-3-: Lakes **and** Reservoirs of Los Angeles County (updated 2011)

Lake or Reservoir	Location
Big Dalton Reservoir	Angeles National Forest
Bouquet Reservoir	Angeles National Forest
Bouton Lake	Lakewood
Caldwell Lake	Angeles National Forest
Castaic Lake	Castaic
Chatsworth Lake Manor	Los Angeles (Chatsworth)
Chatsworth Reservoir	Los Angeles (Chatsworth)
Cogswell Reservoir	Angeles National Forest
Crystal Lake	Angeles National Forest
Devil's Gate Reservoir	La Cañada Flintridge
Eagle Rock Reservoir	Los Angeles (Eagle Rock)
Eaton Wash Reservoir	Altadena
Echo Lake	Los Angeles (Echo Park)
Elizabeth Lake	Lake Hughes Area
Enchanto Lake	Malibu
Encino Reservoir	Los Angeles (Encino)
Hansen Dam	Los Angeles (Pacoima)
Hollywood Reservoir	Los Angeles (Hollywood)
Jackson Lake	Angeles National Forest
Lake Hughes	Angeles National Forest
Lake Lindero	Agoura Hills
Lees Lake	Los Angeles (Chatsworth)
Legg Lake	Whittier Narrows
Littlerock	Palmdale
Los Angeles Reservoir	San Fernando
Lower Franklin Reservoir #2	Los Angeles (Hollywood)
MacArthur Lake	Los Angeles (Westlake Area)
Machado Lake	Los Angeles (Wilmington)

Lake or Reservoir	Location
Malibu Lake	Malibu
Milton Arthur Lakes	El Dorado Park, Long Beach
Morris	Angeles Natl. Forest
Munz Lakes	Angeles Natl. Forest
Pacoima	Angeles Natl. Forest
Palmdale Lake	Palmdale
Peck Rd Water Conservation Peak	Arcadia
Puddingstone Lake	Angeles National Forest
Pyramid Lake	Near Gorman
Quail Lake	Angeles National Forest
Rosamond Dry Lake	Edwards AF Base
Rowena	Los Angeles (Los Feliz)
San Dimas Canyon	Angeles National Forest
San Gabriel	Angeles National Forest
Santa Fe Dam	Irwindale
Sawpit Canyon	Monrovia
Silver Lake	Los Angeles (Silver Lake)
Stone Canyon	Los Angeles (Hollywood)
Toluca Lake	Universal City
Trancas Lake	Malibu Country Club
Tujunga	Angeles National Forest
Tweedy Lake	Antelope Valley
Twin Lakes	Los Angeles (Chatsworth)
Una Lake	Palmdale
Upper Van Norton Lake	San Fernando
Westlake	Westlake Village

Table 3-4: Rivers in Los Angeles County (updated 2011)

River	Stream Miles (main stem)	Drainage Area (square miles)
Los Angeles River	97	830
Rio Hondo River	20	125
San Gabriel River	59	350
Santa Clara River	75	1,616

Topography

Table 3-5: Mountain Peaks and Other High Points of Los Angeles County, by Elevation (feet above sea level) (updated 2011)

San Gabriel Mountains (Angeles National Forest)			
Mt. San Antonio (Old Baldy Peak)	10,064	Mt. Islip	8,250
Mt. Baden-Powell	9,399	Mt. Williamson	8,214
Throop Peak	9,138	Waterman Mountain	8,038
Mt. Burnham	8,997	Iron Mountain (Sheep Mountain)	8,007
Mt. Hawkins	8,850		
Mt. Lewis	8,396		

Mountain Ranges and Hills in Los Angeles County

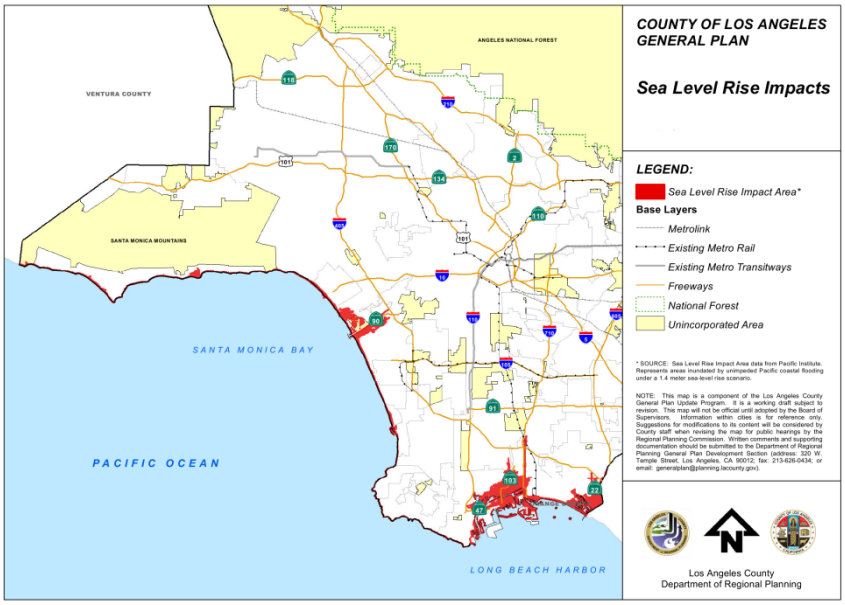
Mountain Ranges	Hills
San Gabriel Mountains Santa Monica Mountains Santa Susana Mountains Verdugo Mountains	Dominguez Hills Hollywood Hills Signal Hill Puente Hills Palos Verdes Hills

Lowest Point in Los Angeles County

The lowest point in Los Angeles County is in Wilmington, at 9 feet below sea level.

Map 3-1: Sea Level Rise Impacts

(Source: County of Los Angeles General Plan Draft 2014)



Water Resources

The following content was extracted from the General Plan.

The arid climate and landscape of the County requires that water be managed as an invaluable resource. The County recognizes that the effective management and preservation of its water resources is vital to preserving a high quality of life for County residents and businesses.

Water Sources

The three major types of water sources in the County are major surface water, groundwater, and recycled water.

Major Surface Water

Most major surface waters serve as storage facilities. Lakes and reservoirs receive rainwater and snowmelt from rivers, streams, and imported supplies from aqueducts, holding them until the water is needed. Most of the County's major surface waters are controlled by man-made facilities. For example, a series of dams and spreading grounds are used to capture close to 80 percent of the water that flows from the San Gabriel Mountains and through the San Gabriel River. Some of these surface waters support fish and wildlife and provide recreation areas for County residents that are compatible with flood management and water conservation operations. Due to the County's climate patterns, streams and rivers receive intermittent heavy winter rainstorms and little summer or fall precipitation, which affects the consistency of water flow. Small tributaries are also highly sensitive to pollution, and the cumulative impacts of polluted runoff and unnatural levels of silt degrades the water quality of these waterways to a much greater extent than a high volume river with continuous flow. The County works within its jurisdiction to improve the health of rivers, streams, and minor tributaries to enhance overall water resources, groundwater recharge, and wildlife habitat.

Groundwater

Groundwater is a crucial component of local fresh water supplies. Groundwater is the water beneath the Earth's surface that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the Earth's surface via seeps or springs. Eight major groundwater basins provide about one third of the County's overall water demand, except during times of drought.

A reduction or decline in groundwater quantity or quality is detrimental to water users countywide, especially to the hundreds of households in rural areas who depend solely on private wells. Water accumulates beneath the ground in saturated zones, or aquifers, which are referred to as groundwater basins. These aquifers can hold millions of acre-feet of water and extend for miles. Basins fill with water as a result of snowmelt, rain, and surface flow percolating through the soil.

Recycled Water

Recycled water is used primarily for recharging groundwater aquifers through spreading operations and injection at seawater barriers. Other uses of recycled water include irrigation of landscaping, most commonly in parks, golf courses, and for roadway medians; supplying industrial processes, such as cooling and transportation, washing, and rinsing; filling artificial and decorative ponds and lakes; and flushing toilets in large, non-residential buildings. The County Sanitation Districts operate reclamation plants throughout the County and are the largest producers of recycled water. Other producers of recycled water include the cities of Burbank, Glendale, Los Angeles, Santa Monica, and the Central, Las Virgenes, and West Water Districts. Three of these plants in the southern portion of the County are capable of delivering over 50,000 acre-feet of treated water each year to spreading grounds and injection wells to combat saltwater intrusion into groundwater basins from the Pacific Ocean. In the Antelope Valley, recycled water is used for agriculture and supports large bird populations at Piute Ponds.

Watersheds

A watershed is an area or region that, by its land characteristics, contributes to the flow of water, sediments, and dissolved materials from the land into a common river, lake, groundwater basin, ocean, or other water body. A watershed encompasses all interrelated functions of the water cycle, surface flow, soil movement, vegetation, and wildlife occurring in a land area that is naturally bounded by mountain ridgelines. Sub-watersheds are a smaller geographic section of a larger watershed unit within a drainage area. It is a vast undertaking to analyze the health of watersheds. However, individual watersheds are monitored to better understand the connections between their natural functions and human activities. The County manages the following major watersheds, which are comprised of many sub watersheds, as shown in Map 3-2: Watersheds in Los Angeles County.

- Antelope Valley Watershed
- Los Angeles River Watershed
- San Gabriel River Watershed
- Santa Clara River Watershed
- Santa Monica Bay Watershed

Watershed Management

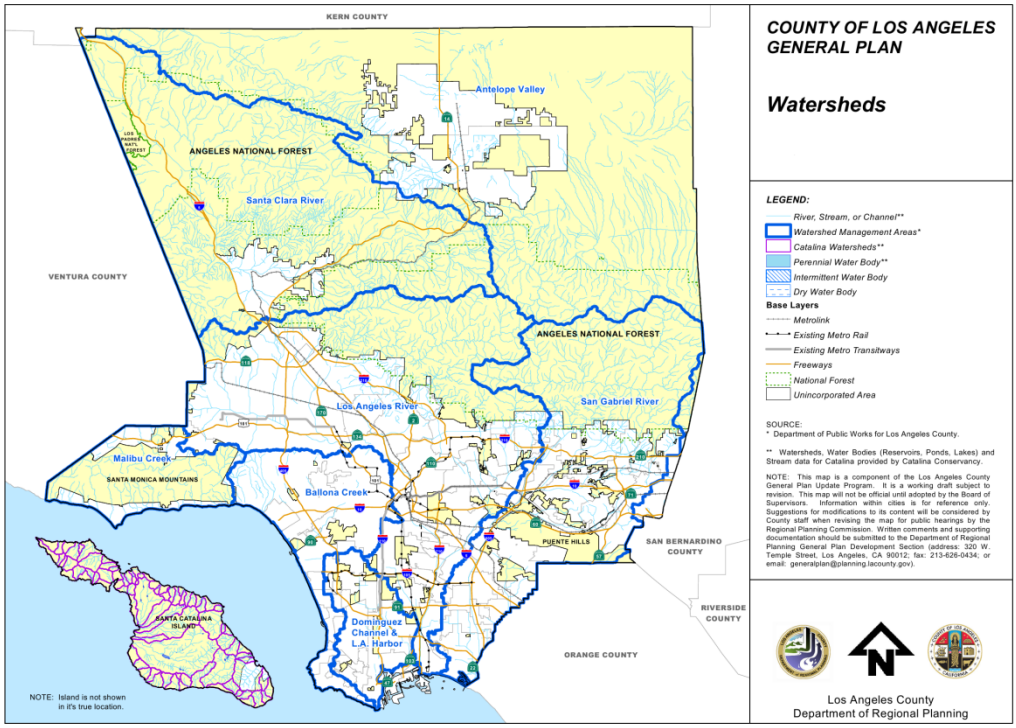
Watershed management is a comprehensive approach to effectively protecting and restoring a watershed's natural resources and water quality, particularly the biological function of riparian habitat and aquatic systems.

Watershed management integrates flood protection with water quality and conservation, and preserves existing open space for habitat and recreation. Because a watershed encompasses many jurisdictions, water quality and natural resource issues are best managed at a regional or watershed level. The Los Angeles County Department of Public Works has taken a leading role in engaging local stakeholders and local jurisdictions in an effort to generate partnerships, collaborate with educational and professional institutions, and develop and implement Watershed Master Plans throughout the County.

These plans incorporate measures to maintain flood protection standards and provide assistance in the event of flooding, encourage watershed management practices, and improve the quality of water that flows to rivers, lakes, and the ocean.

Map 3-2: Watersheds in Los Angeles County

(Source: County of Los Angeles General Plan Draft 2014)



Hillside Regulation

The following content was extracted from the General Plan.

The geologic instability of the County's mountain ranges is apparent in the numerous earthquake induced landslide and liquefaction areas in the County. A majority of the mountains and hilly terrain in the County is steeply sloped land of 25 percent slope, with a large portion of this area greater than 50 percent slope. Development of terrain this steep is costly and the public costs associated with years of safety and public services in certain areas can be prohibitive. The highest and best use for some mountainous terrain may be as an airshed, watershed and natural habitat. In addition, hillside development has the potential to change natural drainage systems and remove the native vegetation that once slowed water runoff. The removal of vegetation eliminates the natural containment of runoff. Water cannot then percolate into the soil, and instead gathers velocity as it flows down the hillside, causing accelerated erosion.

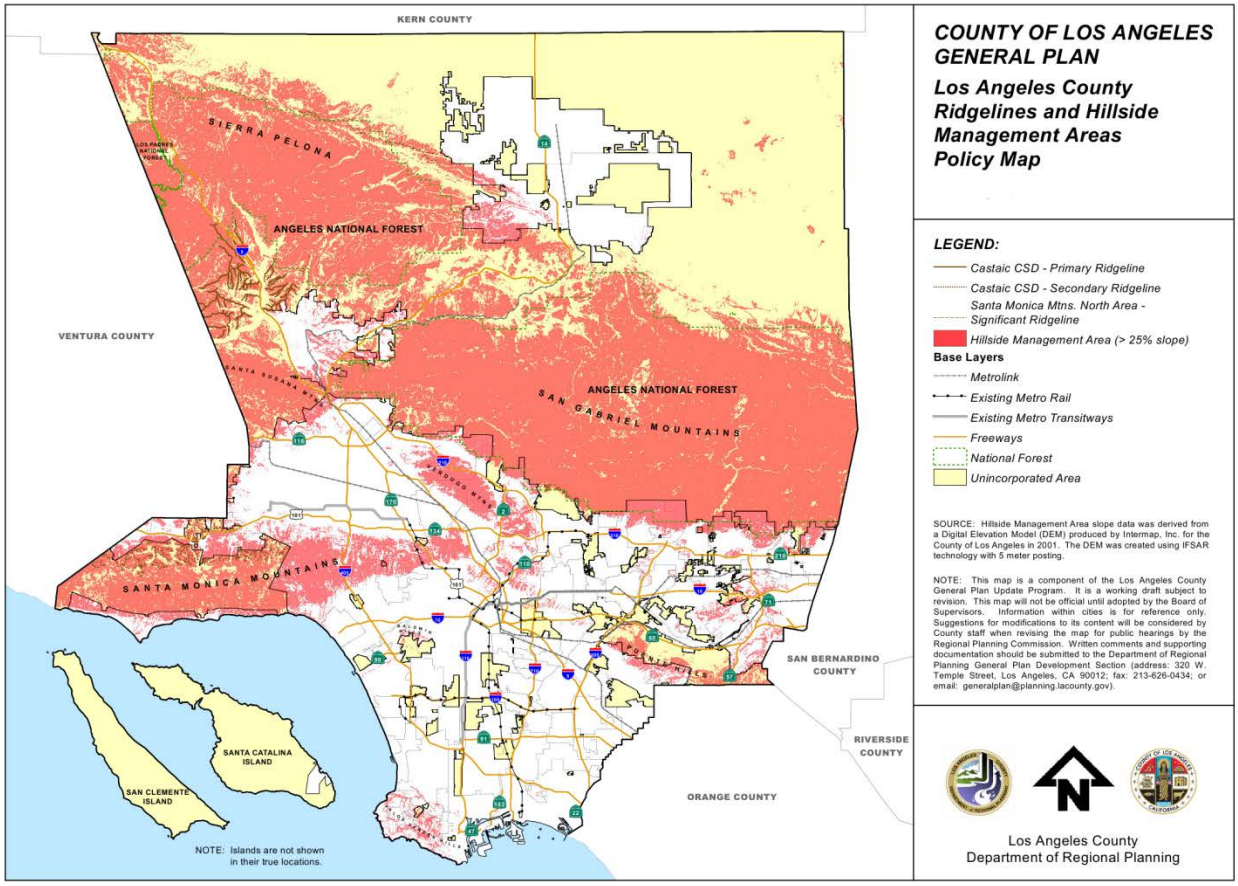
Erosion that is accelerated beyond its normal rate can deposit silt into streams and lakes, which can adversely affecting water quality, smother vegetation, and trigger landslides.

To conserve the natural beauty and public benefit of hillsides, land use activities that may result in environmental degradation are subject to regulations and design guidelines that limit hillside development based on slope, soil, natural drainage channels, and seismic and fire hazards. The Hillside Management Conditional Use Permit (CUP) is a regulatory vehicle to consider potential environmental degradation and hillside alteration in areas where the slope is 25 percent or greater.

The Hillside Management CUP allows clustering development at the base of the slope, limiting grading, and ensuring that the drainage configuration remains as natural as possible and will not adversely impact the area below the site. Hillside design guidelines are referenced during the predevelopment and permit processing phases to minimize hillside alteration, preserve ridgeline silhouettes, determine traffic circulation and building placement by topography, and incorporate trails where appropriate. By imposing these design conditions, a more sensitive development will occur in the County's hillsides in a manner that respects the natural topography and biological resources of the area.

Map 3-3: Los Angeles County Ridgelines and Hillside Management Areas Policy Map

(Source: County of Los Angeles General Plan Draft 2014)



Redevelopment

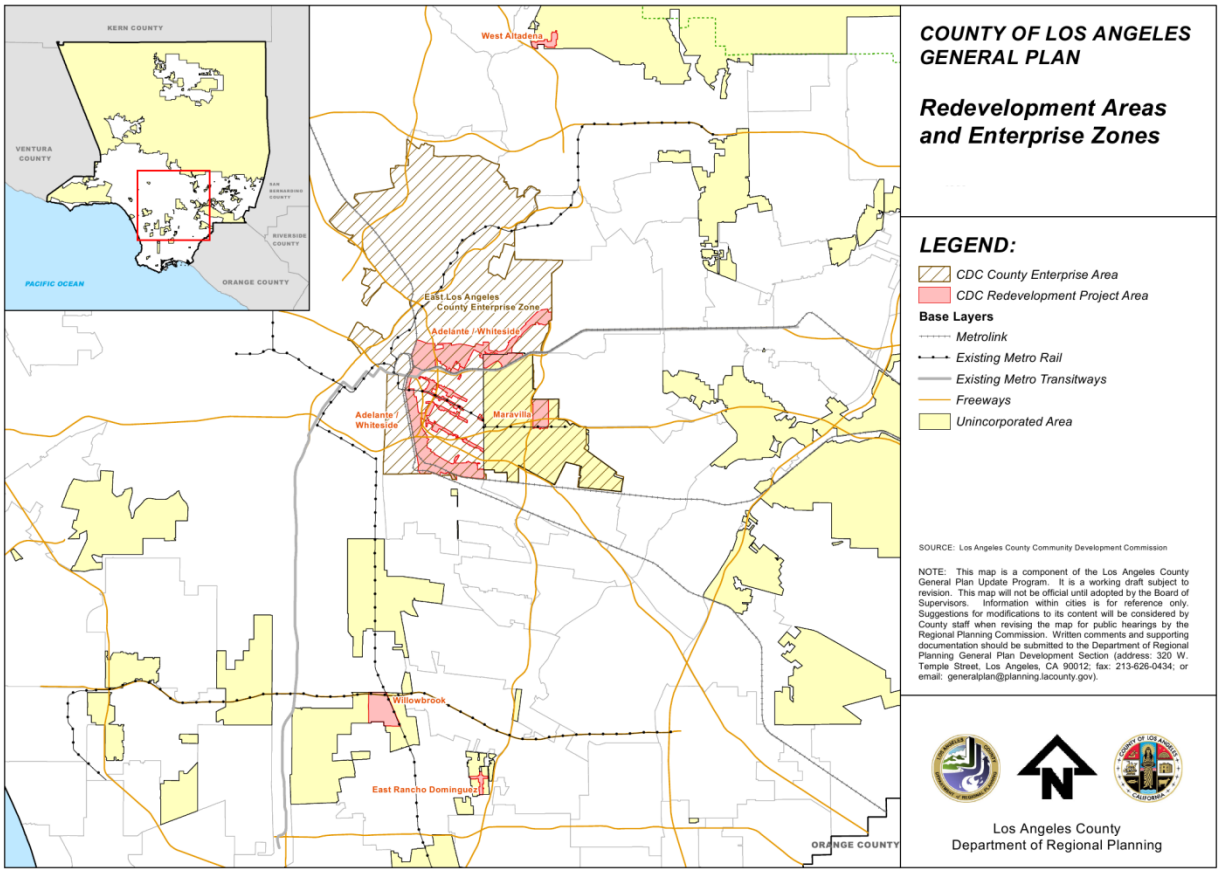
The following content was extracted from the General Plan.

Redevelopment is a process authorized under the State law that enables local government entities to revitalize deteriorated and blighted areas within their jurisdictions. Redevelopment agencies develop a plan, assemble sites for new development, and provide financial assistance. Redevelopment encourages and attracts private sector investment that would not otherwise occur. Redevelopment activities create jobs and expand business opportunities, provide affordable housing, help reduce crime, improve infrastructure, and clean up environmentally constrained areas.

As shown in Map 3-4: Redevelopment Areas and Enterprise Zones, CDC administers five redevelopment project areas in the unincorporated areas of Willowbrook, East Los Angeles (Maravilla and Whiteside neighborhoods), East Rancho Dominguez, and West Altadena. Table 11.1 provides a general description of each County Redevelopment Area. Redevelopment Plans must be consistent with the General Plan.

Map 3-4: Redevelopment Areas and Enterprise Zones

(Source: County of Los Angeles General Plan Draft 2014)



Mineral and Energy Resources

Oil and Natural Gas Resources

The following content was extracted from the General Plan.

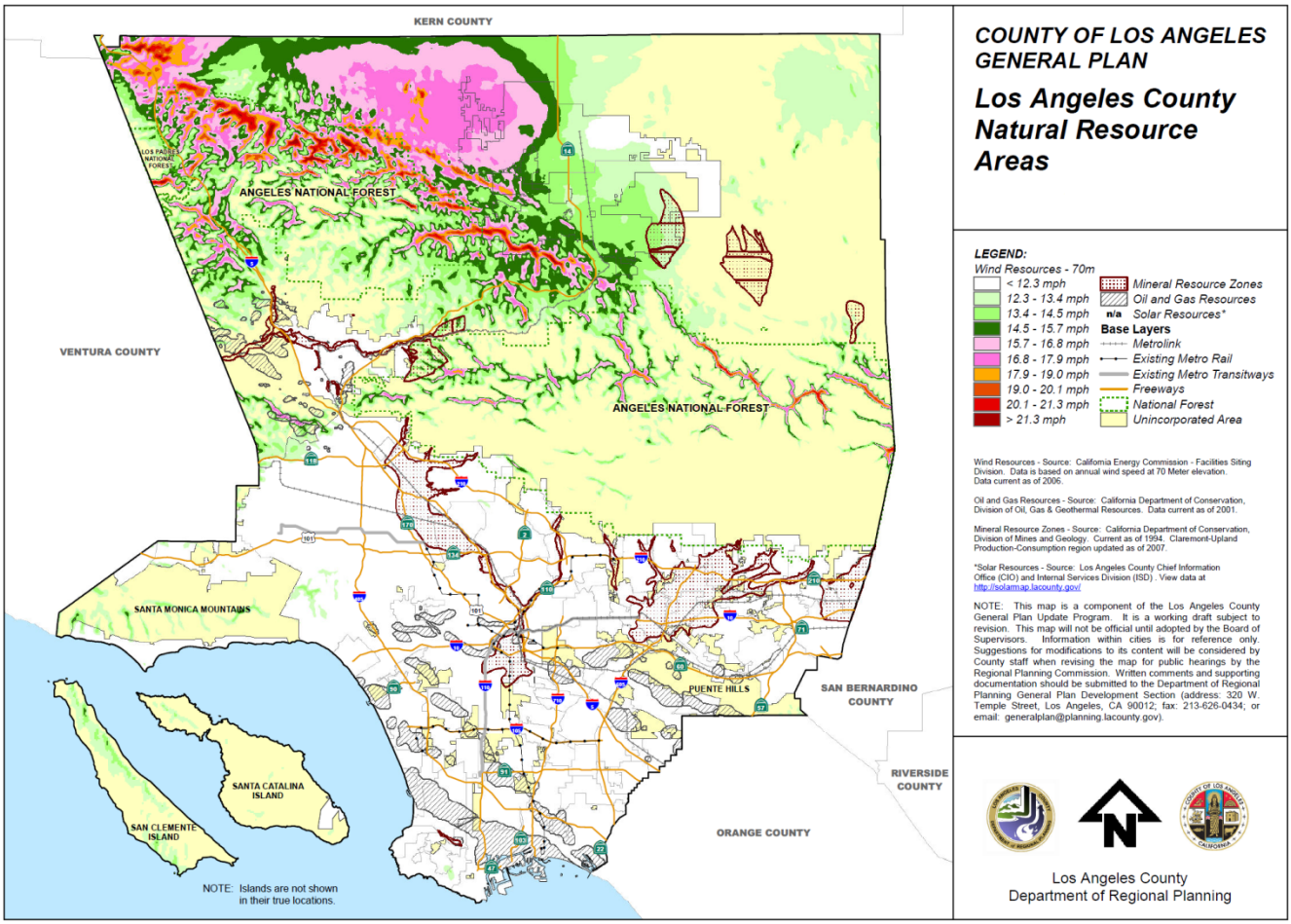
Small-scale oil production still occurs in many parts of the County, including the Baldwin Hills and the Santa Clarita Valley. The California Division of Oil, Gas, and Geothermal Resources (DOGGR) permits and tracks each operating production well and natural gas storage well and ultimately monitors the decommissioning process. The county's involvement is limited to zoning and land use regulations that protect surrounding communities from oil production impacts. Strict standards for the installation, operation, and decommissioning of oil derricks are necessary to protect natural resources and prevent excessive grading in hillside areas.

Energy Resources

Energy in California is produced from a variety of non-renewable and renewable natural resources, including oil, natural gas, and hydrologic, wind, and solar power. Although non-renewable energy resources (oil and natural gas) generate a majority of its energy, the State has one of the most diverse portfolios of renewable energy resources in the country. Renewable energy is derived from resources that are regenerative and cannot be depleted, such as wind and solar power. For this reason, renewable energy sources are fundamentally different from fossil fuels, such as coal, oil, and natural gas, which are finite and also produce harmful greenhouse gases and other pollutants. Aside from existing oil and natural gas deposits, the State's topography and climate easily lend themselves to the production of energy from hydrologic, wind, solar, and tidal power. There are significant opportunities for the County to produce energy from renewable sources.

Map 3-5: Los Angeles County Natural Resource Areas

(Source: County of Los Angeles General Plan Draft 2014)



General Data

With approximately 4,083 square miles, Los Angeles County is geographically one of the largest counties in the country. The county stretches along 75 miles of the Pacific coast of Southern California, and is bordered to the east by Orange County and San Bernardino County, to the north by Kern County, and to the west by Ventura County. The county also includes two offshore islands, Santa Catalina Island and San Clemente Island.

Map 3-6: Regional Location of Los Angeles County
(Source: County of Los Angeles General Plan Draft 2014)

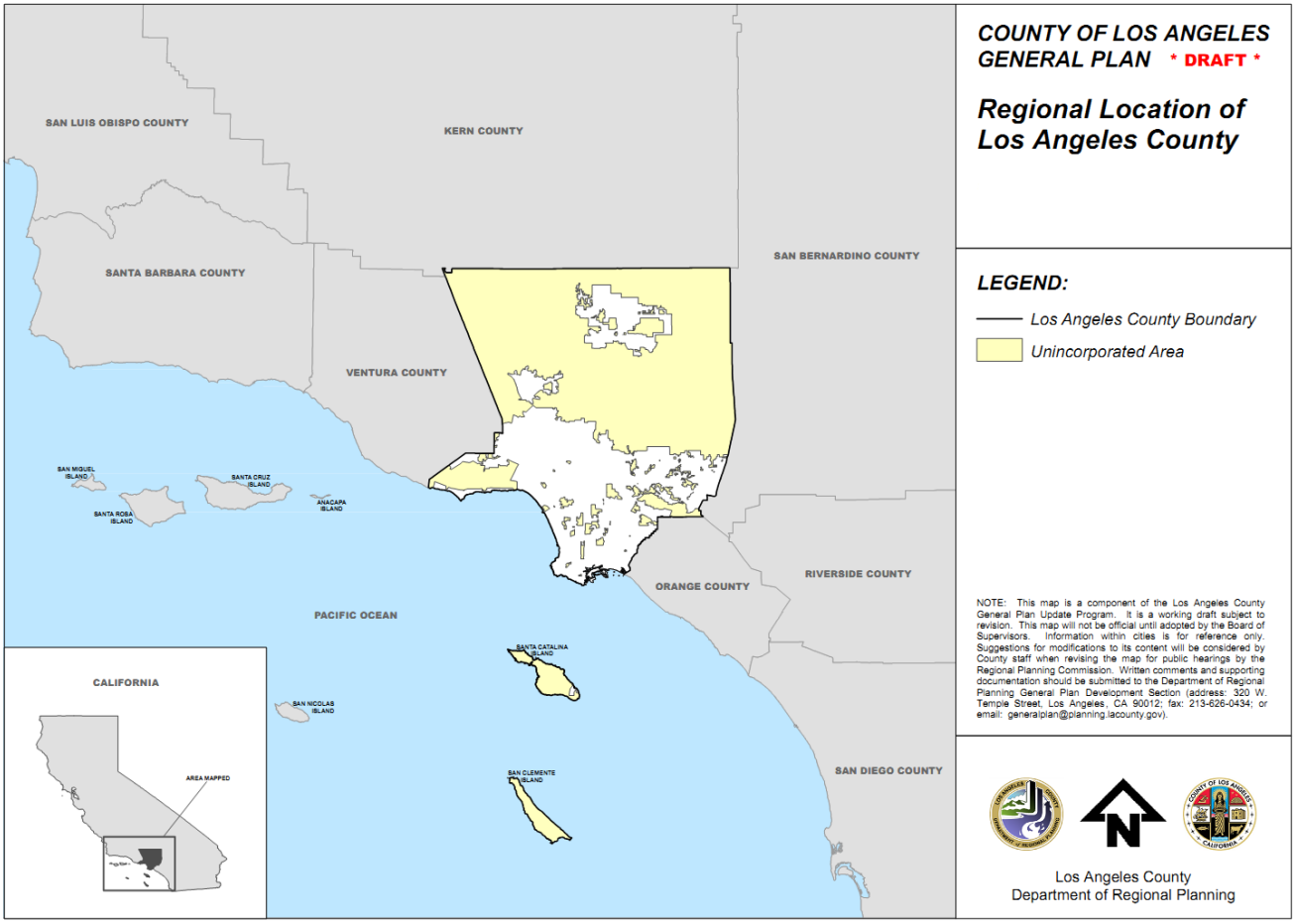


Table 3-6: Los Angeles County Distribution of Land Area
(Source: Los Angeles County Department of Public Works)

County Land Components	Cities (sq. miles)	Unincorporated (sq. miles)	Total (sq. miles)
Mainland	1,423.7	2,528.3	3,952
San Clemente Island	0	56.4	56.4
Santa Catalina Island	2.9	71.9	74.8
Total	1,426.6	2,656.6	4,083.2

The increase of people living and working in Los Angeles County creates more community exposure, and changes how agencies prepare for and respond to hazards.

Additionally, Los Angeles County continues to experience growth through in-fill building, which is increasing the population density creating greater service loads on the built infrastructure, including roads, water supply, sewer services and storm drains.

Hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among the population. According to Peggy Stahl of the Federal Emergency Management Agency (FEMA) Preparedness, Training, and Exercise Directorate, 80% of the disaster burden falls on the public, and within that number, a disproportionate burden is placed on special needs groups: women, children, minorities, and the poor.

Municipal Governments (Incorporated Cities)

Map 3-7: Map of Incorporated Cities in Los Angeles County
(Source: laalmanac.com)

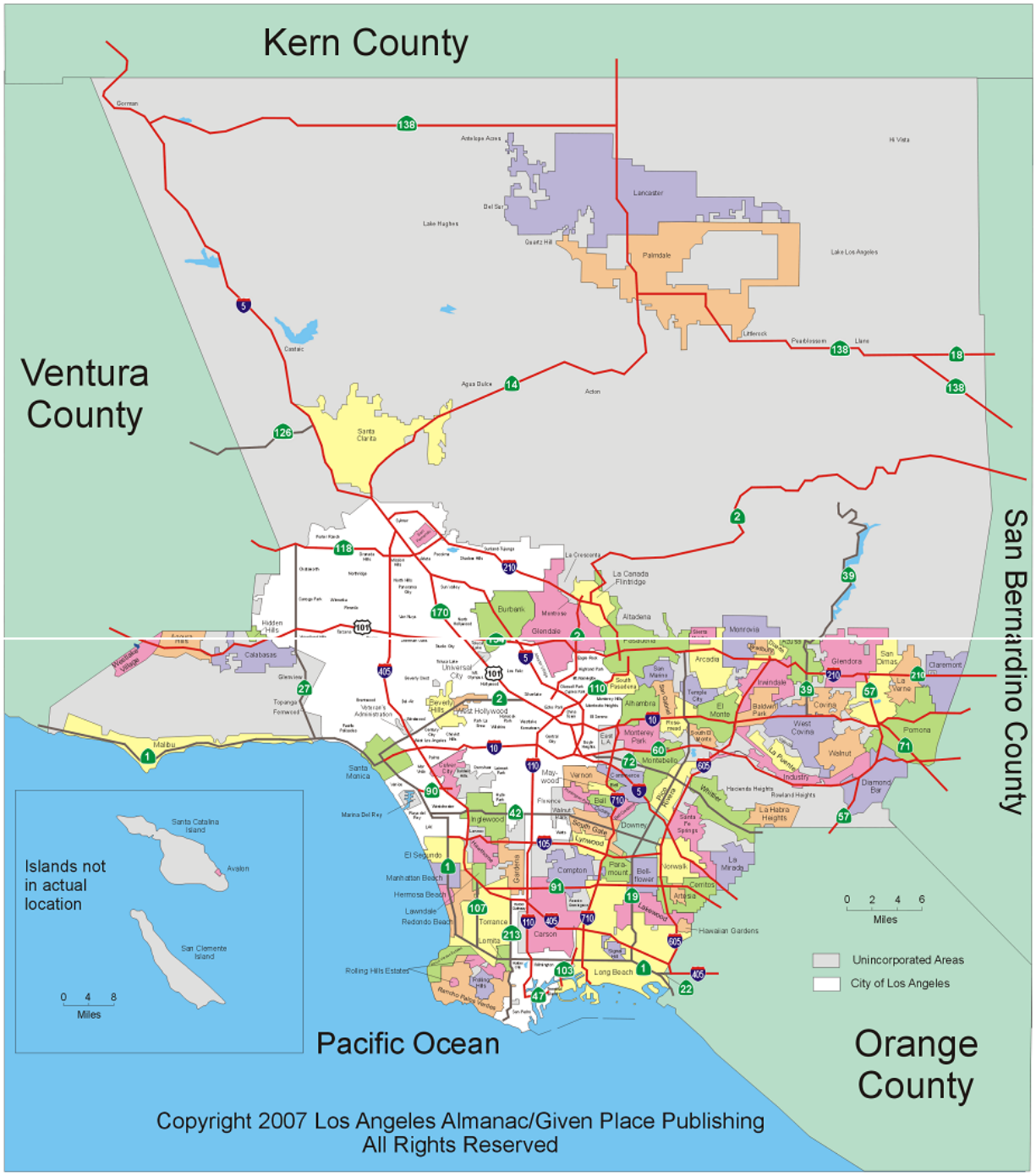


Image 3-1: Incorporated Cities and their Respective Districts
(Source: Citizens Guide to County Services, 2010)



The 88 Cities in the County of Los Angeles

City Name	Supervisorial District	City Name	Supervisorial District
Agoura Hills	3	La Verne	5
Alhambra	5	Lawndale	2
Arcadia	5	Lomita	4
Artesia	4	Long Beach	4
Avalon	4	Los Angeles	1-5
Azusa	1	Lynwood	2
Baldwin Park	1	Malibu	3
Bell	1	Manhattan Beach	4
Bell Gardens	1	Maywood	1
Bellflower	4	Monrovia	5
Beverly Hills	3	Montebello	1
Bradbury	5	Monterey Park	1
Burbank	5	Norwalk	4
Calabasas	3	Palmdale	5
Carson	2	Palos Verdes Estates	4
Cerritos	4	Paramount	4
Claremont	5	Pasadena	5
Commerce	1	Pico Rivera	1
Compton	2	Pomona	1
Covina	5	Rancho Palos Verdes	4
Cudahy	1	Redondo Beach	4
Culver City	2	Rolling Hills	4
Diamond Bar	4	Rolling Hills Estates	4
Downey	4	Rosemead	1
Duarte	5	San Dimas	5
El Monte	1	San Fernando	3
El Segundo	4	San Gabriel	5
Gardena	2	San Marino	5
Glendale	5	Santa Clarita	5
Glendora	5	Santa Fe Springs	1
Hawaiian Gardens	4	Santa Monica	3
Hawthorne	2	Sierra Madre	5
Hermosa Beach	4	Signal Hill	4
Hidden Hills	3	South El Monte	1
Huntington Park	1	South Gate	1
Industry	1	South Pasadena	5
Inglewood	2	Temple City	5
Irwindale	1	Torrance	4
La Canada-Flintridge	5	Vernon	1
La Habra Heights	4	Walnut	1
Lakewood	4	West Covina	5
La Mirada	4	West Hollywood	3
Lancaster	5	Westlake Village	3
La Puente	1	Whittier	4

General Population

Table 3-7: General Population
(Source: U.S. Census Bureau)

City	2010 Census	2000 Census	1990 Census
County of Los Angeles	9,818,605	9,519,338	8,863,164
Agoura Hills	20,330	20,537	20,390
Alhambra	83,089	85,804	82,106
Arcadia	56,364	53,054	48,290
Artesia	16,522	16,380	15,464
Avalon	3,728	3,127	2,918
Azusa	46,361	44,712	41,333
Baldwin Park	75,390	75,837	69,330
Bell	35,477	36,664	34,365
Bell Gardens	76,616	72,878	61,815
Bellflower	42,072	44,054	42,355
Beverly Hills	34,109	33,784	31,971
Bradbury	1,048	855	832
Burbank	103,340	100,316	93,643
Calabasas	23,058	20,033	N/A
Carson	91,714	89,730	83,995
Cerritos	49,041	51,488	53,240
Claremont	34,926	33,998	32,503
Commerce	12,823	12,568	12,141
Compton	96,455	93,493	90,454
Covina	47,796	46,837	43,207
Cudahy	23,805	24,208	22,817
Culver City	38,883	38,816	38,793
Diamond Bar	55,544	56,287	53,672
Downey	111,772	107,323	91,444
Duarte	21,321	21,486	20,688

City	2010 Census	2000 Census	1990 Census
El Monte	113,475	115,965	106,209
El Segundo	16,654	16,033	15,223
Gardena	58,829	57,746	49,847
Glendale	191,719	194,973	180,038
Glendora	50,073	49,415	47,828
Hawaiian Gardens	14,254	14,779	13,639
Hawthorne	84,293	84,112	71,349
Hermosa Beach	19,506	18,566	18,219
Hidden Hills	1,856	1,875	1,729
Huntington Park	58,114	61,348	56,065
Industry	219	777	580
Inglewood	109,673	112,580	109,602
Irwindale	1,422	1,446	1,050
La Cañada Flintridge	20,246	20,318	19,378
La Habra Heights	5,325	5,712	6,226
La Mirada	80,048	46,783	40,452
La Puente	156,633	41,063	36,955
La Verne	31,063	31,638	30,897
Lakewood	32,769	79,345	73,557
Lancaster	48,527	118,718	97,291
Lawndale	39,816	31,711	27,331
Lomita	20,256	20,046	19,382
Long Beach	462,257	461,522	429,433
Los Angeles	3,792,621	3,694,820	3,485,398
Lynwood	69,772	69,845	61,945
Malibu	12,645	12,575	N/A
Manhattan Beach	35,135	33,852	32,063
Maywood	27,395	28,083	27,850
Monrovia	36,590	36,929	35,758

City	2010 Census	2000 Census	1990 Census
Montebello	62,500	62,150	59,564
Monterey Park	60,269	60,051	60,738
Norwalk	105,549	103,298	94,279
Palmdale	152,750	116,670	68,917
Palos Verdes Estates	13,438	13,340	13,512
Paramount	54,098	55,266	47,669
Pasadena	137,122	133,936	131,591
Pico Rivera	62,942	63,428	59,177
Pomona	149,058	149,473	131,723
Rancho Palos Verdes	41,643	41,145	41,659
Redondo Beach	66,748	63,261	60,167
Rolling Hills	1,860	1,871	1,871
Rolling Hills Estates	8,067	7,676	7,789
Rosemead	53,764	53,505	51,638
San Dimas	33,371	34,980	32,397
San Fernando	23,645	23,564	22,580
San Gabriel	39,718	39,804	37,120
San Marino	13,147	12,945	12,959
Santa Clarita	176,320	151,088	110,642
Santa Fe Springs	16,223	17,438	15,520
Santa Monica	89,736	84,084	86,905
Sierra Madre	10,917	10,578	10,762
Signal Hill	11,016	9,333	8,371
South El Monte	20,116	21,144	20,850
South Gate	94,396	96,375	86,284
South Pasadena	25,619	24,292	23,936
Temple City	35,558	33,377	31,100
Torrance	145,438	137,946	133,107
Vernon	112	91	146

City	2010 Census	2000 Census	1990 Census
Walnut	29,172	30,004	29,105
West Covina	106,098	105,080	96,086
West Hollywood	34,399	35,716	36,118
Westlake Village	8,270	8,368	7,455
Whittier	85,331	83,680	77,671

Table 3-8: Planning Area Growth Projections for Los Angeles County

	Countywide			Unincorporated Areas		
Planning Areas	**Population 2010**	**Population 2035**	**Percent Change**	**Population 2010**	**Population 2035**	**Percent Change**
Antelope Valley	446,965	880,234	97	103,451	255,364	147
Coastal Islands	5,082	7,605	50	1,445	2,646	83
East San Gabriel Valley	1,045,184	1,298,746	24	274,374	371,842	36
Gateway	2,018,652	2,224,653	10	129,247	142,829	11
Metro	1,851,512	2,025,462	9	316,978	353,336	11
San Fernando Valley	1,870,034	2,045,335	9	27,634	34,505	25
Santa Clarita Valley	267,350	410,163	53	85,326	170,085	99
Santa Monica Mountains	94,524	113,962	21	21,925	32,888	50
South Bay	984,751	1,075,384	9	78,254	86,880	11
West San Gabriel Valley	976,136	1,112,313	14	117,913	157,371	33
Westside	1,055,510	1,144,766	8	31,777	40,949	29
Total	**10,615,700**	**12,338,623**	**16**	**1,188,324**	**1,648,695**	**39**

Source: 2008 SCAG RTP

State and Local Stakeholders

Ports and waterways stimulate economic development, which in turn benefits state and local economies. In 1994, U.S. port activities contributed more than $780 billion to the gross domestic product. Port activities also resulted in tax payments of $56 billion to state and local governments (Maritime Administration, 1994).

Successful ports attract a wide variety of support businesses, such as container manufacturers, stevedore companies, ship chandlers, customhouse brokers, and freight forwarders. These support groups, in turn, become stakeholders in the continued success of the port. States also have an interest in effective port administration and operation. In addition to collecting taxes from businesses that depend on port activity, states have a political interest in promoting safety and sound environmental practices.

Public and Community Stakeholders

Throughout U.S. history, efficient water transportation has stimulated economic growth. It is no accident that the top ports in terms of tonnage are located in densely populated areas. New York, Los Angeles, Houston, and Philadelphia are cases in point. History has proven that population density and economic prosperity are often brought about by the presence of a port.

One of the most important public benefits generated by ports is job creation. In 1992, more than 1.5 million people were employed directly by the port industry; another 14 million were employed by port users and suppliers. That same year, port activities generated $523 billion in personal income (Maritime Administration, 1994). These workers have a significant stake in the port industry.

Ports and waterways also provide significant aesthetic and recreational opportunities, which are highly valued by the public today. These activities are fostered by environmental protection, one of the most significant public issues shaping the economic and political landscape today. In response to public demands, federal and state governments have imposed numerous environmental laws and regulations in recent years. Logistics and transportation professionals, as well as architects and operators of ports and waterways, must comply with a growing catalog of environmental restrictions in order to survive. Technological advances that reduce the incidence of oil spills are in keeping with the public interest in protecting the environment.

Table 3-9: County of Los Angeles QuickFacts
(Source: U.S. Census Bureau, State and County QuickFacts)

People QuickFacts	Los Angeles County	California
Population, 2010	9,818,605	37,253,956
Population, percent change, 2000 to 2010	3.1%	10.0%
Population, 2000	9,519,331	33,871,648
Persons under 5 years old, percent, 2009	7.4%	7.5%
Persons under 18 years old, percent, 2009	25.4%	25.5%
Persons 65 years old and over, percent, 2009	10.6%	11.2%
Female persons, percent, 2009	50.4%	49.9%
White persons, percent, 2010 (a)	50.3%	57.6%
Black persons, percent, 2010 (a)	8.7%	6.2%
American Indian and Alaska Native persons, percent, 2010 (a)	0.7%	1.0%
Asian persons, percent, 2010 (a)	13.7%	13.0%
Native Hawaiian and Other Pacific Islander, percent, 2010 (a)	0.3%	0.4%
Persons reporting two or more races, percent, 2010	4.5%	4.9%
Persons of Hispanic or Latino origin, percent, 2010 (b)	47.7%	37.6%
White persons not Hispanic, persons, 2010	27.8%	40.1%

People QuickFacts	Los Angeles County	California
Living in same house 1 year ago, percent 1 yr. old and over, 2005–2009	87.0%	83.9%
Foreign born persons, percent, 2005–2009	35.4%	26.8%
Language other than English spoken at home, percent age 5+, 2005–2009	56.1%	42.2%
High school graduates, percent of persons age 25+, 2005–2009	75.5%	80.5%
Bachelor's degree or higher, percent of persons age 25+, 2005–2009	28.4%	29.7%
Veterans, 2005–2009	379,969	2,092,627
Mean travel time to work (minutes), workers age 16+, 2005–2009	29	27
Housing units, 2009	3,390,795	13,433,718
Homeownership rate, 2005-2009	48.6%	57.9%
Housing units in multi-unit structures, percent, 2005–2009	41.7%	30.7%
Median value of owner-occupied housing units, 2005–2009	$521,900	$479,200
Households, 2005–2009	3,178,266	12,187,191
Persons per household, 2005–2009	3.02	2.91
Per capita money income in past 12 months (2009 dollars) 2005–2009	$26,983	$29,020
Median household income, 2009	$54,375	$58,925

People QuickFacts	Los Angeles County	California
Persons below poverty level, percent, 2009	16.0%	14.2%
Business QuickFacts	Los Angeles County	California
Private nonfarm establishments, 2008	250,255	879,025
Private nonfarm employment, 2008	3,910,429	13,742,925
Private nonfarm employment, percent change 2000–2008	1.2%	6.7%
Nonemployer establishments, 2008	820,986	2,688,453
Total number of firms, 2007	1,047,037	3,425,818
Black-owned firms, percent, 2007	5.7%	4.0%
American Indian and Alaska Native owned firms, percent, 2007	1.4%	1.3%
Asian-owned firms, percent, 2002	15.6%	12.8%
Native Hawaiian and Other Pacific Islander owned firms, percent, 2007	0.3%	0.3%
Hispanic-owned firms, percent, 2007	21.6%	16.5%
Women-owned firms, percent, 2007	30.2%	30.3%
Manufacturers' shipments, 2007 ($1000)	153,343,705	491,372,092
Merchant wholesaler sales, 2007 ($1000)	198,435,837	598,456,486
Retail sales, 2007 ($1000)	119,111,840	455,032,270
Retail sales per capita, 2007	$12,236	$12,561
Accommodation and food services sales, 2007 ($1000)	20,238,148	80,852,787
Building permits, 2009	5,138	35,069
Federal spending, 2008	76,235,164	299,922,630
Geography QuickFacts	**Los Angeles County**	**California**
Land area, 2000 (square miles)	4,060.87	155,959.34
Persons per square mile, 2010	2,417.9	238.9
FIPS Code	37	6
Metropolitan or Micropolitan Statistical Area	Los Angeles–Long Beach–Santa Ana, CA Metro Area	

Key:

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race, so also are included in applicable race categories.

FN: Footnote on this item for this area in place of data

NA: Not available

D: Suppressed to avoid disclosure of confidential information

People QuickFacts	Los Angeles County	California
X: Not applicable		
S: Suppressed; does not meet publication standards		
Z: Value greater than zero but less than half unit of measure shown		
F: Fewer than 100 firms		

Transportation

Los Angeles County has 527 miles of freeway and 382 miles of conventional highway. On the average day, 92 million vehicle miles are driven in L.A. County.

Table 3-10: Miles of Public Roads Los Angeles County (updated 2010)

Type of Road	Miles
Total	21,197.85
County Roads	3,103.55
City Streets	16,669.52
State Highways*	886.47
State Parks	132.81
U.S. Forest Service	405.50

**Centerline mileage based on federal criteria. Both streets included in couplet mileage. Also includes mileage to be relinquished to cities and counties at a future date.*
Source: California Dept. of Transportation (Caltrans)

Table 3-11: Highway Names in Los Angeles County (updated 2011)
(Source: http://www.laalmanac.com/transport/tr26.htm)

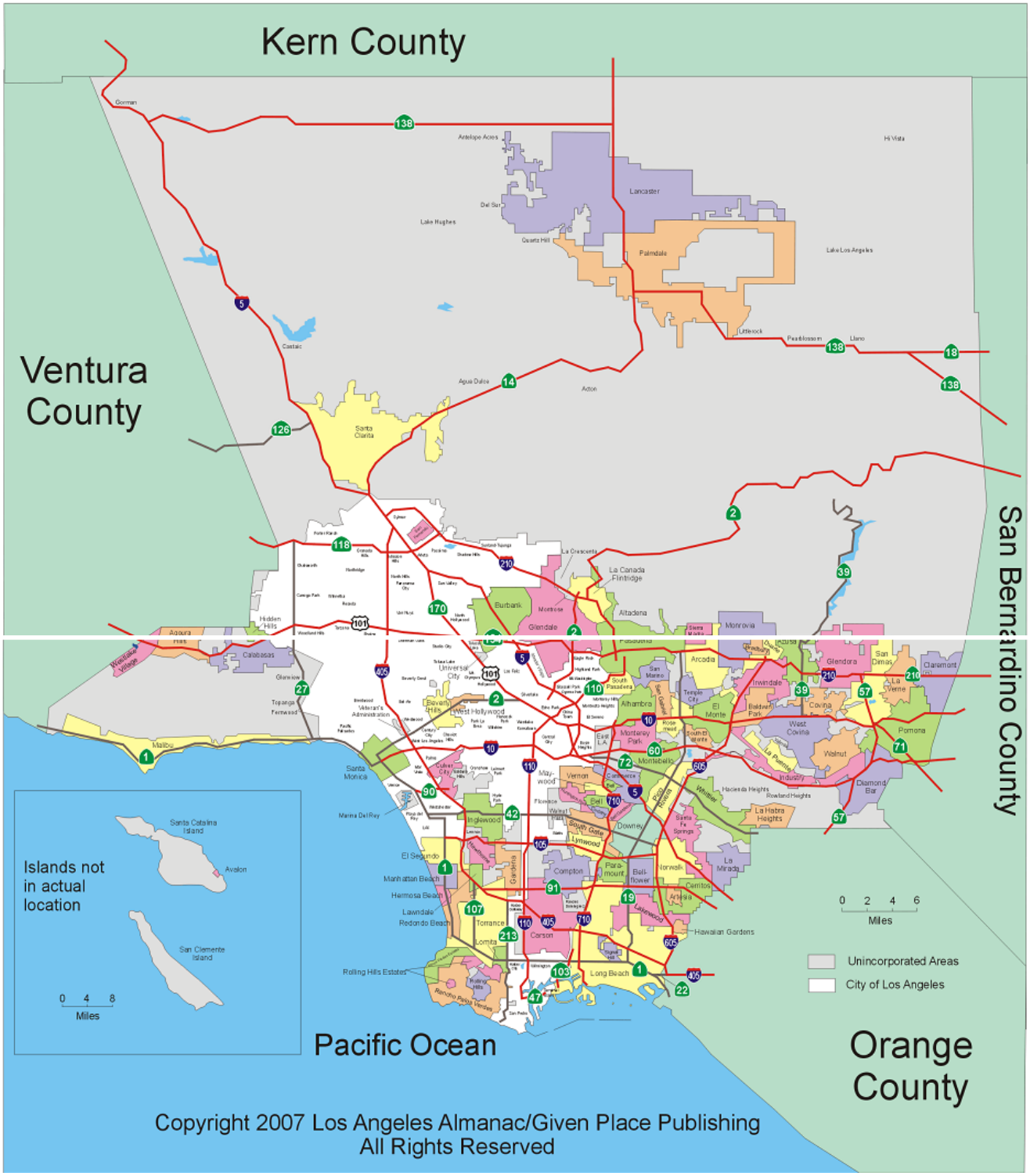
Route	Type of Highway	Nickname and Year Opened
1	State Route	*PCH* - Malibu stretch completed in, 1929
2	State Route	*Glendale* or *Angeles Crest Highway,* 1958–78
5	Interstate	*Santa Ana* (south of downtown), 1945–58; *Golden State* (north of downtown), 1956–75
10	Interstate	*San Bernardino* (east of downtown), 1943–57; *Santa Monica* (west of downtown), 1961-66
14	State Route	*Antelope Valley*, 1963-74
18	State Route	---
19	State Route	Lakewood/Rosemead Blvd.
22	State Route	*Garden Grove*, 1964–67
23	State Route	---

Route	Type of Highway	Nickname and Year Opened
27	State Route	---
30	State Route	1955–77
39	State Route	---
47	State Route	*Terminal Island, 1947*
57	State Route	*Orange*
60	State Route	*Pomona, 1965-71*
66	State Route	*Old Route 66*
71	State Route	---
72	State Route	---
90	State Route	*Marina*, 1968-72
91	State Route	*Redondo Beach, Artesia, 1968-75*
101	U.S. Highway	*Hollywood* (south of Cahuenga), 1940-48; *Ventura* (north of Cahuenga), 1955-74
103	State Route	---
105	Interstate	*Glenn Anderson* (or *Century*) 1993
107	State Route	*Hawthorne Blvd, Gardena*
110 (Pasadena)	State Route	*Harbor* (south of Jct. U.S. 101), 1952-70
110 (Harbor)	Interstate	*Pasadena* (north of Jct. U.S. 101), 1940-53
118	State Route	*Ronald Reagan (or Simi Valley-San Fernando Valley), 1968-77*
126	State Route	---
134	State Route	1955-77
138	State Route	---
164	State Route	---
170	State Route	---
187	State Route	---
210	Interstate	*Foothill*, 1955-2003
213	State Route	---
405	Interstate	*San Diego, 1957-69*
605	Interstate	*San Gabriel River, 1964-71*
710	Interstate	*Long Beach, 1952-65*

For a list of traffic volume data, visit http://www.laalmanac.com/transport/tr26b.htm.

Major Transportation Routes

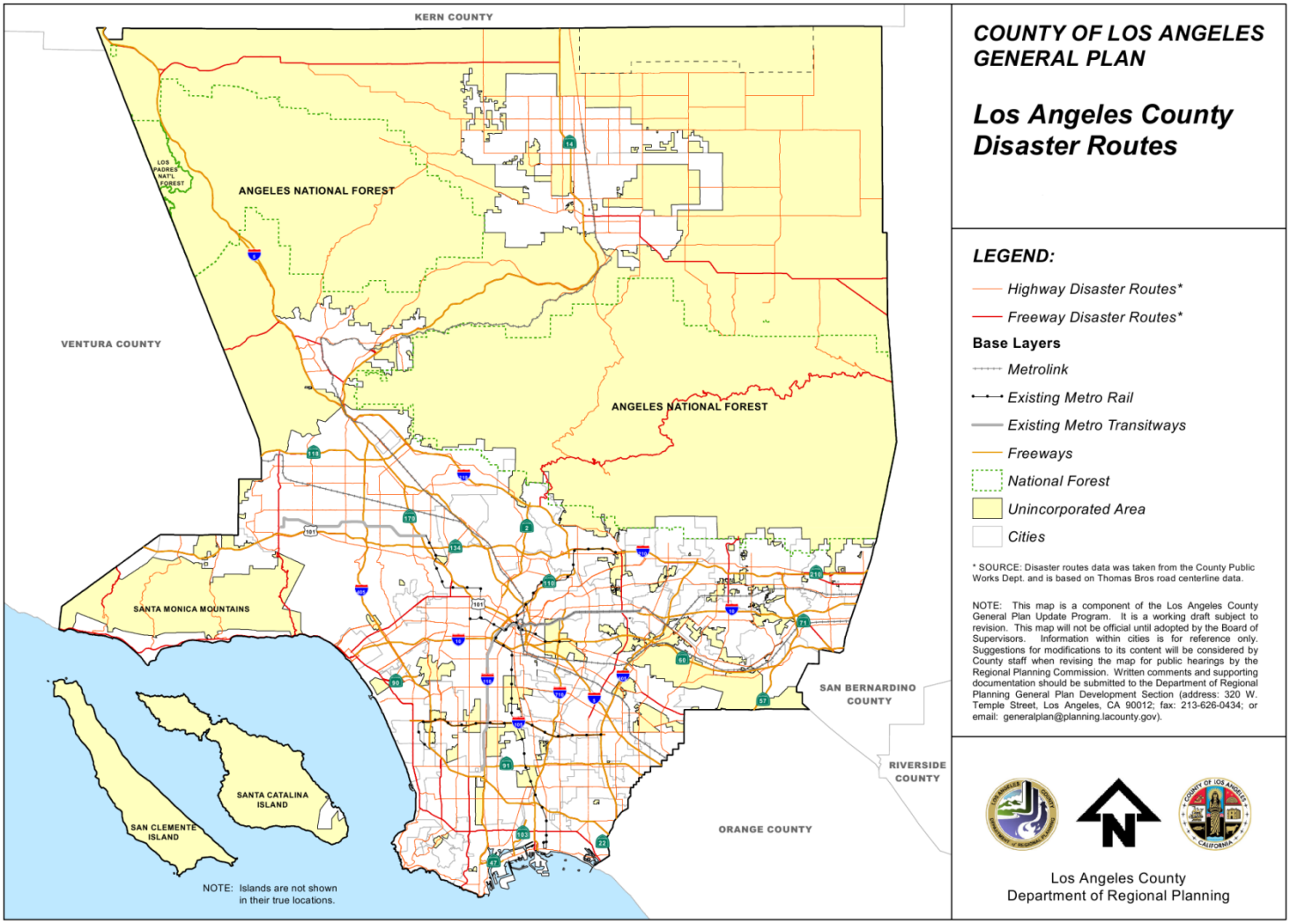
(Source: Los Angeles Almanac, 2007)



A network of pre-identified routes (including road, marine, air, and rail) that can best move emergency services and supplies to where they are needed in response to a major disaster, DRRs are a critical part of the overall emergency transportation system.

Map 3-8: Disaster Routes in Los Angeles County

(Source: County of Los Angeles General Plan Draft 2014)



Railways

In 1995, Burlington Northern merged with the Atchinson Topeka & Santa Fe Railway to form Burlington Northern & Santa Fe Railway. The following year, Southern Pacific Lines was acquired by Union Pacific Railroad.

Table 3-12: Railways Operating in Los Angeles County (Source: www.laalmanac.com)

Railways in	Carriage
Amtrak	Passengers
Metrolink (*Southern California Regional Rail Authority*)	Passengers
Burlington Northern & Santa Fe Railway	Freight
Los Angeles Junction Railway (*owned by Burlington Northern Santa Fe Railway*)	Freight
Union Pacific Railroad Company	Freight

Table 3-13: Amtrak Routes from/through Los Angeles

Route	Major Stops
Coast Starlight	Los Angeles-San Jose–Oakland-Sacramento-Portland-Seattle
Pacific Surfliner	San Diego–Anaheim–Los Angeles–Ventura–Santa Barbara–San Luis Obispo
Southwest Chief	Los Angeles–Flagstaff-Albuquerque-Topeka-Kansas City-Chicago
Sunset Limited	Los Angeles–Tucson–El Paso–San Antonio–Houston–New Orleans–Mobile-Jacksonville-Orlando

**Amtrak bus service ferries passengers between the Los Angeles and Bakersfield stations.*

Amtrak assumed operation of the San Diegan route (now Pacific Surfliner) in May 1971. With more than 1.5 million passengers taking the route, it is the second most heavily traveled Amtrak route in the nation.

Amtrak Stations in Los Angeles County (Source: Amtrak)	
Burbank Airport (routes: Pacific Surfliner)	Amtrak Station (unstaffed), 3750 Empire Ave., Burbank 91505
Chatsworth (routes: Pacific Surfliner)	Amtrak Station (unstaffed), 21510 Devonshire St., Chatsworth 91311
Glendale (routes: Coast Starlight, Pacific Surfliner)	Amtrak Station (staffed), 400 W. Cerritos Ave., Glendale 91204; (818) 246-4455
Los Angeles* (routes: Pacific Surfliner, Coast Starlight, Southwest Chief, Sunset Limited)	Union Station (staffed), 800 N. Alameda St., LA 90012; (213) 624-0171
Pomona (routes: Sunset Limited)	Amtrak Station (unstaffed), 156 W. Commercial St., Pomona 91768

Amtrak Stations in Los Angeles County (Source: Amtrak)	
Van Nuys* (routes: Pacific Surfliner)	Amtrak/Metrolink Station (staffed), 7724 Van Nuys Blvd., Van Nuys 91405

Ticket Agent on site

Coast Starlight: *Los Angeles – Seattle Chicago*

Pacific Surfliner: *San Diego – San Luis Obispo*

Southwest Chief: *Los Angeles–Albuquerque-*

Sunset Limited: *Los Angeles–San Antonio–New Orleans–Orlando*

Metrolink

Southern California Regional Rail Authority

Metro operates the Metro Rail system, which is exclusively within the county. It consists of 17.4 miles of subway and 55.7 miles of light rail. The Metro Rail system consists of the following lines: Red, Purple, Blue, Green, and Gold. The hub of the system is in downtown Los Angeles at Union Station. The Metro lines that serve the unincorporated areas include the Blue, Green, and Gold Lines. Blue Line stations located in the unincorporated areas are located at the intersections at Slauson Avenue, Florence Avenue, Firestone Boulevard, and Imperial Highway. The Green Line has stations within unincorporated areas at the intersections of Vermont Avenue and Hawthorne Boulevard. The 13.7-mile Gold Line connects Union Station to Pasadena, and the 6-mile Gold Line extension connects Union Station to East Los Angeles. Plans are under way to extend the Gold Line from Pasadena to Claremont by 2015.Two additional rail service operators that provide services in the county are Metrolink and Amtrak. The Southern California Regional Rail Authority (SCRRA) operates the 416-mile Metrolink commuter rail system, which has its hub at Union Station in downtown Los Angeles, and extends to Ventura, San Bernardino, Riverside, Orange, and San Diego counties. Amtrak provides interstate service from points around the country to Union Station, as well as regional service between major cities throughout California.

Metrolink Lines

Table 3-14: Metrolink Lines

(Source: http://www.metrolinktrains.com/about/?id=6)

	Ventura County Line	Antelope Valley Line	San Bernardino Line	Riverside Line	Orange County Line	Inland Empire - Orange County Line	91 Line
	Sep. 10/09	Sep. 10/09	Sep. 10/09	Sep. 10/09	Sep. 10/09	Sep. 10/09	Sep. 10/09
Stations	12/12	11/11	13/13	7/7	14/14	14/14	9/9
Route Miles	70.9/70.9	76.6/76.6	56.5/56.5	59.1/59.1	87.2/87.2	100.1/100.1	61.6/61.6
Trains Operated/Weekday	30*/31	24/24	36/38	12/12	19/19	14/16	9/9
Trains Operated/Saturday	--	12/12	20/20	--	4/8	2/6	--
Trains Operated/Sunday	--	6/6	14/14	--	4/8	2/4	--
Total Average Weekday Riders on Metrolink (Jul. – Sep.)	3,904 (-5%) / 4,093	5,781 (-9%) / 6,324	11,052 (-8%) / 11,950	5,069 (+4%) / 4,859	6,865 (-3%) / 7,056	3,835 (-3%) / 3,966	2,178 (+4%) / 2,085
Average Weekday Metrolink Riders on Amtrak (Jul. – Sep.)	287 (-9%) / 314	--	--	--	1,574 (-6%) / 1,671	--	--
Average Saturday Service Riders on Metrolink (Jul. – Sep.)	--	2,190 (+7%) / 2,052	3,544 (+2%) / 3,485	--	457 (-53%) / 967	1,290 (-14%) / 1,494	--

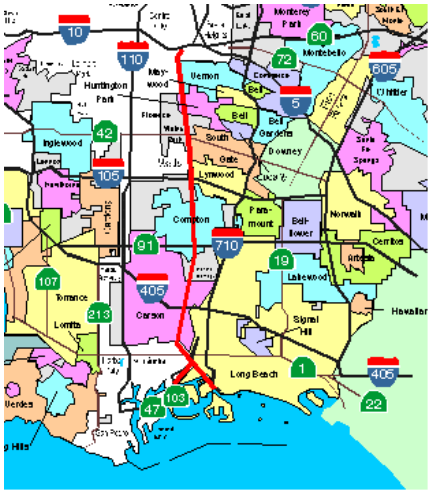
	Ventura County Line	Antelope Valley Line	San Bernardino Line	Riverside Line	Orange County Line	Inland Empire - Orange County Line	91 Line
Average Sunday Service Riders on Metrolink (Jul. – Sep.)	--	1,181 (+6%) / 1,110	2,234 (-5%) / 2,344	--	453 (-10%) / 750	742 (-33%) / 1,113	--
Average Saturday Metrolink Riders on Amtrak (Jul. – Sep.)	81 (-27%) / 111	--	--	--	401 (-47%) / 504	--	--
Average Sunday Metrolink Riders on Amtrak (Jul. – Sep.)	66 (-27%) / 91	--	--	--	365 (-20%) / 456	--	--
Average Speed	39/39 m.p.h.	39/39 m.p.h.	37/37 m.p.h	43/43 m.p.h.	43/43 m.p.h.	40/40 m.p.h.	39/39 m.p.h.

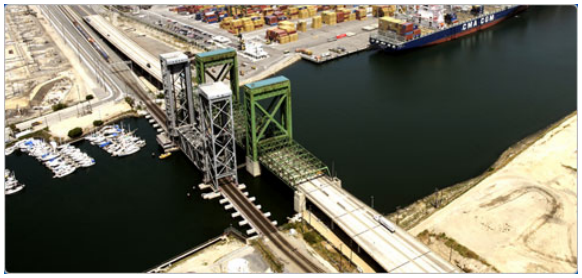
* Includes 12 Burbank/Bob Hope Airport trains

Metrolink is operated by Amtrak under contract with the Southern California Regional Rail Authority. The line operates 33 low-emission GM EMD locomotives and 119 double-deck passenger cars built by UTDC/Bombardier of Canada. In 1992, Metrolink purchased 338 miles of right-of-way track from the former Atchison, Topeka, & Santa Fe Railway (now Burlington Northern), though the freight railway retains trackage rights.

Alameda Corridor

The Alameda Corridor is a 20-mile-long rail cargo expressway that links the ports of Long Beach and Los Angeles to the railroad mainlines near downtown Los Angeles. It consists of a series of bridges, underpasses, overpasses, and a mid-corridor trench that carries freight trains in an open trench 10 miles long, 33 feet deep, and 50 feet wide between State Route 91 in Carson and 25th Street in Los Angeles. The corridor provides more efficient freight movement while reducing truck trips, traffic congestion, and air emissions, and slashing delays at railroad crossings. It is both an environmental mitigation project and a capacity enhancement project.





METROLINK

WWW.METROLINKTRAINS.COM

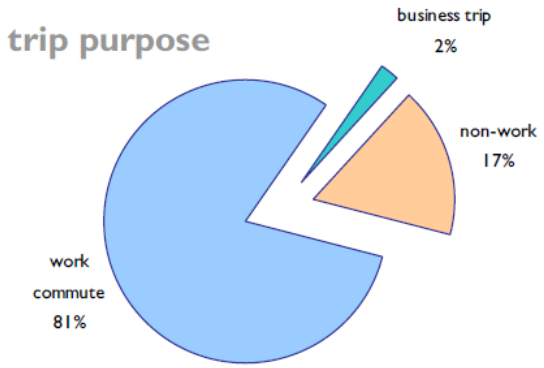
Antelope Valley Line
2007 Weekday Fact Sheet



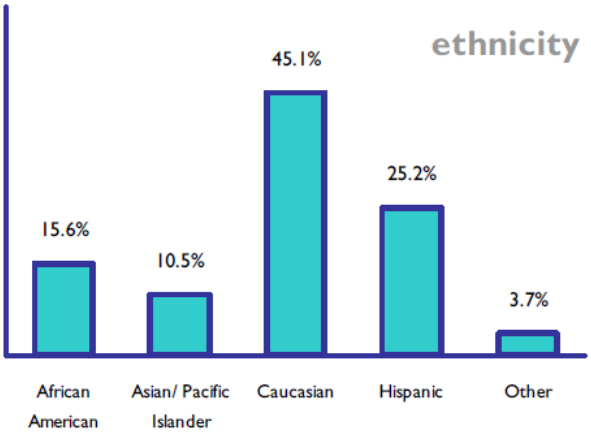
ridership stats

Average weekday ridership (Apr. 2007)	7,302
Average trip length (miles)	41.9
Riders with car available	77.8%
Gender	
Male	48.2%
Female	51.8%
Median household income (2005)	$64,238
Employment status	
Employed (full-time)	77.3%
Employed (part-time)	6.5%
Self-employed	4.8%
Retired	2.6%
Not employed/seeking employment	3.6%
Student (full-time)	5.0%

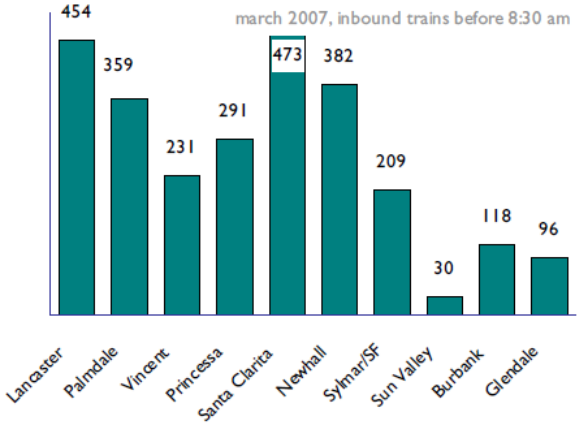
trip purpose



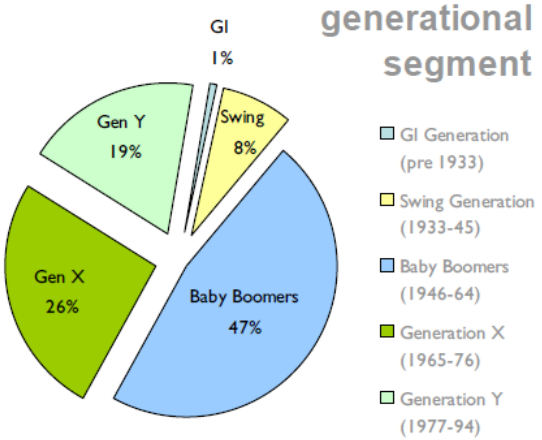
ethnicity



daily station boardings



generational segment



SOUTHERN CALIFORNIA'S COMMUTER TRAIN
METROLINK
METRO • OCTA • RCTC • SANBAG • VCTC

Source: Metrolink 2006, 2007

Airports

Table 3-15: Los Angeles County Airports and Airfields (updated 2011)

(Source: http://www.airnav.com/)

Airport/Airfield	Location
Agua Dulce Airpark	Agua Dulce Canyon Rd., Saugus
Brackett Field (POC)	1615 McKinley Ave., La Verne 91750, (909) 593-1395
Brian Ranch	Palmdale
Catalina (AVX)	Avalon
Catalina Air & Sea Terminal	Berth 95, San Pedro
Crystal Airport	Llano, California, USA
Compton (CPM)	901 W. Alondra Blvd., Compton 90220, (310) 631-8140
El Monte Airport (EMT)	4233 Santa Anita Ave., El Monte 91731, (626) 448-6129
General William J. Fox Airfield (WJF)	4555 W. Avenue G, Lancaster 93536, (661) 940-1709
Goodyear Blimp Base	19200 S. Main St., Carson
Hawthorne Municipal (Jack Northrop Field) (HHR)	12101 Crenshaw Ave., Hawthorne
Little Buttes Antique Airfield Airport	Lancaster 93539, (805) 948-0577
Long Beach Airport (Daugherty Field) (LGB)	4100 Donald Douglas Dr., Long Beach
Los Angeles International Airport (LAX)	World Way, Los Angeles
Nichols Farms Airport (8CL0)	Lancaster, CA 93539, (661) 945-9223
Palmdale Regional Airport	39516 N. 20th St. E., Palmdale 93550, (661) 266-7602
Palmdale Production Flight/Test Installation Plant 42	Palmdale
Santa Monica Municipal (SMO)	3200 Airport Dr., Santa Monica
Torrance Municipal (Zamperini Field) (TOA)	3115 Airport Dr., Torrance
Van Nuys (VNY)	16461 Sherman Way, Van Nuys
Whiteman Airport (WHP)	12653 Osborn St., Pacoima 91331, (818) 896-5271

Mass Transit

Table 3-16: Public Transit Ridership Los Angeles County, Fiscal Year 2004–2005 (updated 2011)

System	Ridership	Vehicles in Operation at Peak Weekday Usage
MTA* – Motor Bus	364,787,355	2,041
MTA* – Street Car	37,970,291	89
MTA* – Rapid Rail	36,272,621	62
Long Beach Transit	26,964,674	179
Santa Monica's Big Blue Bus	20,543,294	145
Foothill Transit	14,747,521	250
Montebello Bus Lines	9,474,939	67
Southern California Regional Rail Authority (MetroLink)	10,693,327	139
Gardena Municipal Bus Lines	4,656,211	40
Culver City Transit	5,402,335	32
Torrance Transit	4,612,548	55
Antelope Valley Transit Authority	2,693,772	49
Santa Clarita Transit	3,446,513	47
Norwalk Transit	2,556,054	27
Los Angeles Department of Transportation (LADOT) (Commuter Express; Community Connection; DASH)	2,404,328	146
Commerce Municipal Bus Lines	675,074	6
Downey LINK Public Transit Service	232,504	6
Palos Verdes Transit Authority	165,249	21
Beach Cities Transit (Redondo Beach)	56,918	5

**LA County Metropolitan Transit Authority (MTA), once known as Southern California Rapid Transit District (SCRTD)*
n/a = information not available
Source: California State Controller

The MTA bus system operates 185 routes. There are 18,500 bus stops in MTA's 1,433–square mile service area.

The oldest public transit bus systems still operating in Los Angeles County are Culver City Transit (established March 4, 1928) and Santa Monica's Big Blue Bus (established April 14, 1928).

There are 2,084 licensed taxi cabs in the City of Los Angeles, as compared to 12,187 in New York City and 6,300 in Chicago. It is estimated that from 1,500 to 4,000 "bandit" or unlicensed cabs also operate on L.A. streets.

Metropolitan Transit Authority (MTA) Light Rail Lines

Metro operates the Metro Rail system, which is exclusively within the county. It consists of 17.4 miles of subway and 55.7 miles of light rail. The Metro Rail system consists of the following lines: Red, Purple, Blue, Green and Gold. The hub of the system is in downtown Los Angeles at Union Station. The Metro lines that serve the unincorporated areas include the Blue, Green and Gold Lines. Blue line stations located in the unincorporated areas are located at the intersections at Slauson Avenue, Florence Avenue, Firestone Boulevard, and Imperial Highway. The Green Line has stations within unincorporated areas at the intersections of Vermont Avenue and Hawthorne Boulevard. The 13.7-mile Gold Line connects Union Station to Pasadena, and the six-mile Gold Line extension connects Union Station to East Los Angeles. Plans are underway to extend the Gold Line from Pasadena to Claremont by 2015.

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Figure 3-1: Metro Line (updated 2011)



Ports and Harbors

Ports, Harbors, and Piers, Los Angeles County

Major Ports	Smaller Harbors and Piers (Listed Geographically – South to North)
Port of Los Angeles 425 S. Palos Verdes St. PO Box 151 San Pedro 90733 (310) 519-7501 Port of Long Beach 925 Harbor Plaza PO Box 570 Long Beach 90801 (562) 437-0041	Avalon Bay, Avalon, Catalina Island Green Pleasure Pier, Avalon, Catalina Island Two Harbors, Catalina Island Alamitos Bay Marina, Long Beach Belmont Pier, Long Beach Long Beach Shoreline Marina (Downtown Marina) Rainbow Harbor/Rainbow Marina, Long Beach Cabrillo Pier, San Pedro Cabrillo Marina, San Pedro Port Royal Marina, Redondo Beach Portofino Marina, Redondo Beach Redondo Sportfishing Pier, Redondo Beach King Harbor Marina, Redondo Beach Hermosa Beach Municipal Pier Manhattan Beach Municipal Pier Marina del Rey Burton Chace Fishing Platform, Marina del Rey Venice Fishing Pier Santa Monica Pier Malibu Pier

Port of Los Angeles

The Port of Los Angeles is the number one port by container volume and cargo value in the United States, handling a record-breaking 8.4 million TEUs (twenty-foot equivalent units) in calendar year 2007.

The port prides itself on ultra-modern terminal efficiency, robust intermodal assets, and its world-class security operations, which include Homeland Security operations and the nation's largest dedicated port police force.



The port also is an environmental leader in the industry. In late 2006, the ports of Los Angeles and Long Beach created the San Pedro Bay Ports Clean Air Action Plan. This historic plan aims to reduce emissions from port-related operations by nearly 50% over a five-year period. The Port of Los Angeles has also invested in world-class waterfront development aimed at the San Pedro and Wilmington communities, and donates thousands of dollars each year to local community programs.

Today, the port generates 919,000 regional jobs and $39.1 billion in annual wages and tax revenues. A proprietary department of the City of Los Angeles, the port is self-supporting and does not receive taxpayer dollars. At the Port of Los Angeles, high priority is placed on responsible and sustainable growth initiatives, combined with high security, environmental stewardship, and community outreach.

The Port of Los Angeles celebrated its centennial on December 9, 2007, marking the 100th anniversary of the founding of the Los Angeles Board of Harbor Commissioners.

Port of Long Beach

The Port of Long Beach is one of America's premier seaports, and a trailblazer in goods movement and environmental stewardship.

Trade valued annually at more than $140 billion moves through Long Beach, making it the second-busiest seaport in the United States. Everything from clothing and shoes to toys, furniture, and consumer electronics arrives at the port before making its way to store shelves throughout the country. Specialized terminals also move petroleum, automobiles, cement, lumber, steel, and other products.

A major economic force, the port supports more than 30,000 jobs in Long Beach, 316,000 jobs throughout Southern California, and 1.4 million jobs throughout the United States. It generates about $16 billion in annual trade-related wages statewide.

With a "green: port policy guiding efforts to minimize or eliminate negative environmental impacts, the port also is a catalyst for innovative environmental programs. Serving as a model for ports around the world, the Port of Long Beach pioneered such programs as the green flag vessel speed reduction air quality program, green leases with environmental covenants, and the San Pedro Bay Ports Clean Air Action Plan. The port also is moving aggressively to outfit its container terminals with shore power. Shore power allows docked ships to plug into a land-based electric utility instead of burning diesel fuel to run their auxiliary engines, a source of pollution. By 2014, at least one berth at every container terminal will have shore power. By 2020, all container berths will have shore power.

With these bold initiatives, the port is dedicated to improving air quality more quickly and aggressively than has ever been attempted by any seaport, anywhere in the world.

For these reasons and more, the port is recognized internationally as one of the world's best seaports, and locally as a partner dedicated to helping the community thrive.

Climate

Local Meteorology

Monthly Average Maximum and Minimum Temperatures (updated 2011) (measured in degrees Fahrenheit)
(Source: http://www.laalmanac.com/)

Station	Avg. Temp.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Avalon [1]	Max.	61.9	62.9	63.3	65.3	66.9	69.2	72.1	73.5	73.0	70.7	67.1	63.2	67.4
	Min.	46.6	47.6	48.4	51.2	53.8	56.9	60.3	61.4	59.9	56.4	51.0	47.4	53.4
Burbank [2]	Max.	67.3	68.8	70.4	73.8	76.7	81.6	88.6	89.1	87.2	80.9	73.6	68.1	77.2
	Min.	41.6	43.6	45.7	49.0	53.5	57.2	61.1	61.3	59.1	53.3	45.9	41.7	51.1
Canoga Park [3]	Max.	67.9	70.0	72.3	76.8	81.1	87.4	94.9	95.4	91.7	84.0	74.8	68.8	80.4
	Min.	39.3	40.7	41.9	44.6	49.1	53.0	57.0	57.3	54.6	49.0	42.6	38.8	47.3
Culver City [4]	Max.	66.5	67.2	67.8	70.2	71.5	74.2	78.0	79.1	78.7	76.0	71.7	67.8	72.4
	Min.	45.2	46.5	48.2	51.2	54.4	58.0	61.2	61.8	60.5	56.1	50.1	46.0	53.3
Lancaster [5]	Max.	57.7	60.3	65.4	71.4	80.3	89.6	96.1	95.3	89.2	78.6	65.7	57.5	75.6
	Min.	31.2	34.8	39.7	44.8	53.4	60.9	66.4	64.1	57.0	46.4	35.4	29.0	46.9
Long Beach [6]	Max.	66.9	67.3	68.2	71.7	73.6	77.1	82.5	83.9	82.3	78.0	72.1	67.2	74.2
	Min.	45.6	47.3	49.7	52.3	56.8	60.3	63.7	64.9	62.8	57.9	50.4	45.3	54.7
Los Angeles Airport [7]	Max.	65.1	65.4	65.2	67.5	69.2	72.0	75.3	76.4	76.1	73.6	70.3	66.1	70.2
	Min.	47.4	48.9	50.4	52.9	56.3	59.6	62.9	63.8	62.6	58.5	52.2	47.9	55.3
Los Angeles Civic	Max.	66.4	67.4	68.8	71.1	73.1	77.1	82.5	83.2	81.8	77.5	72.9	67.6	74.1

Station	Avg. Temp.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Center[8]	Min.	48.4	49.7	51.2	53.5	56.6	59.8	63.2	64.0	62.7	58.8	53.4	49.3	55.9
Montebello [9]	Max.	69.4	71.1	72.8	77.8	79.4	83.7	88.6	89.7	87.9	82.6	75.4	70.9	79.1
	Min.	47.8	48.9	50.5	53.3	57.2	60.8	64.3	65.2	63.6	58.3	51.4	47.2	55.7
Mt Wilson [10]	Max.	51.9	52.5	54.0	59.3	66.6	75.4	81.7	81.1	77.3	68.8	59.3	53.1	65.1
	Min.	36.4	36.5	37.0	40.6	47.6	56.1	63.5	62.6	58.6	50.9	42.8	37.6	47.5
Palmdale [11]	Max.	58.3	62.1	67.1	73.9	81.8	90.1	97.5	96.8	91.3	80.2	67.2	58.8	77.1
	Min.	32.4	35.6	38.9	43.7	50.7	57.8	65.1	63.7	57.4	48.0	38.0	32.6	47.0
Pasadena [12]	Max.	66.9	68.4	70.3	73.9	76.8	81.7	88.6	89.5	87.6	81.1	73.9	67.8	77.2
	Min.	43.1	44.7	46.3	49.2	52.8	56.3	60.6	61.2	59.5	54.3	47.7	43.7	51.6
Pearblossom [13]	Max.	57.6	60.4	67.0	73.1	82.3	90.9	96.6	96.1	88.8	78.1	65.2	56.8	76.1
	Min.	37.0	38.7	41.8	45.5	52.6	59.7	66.0	66.5	60.3	52.7	42.4	35.7	49.9
Pomona Fairplex [14]	Max.	65.7	67.8	69.9	73.9	77.6	83.2	90.8	90.8	88.4	81.0	73.3	66.8	77.4
	Min.	38.4	40.6	42.6	45.8	50.1	53.5	57.9	58.3	55.9	50.5	42.8	38.7	47.9
Sandberg [15]	Max.	47.9	50.0	52.9	58.6	66.8	76.7	85.0	84.5	79.1	68.4	56.2	48.5	64.5
	Min.	35.4	36.5	37.3	40.8	46.9	55.1	63.1	62.6	58.8	50.8	41.8	35.8	47.1

Station	Avg. Temp.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
San Gabriel [16]	Max.	69.1	70.3	71.7	75.3	77.8	82.6	88.9	89.8	88.2	82.4	75.4	70.0	78.5
	Min.	41.6	43.5	45.7	49.0	53.3	57.0	60.9	61.3	59.3	53.6	46.1	41.8	51.1
Santa Monica Pier [17]	Max.	63.9	63.5	63.0	63.9	64.8	67.4	70.4	71.3	71.5	70.0	67.8	64.7	66.8
	Min.	49.6	50.3	51.2	53.2	55.8	58.8	61.5	62.5	61.7	58.6	53.9	50.0	55.6
Saugus [18]	Max.	54.3	62.5	67.6	72.8	77.6	85.9	93.2	93.2	91.5	82.2	73.5	62.2	76.4
	Min.	31.1	35.1	35.4	41.1	44.3	48.0	52.7	52.5	50.9	45.3	43.2	37.4	43.1
Torrance [19]	Max.	66.1	67.1	67.6	69.9	71.8	74.4	78.2	79.1	78.5	75.9	71.4	67.1	72.3
	Min.	45.0	46.3	47.6	50.2	54.0	57.1	60.6	61.4	60.0	55.9	49.7	45.3	52.8
UCLA[20]	Max.	65.7	66.5	66.4	68.4	69.3	72.3	76.8	77.8	77.7	74.9	71.1	66.7	71.1
	Min.	49.9	50.4	50.3	52.5	55.1	58.0	61.1	61.9	61.3	58.4	54.4	50.7	55.3

Snow in Los Angeles County

Snow in the Los Angeles Basin (where elevation ranges from sea level to about 1,200 feet, and where most of the population lives) is quite rare. Average low temperatures in the basin typically do not dip below the 40s, and less commonly into the high 30s. For measurable snow to occur, temperatures at ground level must be at or below 32 degrees Fahrenheit. Nevertheless, on January 17, 2007, an extremely rare light dusting of snow fell in the Malibu area and in West Los Angeles.

The National Weather Service records area weather data in downtown Los Angeles, at the Los Angeles International Airport, and in Long Beach. These locations, for the reasons outlined above, rarely experience snow. Snow does fall annually in the San Gabriel Mountains in Los Angeles County, and even occasionally in the foothills. The unincorporated community of Altadena, for example, lies about 1,300 feet above sea level, and experiences trace amounts of snow about once a decade and measurable amounts about once every two decades. Mountains in Los Angeles County may get snow as early as late October down to 7,000 feet and, by early December, down to 3,000 feet. By mid-April, snow rarely be found in the mountains below 7,000 foot, but may still remain on some peaks into mid-summer.

Table 3-17: Snowfall Records at Los Angeles Civic Center (updated 2011)

In a 24-Hour Period	In 1 month
A bit more than 0.3 inches January 10–11, 1949	A bit more than 0.3 inches January 1949

Table 3-18: Latest Incidents of Snowfall at Los Angeles International Airport, Los Angeles Civic Center, Long Beach (updated 2011)

Location (in 24 hours)	Amount	Date
Los Angeles Intl. Airport	trace (less than 0.5 inches)	January 22, 1962
Los Angeles Civic Center	trace (less than 0.5 inches)	January 22, 1962
Long Beach	trace (less than 0.5 inches)	January 22, 1962

Table 3-19: Snowfall Occurrences 1921–2002 in Downtown Los Angeles (Civic Center) (updated 2011) Source: National Weather Service

Year	Month & Amount of Snowfall	Year	Month & Amount of Snowfall
1922	January (trace), March (trace)	1951	February (trace), March (trace)
1935	December (trace)	1952	January (trace), March (trace), December (trace)
1947	December (trace)	1954	January (0.3 inches), February (trace)
1949	January (slightly more than 0.3 inches)	1957	January (trace)
1950	April (0.2 inches)	1962	January (trace)

The Warming of Los Angeles

By the 1990s, average temperatures in Los Angeles had risen to be 5 degrees Fahrenheit warmer than in 1940. This was due to the dramatic loss of Los Angeles County orchards and farmland in favor of buildings and roads. The increased concrete and asphalt served to absorb solar heat and heat up the surrounding atmosphere, causing a massive "urban heat island". Studies suggest that a massive planting of trees in the San Fernando Valley alone could lower average temperatures as much as 9 degrees Fahrenheit.

Rainfall Record

California's record rainfall for a 24-hour period was 26.12 inches, occurring January 22–23, 1943, at Hoegees Camp in Los Angeles County (18 miles north of Los Angeles City Hall in the San Gabriel Mountains).

Seasonal Extremes

Table 3-20: Wettest Seasons (Period: July 1 to June 30 of following year)

Total Inches of Rainfall	Season	Total Inches of Rainfall	Season
38.18	1883–1884	26.21	1951–1952
34.84	1889–1890	24.35	1994–1995
33.44	1977–1978	23.65	1913–1914
32.76	1940–1941	23.43	1937–1938
31.25	1982–1983	22.41	1936–1937
31.01	1997–1998	22.41	1966–1967
27.47	1968–1969	22.31	1885–1886
27.36	1992–1993	21.66	1934–1935
26.98	1979–1980	21.26	1877–1878
26.28	1892–1893	21.26	1972–1973

Table 3-21: Wettest Days in Los Angeles County

Total Inches of Rainfall	Date	Total Inches of Rainfall	Date
5.88	Mar. 2, 1938	3.51	Nov. 22, 1965
5.71	Jan. 26, 1956	3.43	Jan. 25, 1969
4.86	Dec. 31, 1933	3.43	Jan. 22, 1943
3.96	Sep. 25, 1939	3.42	Mar. 1, 1983
3.85	Nov. 7, 1966	3.30	Jan. 10, 1995
3.84	Dec. 29, 1965	3.30	Jan. 20, 1969
3.69	Jan. 22, 1967	3.24	Jan. 4, 1995
3.61	Nov. 19, 1967	3.12	Mar. 3, 1943
3.60	Feb. 20, 1944	3.12	Jan. 1, 1934
3.52	Jan. 7, 1974	3.03	Feb. 16, 1980

In 1916, Sunkist took out a full-page ad in the Saturday Evening Post *with the slogan, "Drink an Orange." It was the first attempt to persuade people to squeeze an orange and drink the juice. The ad offered a Sunkist orange extractor for 10 cents. It was this campaign that served as the earliest origins of orange juice for breakfast.*

Agriculture

Table 3-22: Number and Size of Farms in Los Angeles County (updated 2011)
Source: U.S. Census Bureau

Year	Number of Farms	Farm Land (acres)	Average Size of Farms (acres)	Percent of Land in Farms	Harvested Cropland (acres)
2002	1,543	111,458	72	4.3	24,033
1997	1,226	130,838	107	5.1	23,805
1992	1,446	183,569	127	7.1	29,347
1987	2,035	280,156	138	10.8	37,102
1982	2,331	317,757	136	12.2	53,130
1978	1,952	369,061	189	14.2	54,362
1974	1,797	400,500	223	15.4	64,806
1969	2,804	557,770	199	21.4	84,319
1964	2,800	585,340	209	22.5	90,583
1959	4,811	479,011	100	18.4	126,952
1954	8,254	743,613	90	28.5	195,315
1950	11,973	855,563	72	32.8	229,047

Year	Number of Farms	Farm Land (acres)	Average Size of Farms (acres)	Percent of Land in Farms	Harvested Cropland (acres)
1940	12,475	n/a	n/a	n/a	n/a
1930	12,653	527,124	42	20.0	230,068
1920	12,444	882,333	71	33.5	n/a
1910	7,919	757,985	96	29.1	n/a
1900	6,577	895,663	136	34.4	n/a
n/a = Data not available					

Table 3-23: Agricultural Products, Los Angeles County, 2007 (updated 2011)
Source: L.A. County Agricultural Commissioner/Weights & Measures Dept.

Product	Value
Ornamental Trees & Shrubs	$118,240,000
Root Vegetables (includes carrots, potatoes, beets, radishes, turnips, etc.)	$44,111,000
Bedding Plants	$35,369,000
Dry Onions	$12,797,000
Peaches	$11,672,000
Indoor Plants, Foliage	$7,171,000
Alfalfa Hay	$5,897,000
Herbs (includes cilantro, parsley, chives, mint, thyme, etc.)	$4,550,000
Indoor Plants, Flowering	$3,643,000
Strawberries	$2,807,000
Table Greens (includes lettuce, spinach, kale, & oriental specialties)	$1,802,000
Rangeland	$1,611,000
Vine Crops (includes cucumbers, pumpkins, tomatoes, squashes, melons, & green beans)	$1,570,000
Ground Covers	$1,486,000
Grain Hay	$929,000

Product	Value
Apples	$560,000
Honey	$503,000
Grapes	$436,000
Cherries	$406,000
Avocados	$124,000
Beeswax	$82,000
Christmas Trees	$34,000
Firewood	$6,000

Also grown in L.A. County: *nectarines, orchids, cacti, sod, citrus, Asian pears; includes sweet corns, leeks, green onions, bell peppers, oat hay, Sudan hay, lilacs, mums, yarrow, gypsophila, carnations, delphinium, freesia*

Table 3-24: Selected Livestock Inventory, Los Angeles County (updated 2011)

Stock	2002		1997		1992		1987	
	Farms	Inventory	Farms	Inventory	Farms	Inventory	Farms	Inventory
Beef Cows	75	*	84	*	94	6,993	194	4,524
Milk Cows	22	*	7	*	16	2,410	37	4,428
Hogs & Pigs	67	550	59	1,683	88	1,393	125	2,568
Sheep & Lambs	93	2,969	60	8,213	92	14,855	144	19,750
Chickens (layers and pullets – 13 weeks old+)	143	8,458	87	8,821	156	44,549	245	375,520
Chickens (broilers and other meat-type chickens sold)	9	492	11	180,753	13	1,925,148	39	2,197,619

** Withheld to avoid disclosing data for individual farms*

Table 3-25: Horses and Ponies (updated 2011)
Source: U.S. Census Bureau

Year	2002	1997	1992
Horse/Pony Farms	669	391	593
Horse/Pony Inventory	6,142	5,716	6,703
Horses/Ponies Sold	484	421	784
Value of Horses/Ponies Sold	n/a	$1,651,000	$1,968,00

n/a=data not available

Environmental Management

Los Angeles County Sanitation Districts

The Sanitation Districts is a confederation of independent special districts serving the water pollution control and solid waste management needs of more than half the people of Los Angeles County. The agency is made up of 23 separate districts working cooperatively under one administrative staff headquartered near Whittier. The policy body for the Sanitation Districts consists of the mayors of the 78 cities on the system, as well as the County Board of Supervisors.

Source: Los Angeles County Sanitation Districts

The Sanitation Districts provide environmentally sound, cost-effective wastewater and solid waste management for over half the population of Los Angeles County, and, in doing so, take what others had thought of as waste and turn it into resources such as reclaimed water, energy, and recyclable materials.

The Sanitation Districts function on a regional scale and consist of 23 independent special districts serving about 5.7 million people in Los Angeles County. The service area covers approximately 820 square miles and encompasses 78 cities and unincorporated territory within the county.

The Sanitation Districts construct, operate, and maintain facilities to collect, treat, recycle, and dispose of sewage and industrial wastes and provide for the management of solid wastes, including disposal, transfer operations, and materials recovery. Local sewers and laterals that connect to the Sanitation Districts' trunk sewer lines are the responsibility of the local jurisdictions, as is the collection of solid wastes.

The agency is made up of 23 separate sanitation districts working cooperatively under a joint administration agreement. Each sanitation district has a separate board of directors consisting of the mayor of each city within the district, and the chair of the Board of Supervisors for county unincorporated territory. Each sanitation district pays its proportionate share of joint administrative costs.

Approximately 1,400 miles of main trunk sewers and 11 wastewater treatment plants convey and treat about half the wastewater in Los Angeles County. The Sanitation Districts' solid waste management sites similarly provide about one-third of the countywide solid waste management needs. The Sanitation Districts operate three sanitary landfills, four landfill energy recovery facilities, two recycle centers, and three materials recovery/transfer facilities, and participate in the operation of two refuse-to-energy facilities.

Overall, wastewater and solid waste management budgets for 2010–11 are $662 million and $260 million, respectively. Both systems provide their essential public services at some of the most competitive service charges in the country.

Wastewater Management System

Joint Outfall System



Seventeen of the sanitation districts that provide sewerage services in the metropolitan Los Angeles area are also signatory to a joint outfall agreement that provides for a regional, interconnected system of facilities known as the Joint Outfall System. The service area of the Joint Outfall System encompasses 73 cities and unincorporated territory, and includes some areas within the City of Los Angeles.

This system provides sewage treatment and disposal for residential, commercial, and industrial users and includes the following treatment plants:

- Joint Water Pollution Control Plant located in the City of Carson
- Whittier Narrows Water Reclamation Plant (WRP) near the City of South El Monte
- Los Coyotes WRP in the City of Cerritos
- San Jose Creek WRP adjacent to the City of Industry
- Long Beach WRP in the City of Long Beach
- Pomona WRP in the City of Pomona
- La Canada WRP in the City of La Canada Flintridge

In addition, the system includes trunk sewers and pumping plants. Sanitation District No. 2 acts as the agent for the other signatory Sanitation Districts in administering the Joint Outfall Agreement.

Outlying Systems

Each of the other active sanitation districts provides sewerage service either through a system that is separate from the Joint Outfall System, or by means of a contract with the City of Los Angeles:

- Sanitation Districts Nos. 26 and 32 serve the Santa Clarita Valley and operate the Saugus and Valencia WRPs under a joint powers agreement.
- Sanitation Districts Nos. 14 and 20 serve the Antelope Valley, and operate the Lancaster and Palmdale WRPs, respectively.
- Sanitation Districts Nos. 4, 9, and 27 are served by contracts with the City of Los Angeles.
- Sanitation District No. 34, located in La Crescenta, and Sanitation District No. 35, located within the unincorporated area of Acton, have not yet constructed sewerage systems. These sanitation districts are currently inactive, and sewerage service in these areas is provided by individual private disposal systems.

Solid Waste Management System

Within Districts' Boundaries



Seventeen of the districts in the metropolitan Los Angeles area are served by a regional, interconnected system of facilities known as the Joint Outfall System (JOS). The JOS service area includes 73 cities and unincorporated territory, and small areas within the City of Los Angeles, Orange County, and San Bernardino County.

The JOS employs two main types of treatment plants. Upstream water reclamation plants capture higher quality wastewater and convert it into a drought-proof source of water called reclaimed water. Downstream, the Joint Water Pollution Control Plant (JWPCP) treats wastewater with a higher industrial contribution, and the solids are removed at the upstream plants. The JWPCP discharges its treated water to the ocean. This innovative configuration provides an efficient means to maximize recycled water production and its availability on a regional scale. Treating wastewater for reuse is an important way that Southern Californians can maintain a high quality of life in an otherwise arid land.

There are six water reclamation plants (WRPs) in the JOS, which spans from Long Beach to La Cañada Flintridge, and from the Los Angeles City boundary to the Orange County line.

- The La Cañada WRP in the City of La Cañada Flintridge
- The Long Beach WRP in the City of Long Beach
- The Los Coyotes WRP in the City of Cerritos
- The Pomona WRP in the City of Pomona
- The San Jose Creek WRP adjacent to the City of Industry
- The Whittier Narrows WRP near the City of South El Monte

Santa Clarita and Antelope Valleys

Separate from the JOS, smaller regional wastewater systems are managed by the districts in the Santa Clarita Valley and the Antelope Valley. Each of these valley areas is home to two water reclamation plants that provide important sources of water for wildlife habitats and for municipal and agricultural reuse.

- The Santa Clarita Valley Sanitation District operates the Saugus and Valencia WRPs.
- Sanitation Districts Nos. 14 and 20 serve the Antelope Valley. Sanitation District No. 14 operates the Lancaster WRP, and Sanitation District No. 20 operates the Palmdale WRP.

The sanitation districts are pioneers in using recycled water beneficially, and remain strong proponents of expanding reuse options. The JOS WRPs produce a high-quality source of reclaimed water that essentially meets drinking water standards, and is reused at about 570 sites throughout the county. Wastewater received at the JWPCP is higher in salts, making it more costly to reclaim and reuse. Uses of recycled water include industrial, commercial, and recreational applications; groundwater recharge; agriculture; and landscape, park, and golf course irrigation.

500,000 tons of biosolids per year: that's how much the Sanitation Districts' sewerage system produces as a byproduct of wastewater treatment. Prior to dewatering, the biosolids are digested, producing a biogas that is converted to electricity or used for heating parts of the biological process. As a result, the JWPCP is energy self-sufficient and excess electricity is supplied to the power grid, which helps meet the growing needs of Southern California. Biosolids are also beneficially reused through a variety of management options: as a soil amendment for agriculture, in the manufacture of high-quality compost, and by injecting into a cement kiln to help reduce emissions.

Looking toward a sustainable future, the Sanitation Districts' long-range plan includes utilization of two state-of-the-art composting sites. The Inland Empire Regional Composting Facility in Rancho Cucamonga is an entirely enclosed composting facility recently developed in a joint venture with the Inland Empire Utilities Agency. The Westlake Farms Co-Composting Facility in Kings County will compost Sanitation Districts' biosolids with the Central Valley's agricultural waste and urban green waste. This facility is scheduled to be operational in 2013.

The Sanitation Districts operate a comprehensive solid waste management system serving the needs of a large portion of Los Angeles County. This system includes sanitary landfills, recycle centers, materials recovery/transfer facilities, and energy recovery facilities. In every operation, the first order of business is to ensure a "good neighbor policy" that strives for a safe balance with surrounding communities.



The Puente Hills Landfill, located near the City of Whittier, is one of the largest landfills in the nation. Puente Hills is the site of the development of advanced environmental control systems that are now used at well-operated landfills throughout the state and nation. These systems, designed to protect air quality and groundwater, include extensive landfill gas collection networks and underground liners.

The two other operational sites are the Calabasas Landfill, located near the City of Agoura Hills, and the Scholl Canyon Landfill, located in the City of Glendale. At the closed Spadra, Palos Verdes, and Mission Canyon landfills, the Sanitation Districts continue to maintain environmental control systems.

Energizing Southern California through Recovery Facilities

One of the first to utilize landfill gas as a natural resource to produce renewable energy, the Sanitation Districts energy recovery facilities at the Puente Hills, Spadra, Calabasas, and Palos Verdes landfills provide reliable and economic electrical power to help serve Southern California's increasing energy needs.

The use of solid waste as a fuel to produce power reduces our reliance on fossil fuels while helping to prolong the remaining landfill capacity in the region. The Commerce Refuse-to-Energy Facility is the first of its kind in California. It is owned by a Joint Powers Authority (JPA) created by the Sanitation Districts and the City of Commerce, and is operated by the Sanitation Districts. Similarly, the Southeast Resource Recovery Facility (SERRF) in Long Beach is owned by a JPA consisting of the districts and the City of Long Beach, and is operated for the JPA by a private company.

Recycling and Materials Recovery/Transfer Facilities

As the list of recyclables continues to grow, the Districts are deploying new, more sophisticated technology to maximize cost-efficiency. In fact, the Sanitation Districts own and operate facilities that help Los Angeles County meet its goals in diverting waste from landfills and in providing cost-effective transfer of municipal solid waste to landfills by truck or rail.

The recycle centers located at the Puente Hills and Palos Verdes landfills are certified California buy-back centers. The Puente Hills Materials Recovery Facility (MRF) and the Downey Area Recycling and Transfer (DART) Facility recover recyclable materials, such as paper and plastics, through a combination of manual and mechanical methods. The South Gate Transfer Station reduces operational costs by consolidating smaller loads into larger ones for transport to landfills.

Tracking the Future with Waste-By-Rail

The pioneering spirit is again apparent as the Sanitation Districts take the lead role in implementing the waste-by-rail system, the transport of waste to distant disposal facilities by train. This innovative system will provide long-term disposal capacity to replace local landfills as they reach capacity and close.

The Puente Hills MRF was the initial infrastructure for the waste-by-rail system. To further develop the system, the Districts have completed construction of the Mesquite Regional Landfill in Imperial County (see map below), which is permitted to handle up to 20,000 tons per day for approximately 100 years. Development of the intermodal facility is now under way. The agency has also entered into a purchase agreement for the fully permitted Eagle Mountain Landfill in Riverside County, but the acquisition is contingent on successful resolution of pending federal litigation.



Energy Recovery

The Sanitation Districts are leaders in the production of green energy and the recycling of water and materials. The following are just a few of the statistics that have helped to achieve this status.

- Almost 130 megawatts (MW) of electricity are generated in Sanitation Districts' wastewater and solid waste operations. In total, the Sanitation Districts produce power equivalent to the needs of about 170,000 Southern California homes. Generation was increased with a new gas-to-energy facility at the Calabasas Landfill in 2010. Some of the electricity is used in powering Districts' operations; the rest is used to reduce the amount of power produced by utilities, thereby reducing greenhouse gas emissions.

- The JWPCP uses biogas to generate 18 MW of electricity, making the facility virtually energy self-sufficient and saving approximately $20 million per year. Excess electricity is sold to the local power grid.

Energy Efficiency in Wastewater

The Sanitation Districts have been leaders in energy efficiency at wastewater treatment plants for decades. Technologies such as fine bubble diffusion, variable speed drives, and high-efficiency motors have allowed the Sanitation Districts to save over $5 million in the past three years.

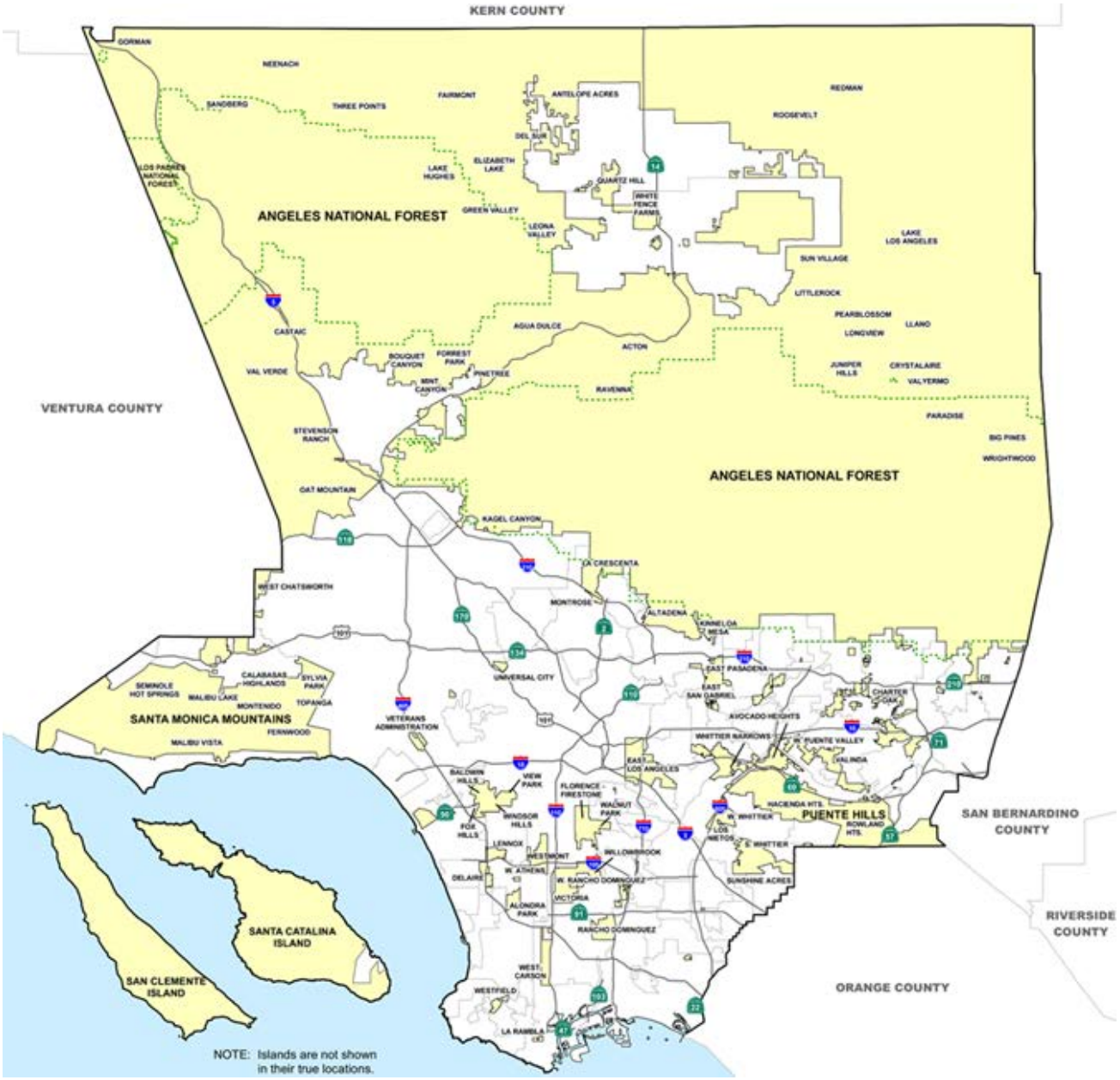
- Gas-to-Energy Facilities: Biogas, generated during the decomposition of organic material managed in landfills, is used to generate electricity. At the Puente Hills Landfill alone, enough electricity is generated to power almost 60,000 Southern California homes. It is sold to the local power grid or used at the nearby San Jose Creek Water Reclamation Plant.

- Commerce Refuse-to-Energy Facility and SERRF: These facilities utilize controlled combustion to convert refuse to electricity—enough to power approximately 55,000 Southern California homes. Sophisticated air pollution control devices make these facilities some of the cleanest of their type in the world.

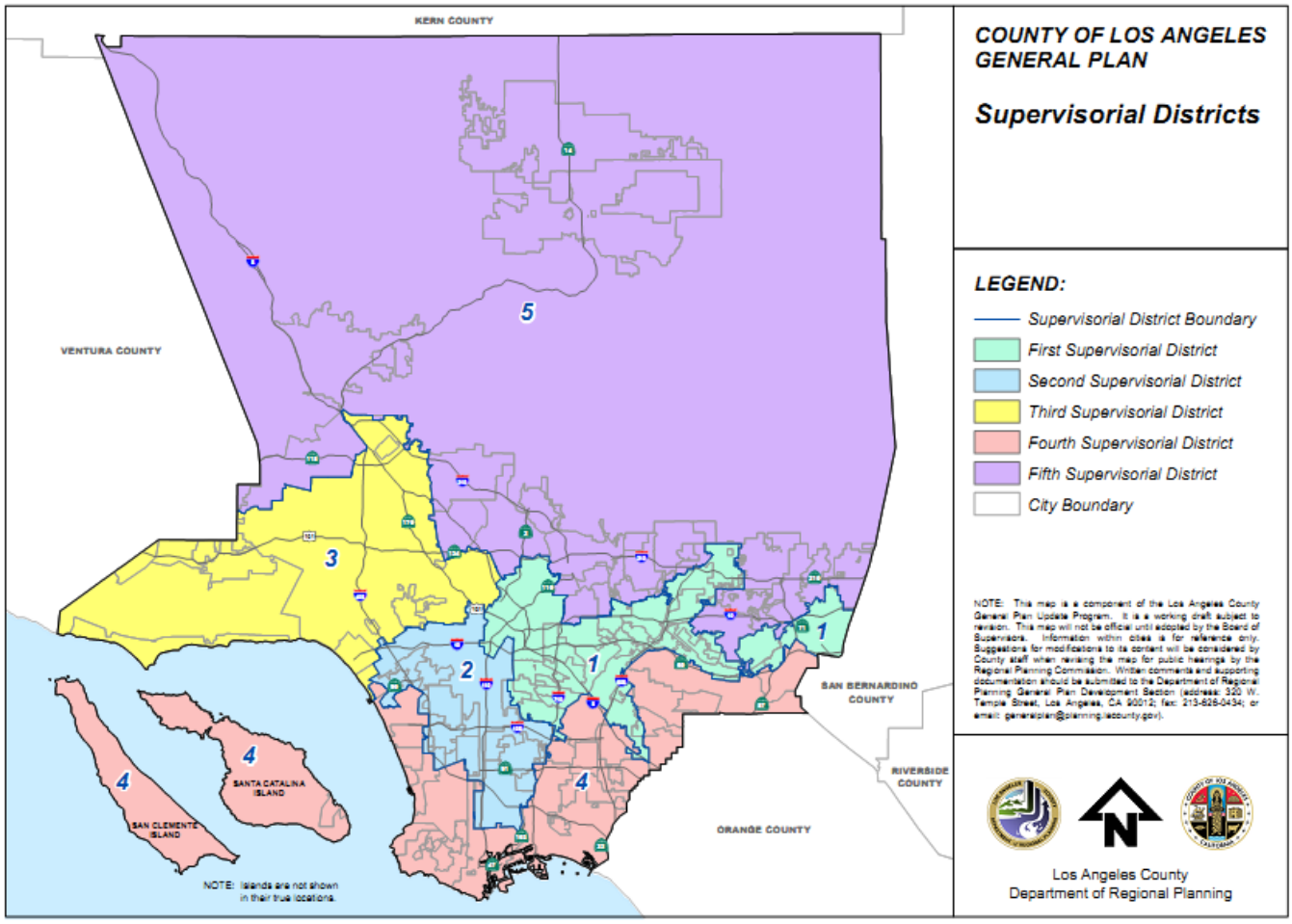
Unincorporated Areas

More than 65% of the county (or 2,640 square miles) is unincorporated, and contains approximately 10.5% of the total residents in Los Angeles County. The Board of Supervisors is the elected decision-making body. The board has executive, legislative, and quasi-judicial roles, and appoints all department heads except the assessor, district attorney, and sheriff, which are elective positions.

Map 3-9: Unincorporated Areas of Los Angeles County (yellow areas)
(Source: County of Los Angeles General Plan Draft 2014)



Map 3-10: Los Angeles County Supervisorial Districts
By Unincorporated Community and City (except for City of Los Angeles)
(Source: County of Los Angeles General Plan Draft 2014)



Administrative Body

Table 3-26: Los Angeles County Supervisors (Elected) 2012

District	Supervisor
1	Gloria Molina
2	Mark Ridley-Thomas
3	Zev Yaroslavsky
4	Don Knabe
5	Michael D. Antonovich

The unincorporated areas in the northern portion of the county are covered by large amounts of sparsely populated land, and include the Angeles National Forest, part of the Los Padres National Forest, and the Mojave Desert. The unincorporated areas in the southern portion of the county consist of 58 noncontiguous land areas, which are often referred to as the county's unincorporated urban islands. There are a total of 53 communities in the unincorporated area of Los Angeles County.

Table 3-27: Unincorporated Communities in the County of Los Angeles
(Source: www.laalmanac.com)

Community	2010 Census	Community	2010 Census	Community	2010 Census
Acton	7,596	East San Gabriel	14,874	Mayflower Village	5,515
Agua Dulce	3,342	Elizabeth Lake	1,756	Pearblossom	3,723
Alondra Park	8,592	Florence-Graham	63,387	Quartz Hill	10,912
Altadena	42,777	Green Valley	1,027	Rose Hills	2,803
Avocado Heights	15,411	Hacienda Heights	54,038	Rowland Heights	48,993
Castaic	19,015	Hasley Canyon	1,137	San Pasqual	2,041
Charter Oak	9,310	La Crescenta-Montrose	19,653	South Monrovia Island	6,777
Citrus	10,866	Ladera Heights	6,498	South San Gabriel	8,070
Del Aire	10,001	Lake Hughes	649	South San Jose Hills	20,551
Desert View Highlands	2,360	Lake Los Angeles	12,328	South Whittier	57,156
East La Mirada	9,757	Lennox	22,753	Stevenson Ranch	17,557
East Los Angeles	126,496	Leona Valley	1,607	Sun Village	11,565
East Pasadena	6,144	Littlerock	1,377	Sun Village	11,565
East Rancho Dominguez	15,135	Marina del Rey	8,866	Topanga	8,289
Val Verde	2,468	Walnut Park	15,966	West Rancho Dominguez	5,669
Valinda	22,822	West Athens	8,729	West Whittier-Los Nietos	25,540

Community	2010 Census	Community	2010 Census	Community	2010 Census
View Park-Windsor Hills	11,075	West Carson	21,699	Westmont	31,853
Vincent	15,922	West Puente Valley	22,636	Willowbrook	35,983

Table 3-28: Unincorporated Supervisorial Representation
(Source: County of Los Angeles Public Information Office Web Site)

Unincorporated Areas within the County of Los Angeles by Supervisorial District

"Enriching Lives"

First District (22)

Avocado Heights
Bandini (islands)
Bassett
Citrus (Covina islands) (portion)
East Azusa (islands) (portion)
East Los Angeles:
- Belvedere Gardens
- City Terrace
- Eastmont

Firestone (portion)
Florence (portion)
Graham (portion)
Hacienda Heights (portion)
Los Nietos (portion)
North Claremont (islands) (portion)
Rowland Heights (portion)
South San Gabriel
South San Jose Hills
South Whittier (portion)
Sunshine Acres
Valinda
Walnut Park
West Puente Valley
West Whittier (portion)
Whittier Narrows

Second District (20)

Athens (or West Athens)
Baldwin Hills
Del Aire
East Compton
El Camino Village
Firestone (portion)
Florence (portion)
Graham (portion)
Ladera Heights
Lennox
Marina del Rey (portion)
Rancho Dominguez
View Park
West Carson (portion)
West Compton
West Rancho Dominguez
Westmont
Willowbrook
Wiseburn
Windsor Hills

Third District (12)

Agoura
Calabasas (adjacent)
Calabasas Highlands
Franklin Canyon
Lake Balboa
Malibu Vista
Mulholland Corridor
- Cornell
- Las Virgenes/Malibu Canyon
- Malibou Lake
- Malibu Bowl
- Malibu Highlands
- Malibu/SycamoreCanyon
- Monte Nido
- Seminole Hot Springs
- Sunset Mesa
- Triunfo Canyon

Topanga Canyon
- Fernwood
- Glenview
- Sylvia Park
- Topanga

Universal City
Valley Glen
Veterans Administration Center
West Chatsworth (portion)

Fourth District (17)

East Whittier
Hacienda Heights (portion)
La Rambla
Long Beach (islands)
Los Cerritos Wetlands
Los Nietos (portion)
Marina del Rey (portion)
Northeast Whittier (portion)
Norwalk/Cerritos (islands) (portion)
Northwest Whittier
Rowland Heights (portion)
San Clemente Island
Santa Catalina Island
South Whittier (portion)
West Carson (portion)
West Whittier (portion)
Westfield

Fifth District (69)

Acton
Agua Dulce
Alpine
Altadena
Antelope Acres
Big Pines
Bouquet Canyon
Canyon Country
Castaic Junction
Charter Oak (islands)
Citrus (Covina islands) (portion)
Crystalaire
Deer Lake Highlands
Del Sur
East Azusa (islands) (portion)
East Pasadena
East San Gabriel
El Dorado
Elizabeth Lake
Fairmont
Forrest Park
Glendora (islands)
Gorman
Green Valley
Hi Vista
Juniper Hills
Kagel Canyon
Kinneola Mesa
La Crescenta
Lake Hughes
Lake Los Angeles
Lakeview
Lang
Leona Valley
Littlerock
Llano
Longview
Mint Canyon
Monrovia/Arcadia/ Duarte (islands)
Montrose
Neenach
Newhall
North Claremont (islands) (portion)
Northeast San Dimas (islands)
Oat Mountain
Pearblossom
Placerita Canyon
Quartz Hill
Redman
Roosevelt
San Pasqual
Saugus
Soledad
Stevenson Ranch
Sulphur Springs
Sunland/Sylmar/Tujunga (adjacent)
Sun Village
Three Points
Twin Lakes
Val Verde
Valencia
Valyermo
Vasquez Rocks
West Arcadia (islands)
West Chatsworth (portion)
West Pomona (islands)
White Fence Farms
Wilsona Gardens
Wrightwood

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http://lacounty.gov
REV. 2/08 AS (13)

Table 3-29: Geographic Size (Square Miles)
(* Unincorporated Places, Source: U.S. Census Bureau)

Place	Area (Square Miles)		
	Total	Land	Water
Acton*	4.64	4.64	0.00
Agoura Hills	8.20	8.18	0.03
Agua Dulce*	22.85	22.84	0.01
Alhambra	7.62	7.62	0.00
Alondra Park*	1.16	1.14	0.02
Altadena*	8.70	8.70	0.00
Arcadia	11.11	10.98	0.12
Artesia	1.62	1.62	0.00
Avalon	3.15	2.81	0.33
Avocado Heights*	2.82	2.67	0.15
Azusa	8.90	8.90	0.00
Baldwin Park	6.80	6.66	0.13
Bell	2.64	2.48	0.17
Bellflower	6.15	6.07	0.07
Bell Gardens	2.49	2.49	0.00
Beverly Hills	5.67	5.67	0.00
Bradbury	1.91	1.91	0.00
Burbank	17.36	17.35	0.02
Calabasas	13.15	13.10	0.05
Carson	18.97	18.84	0.12
Castaic*	7.278	7.26	0.017
Cerritos	8.89	8.62	0.27
Charter Oak*	0.93	0.93	0.00
Citrus*	0.90	0.90	0.00
Hacienda Heights*	11.39	11.38	0.01
Hasley Canyon	5.74	5.74	0

Place	Area (Square Miles)		
	Total	Land	Water
Claremont	13.43	13.14	0.28
Commerce	6.57	6.57	0.00
Compton	10.20	10.13	0.07
Covina	6.97	6.97	0.01
Cudahy	1.12	1.12	0.00
Culver City	5.13	5.11	0.02
Del Aire*	0.99	0.99	0.00
Desert View Highlands*	0.47	0.47	0.00
Diamond Bar	14.76	14.76	0.00
Downey	12.59	12.42	0.17
Duarte	6.68	6.68	0.00
East La Mirada*	1.11	1.11	0.00
East Los Angeles*	7.45	7.44	0.00
East Pasadena*	1.32	1.32	0.00
East Rancho Dominguez*	0.82	0.82	0.0
East San Gabriel*	1.57	1.55	0.01
El Monte	9.69	9.55	0.14
El Segundo	10.80	5.54	5.26
Elizabeth Lake*	6.55	6.25	0.30
Florence-Graham*	3.58	3.58	0.00
Gardena	5.82	5.82	0.00
Glendale	30.67	30.65	0.02
Glendora	19.27	19.14	0.13
Green Valley*	12.8	12.8	0.0
Long Beach	65.87	50.44	15.43
Los Angeles	498.29	469.07	29.22

Place	Area (Square Miles)		
	Total	Land	Water
Hawaiian Gardens	0.98	0.96	0.02
Hawthorne	6.06	6.06	0.00
Hermosa Beach	5.91	1.43	4.48
Hidden Hills	1.65	1.65	0.00
Huntington Park	3.03	3.03	0.00
Industry	11.89	11.72	0.18
Inglewood	9.14	9.14	0.00
Irwindale	9.46	9.29	0.17
La Cañada Flintridge	8.65	8.65	0.00
La Crescenta–Montrose*	3.43	3.43	0.00
Ladera Heights*	2.94	2.94	0.00
Lake Hughes*	10.65	10.62	0.06
La Habra Heights	6.20	6.20	0.00
Lake Los Angeles*	13.06	13.01	0.05
Lakewood	9.50	9.43	0.07
La Mirada	7.88	7.85	0.03
Lancaster	94.18	94.00	0.18
La Puente	3.49	3.49	0.00
La Verne	8.41	8.31	0.10
Lawndale	1.98	1.98	0.00
Lennox*	1.08	1.08	0.00
Leona Valley*	18.58	18.55	0.03
Littlerock*	1.45	1.45	0.00
Lomita	1.90	1.90	0.00
Rowland Heights*	9.02	9.02	0.00
San Dimas	15.63	15.51	0.12
San Fernando	2.38	2.38	0.00

Place	Area (Square Miles)		
	Total	Land	Water
Lynwood	4.85	4.85	0.00
Malibu	100.96	19.87	81.09
Manhattan Beach	10.36	3.93	6.43
Marina del Rey*	1.47	0.88	0.59
Mayflower Village*	0.66	0.66	0.00
Maywood	1.18	1.18	0.00
Monrovia	13.81	13.75	0.07
Montebello	8.35	8.25	0.11
Monterey Park	7.67	7.63	0.03
North El Monte*	0.42	0.42	0.00
Norwalk	9.74	9.68	0.05
Palmdale	105.10	104.96	0.14
Palos Verdes Estates	4.79	4.79	0.00
Paramount	4.84	4.73	0.10
Pasadena	23.17	23.10	0.07
Pico Rivera	8.84	8.30	0.55
Pomona	22.84	22.84	0.00
Quartz Hill*	3.82	3.82	0.00
Rancho Palos Verdes	13.66	13.66	0.00
Redondo Beach	6.43	6.28	0.14
Rolling Hills	3.08	3.08	0.00
Rolling Hills Estates	3.60	3.59	0.02
Rosemead	5.15	5.15	0.01
Rose Hills*	0.439	0.439	0.00
Walnut Park*	0.74	0.74	0.00
West Athens*	1.34	1.34	0.00
West Carson*	2.26	2.26	0.00

Place	Area (Square Miles)		
	Total	Land	Water
San Gabriel	4.13	4.13	0.00
San Marino	3.77	3.77	0.00
San Pasqual*	0.255	0.255	0.00
Santa Clarita	47.85	47.83	0.02
Santa Fe Springs	8.86	8.75	0.11
Santa Monica	15.91	8.26	7.65
Sierra Madre	3.01	3.00	0.01
Signal Hill	2.23	2.23	0.00
South El Monte	2.89	2.88	0.00
South Gate	7.48	7.37	0.12
South Monrovia Island	0.55	0.55	0.00
South Pasadena	3.44	3.44	0.00
South San Gabriel*	0.83	0.83	0.00
South San Jose Hills*	1.46	1.46	0.00
South Whittier*	5.38	5.38	0.00
Temple City	4.01	4.01	0.00
Torrance	20.54	20.54	0.00
Valinda*	2.01	2.01	0.00
Val Verde*	0.33	0.33	0.00
Vernon	5.16	5.00	0.16
View Park-Windsor Hills*	1.86	1.86	0.00
Vincent*	1.50	1.50	0.00
Walnut	8.98	8.98	0.00

Place	Area (Square Miles)		
	Total	Land	Water
West Compton*	1.64	1.64	0.00
West Covina	16.11	16.11	0.00
West Hollywood	1.88	1.88	0.00
Westlake Village	5.66	5.21	0.45
Westmont*	1.85	1.85	0.00
West Puente Valley*	1.75	1.75	0.00
West Whittier-Los Nietos*	2.51	2.51	0.00
Whittier	14.63	14.63	0.00
Willowbrook*	3.74	3.74	0.00

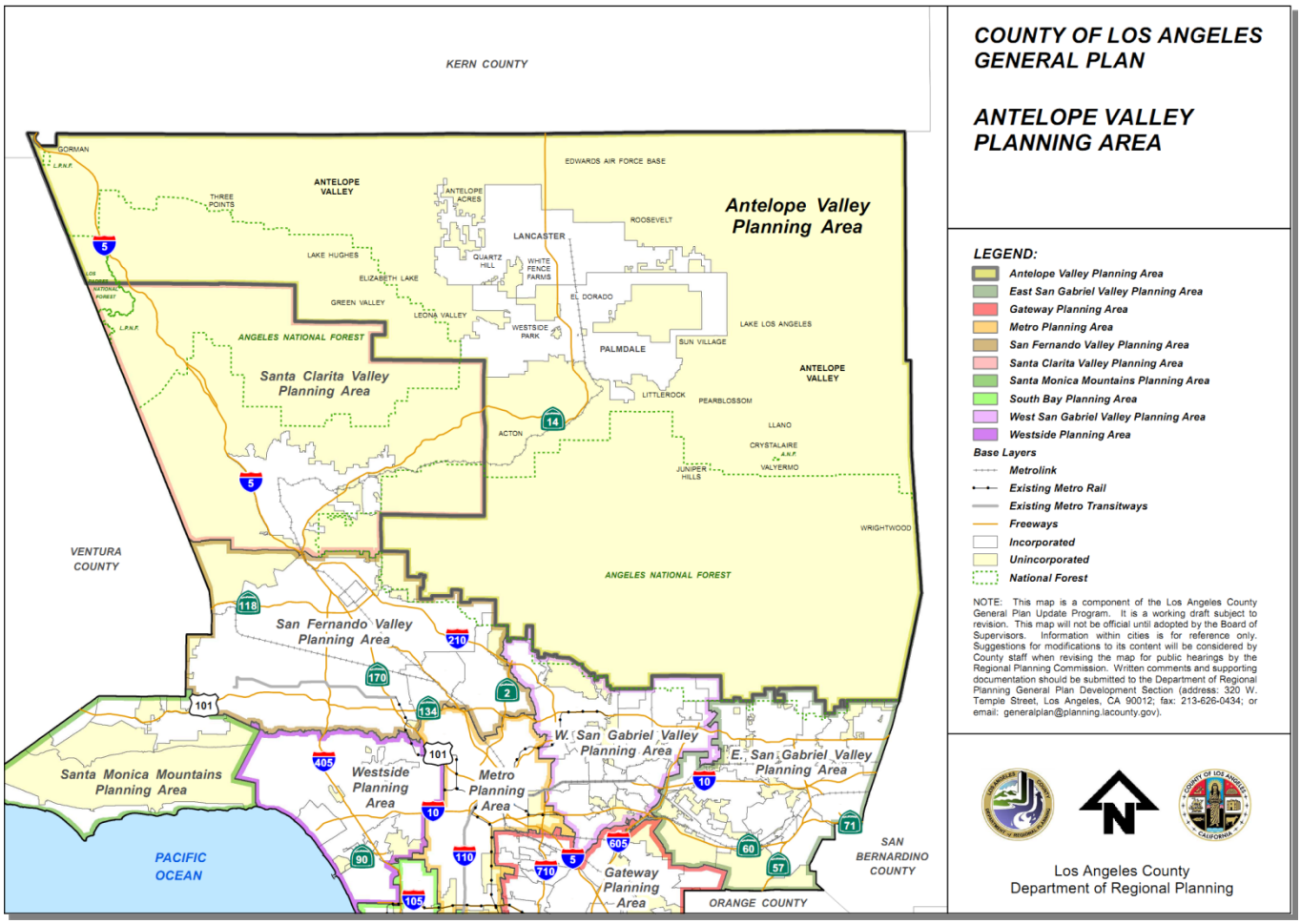
County of Los Angeles Planning Areas

The following descriptions are taken from the *County of Los Angeles General Plan* (2014). The general plan clusters the unincorporated communities into "planning areas." The planning areas are listed in alphabetical order.

Antelope Valley Planning Area

Planning Area Profile

Map 3-11: Antelope Valley Planning Area



Location

The Antelope Valley is located approximately 60 miles north of downtown Los Angeles. The unincorporated portion of the Antelope Valley Planning Area covers 1,800 square miles, or 44% of the 4,083 square miles in the county. The unincorporated Antelope Valley surrounds the cities of Palmdale and Lancaster, and borders San Bernardino County to the east, Ventura County to the west, and Kern County to the north.

Population and Demographics

The population of the Antelope Valley Planning Area is concentrated within the cities of Palmdale and Lancaster, with populations of 116,700 and 118,718 respectively, according to the 2000 U.S. Census.

Currently, the planning area is home to approximately 447,000 residents. SCAG projects that there will be approximately 880,000 people living in the planning area by 2035. In the past decade, there has been a significant increase in residents in the Antelope Valley, primarily due to the region's comparably affordable housing prices. The majority (75%) of the residents in the Antelope Valley Planning Area identify as "white." The median age of population for the planning area is 38.2 years.

Geography

The Antelope Valley Planning Area contains many diverse vegetative communities, geologic forms, and climatic conditions. The Angeles National Forest and the Liebre and Sierra Pelona Mountain Ranges are located in this planning area. A large portion of the planning area includes mountain ranges, but the main land feature is the flat desert, or the "high desert," with elevations between 2,300 and 2,400 feet above sea level. The planning area contains the majority of the county's active agricultural land uses. The Antelope Valley Significant Ecological Area (SEA), San Andreas Rift Zone SEA, Joshua Tree Woodland SEA, and Santa Clara River SEA also cover large portions of the planning area. The San Andreas seismic fault zone, which cuts across the planning area, poses many significant hazards. In addition, a significant portion of the planning area faces threats of wildfires and floods.

Infrastructure

Two major freeways provide access to the Antelope Valley Planning Area: Interstate 5, which is located in the western portion of the planning area, and links Northern and Southern California; and State Route 14, which connects the adjacent Santa Clarita Valley just north of metropolitan Los Angeles to the eastern portion of the Antelope Valley. In addition, Metrolink's Antelope Valley Line has three station stops in the Antelope Valley, which are located in unincorporated Acton, the City of Palmdale, and the City of Lancaster. Palmdale Regional Airport, General William J. Fox Airfield, and Edwards Air Force Base are also located in unincorporated Antelope Valley. Antelope Valley Transit Authority routes, serving unincorporated areas, include four local routes, two special routes, and three commuter routes connecting the Antelope Valley to other areas.

Economy

The largest economic sectors in the Antelope Valley include government, retail services, and manufacturing, in large part due to the major concentration of aerospace research and development activity. The government employs nearly 20% of all employed persons in the planning area. SCAG projects that by 2035, employment in the planning area will grow significantly, to approximately 37,000 jobs. The planning area has a lower cost of doing business than many other cities in the county, with a pro-business environment in addition to special incentive zones. The planning area economy is affected by the availability of affordable land, and the prospect of locating an "inland port" to handle trade near the Palmdale Regional Airport, which may provide the Antelope Valley with an important economic opportunity. Challenges to the planning area economy include limited transportation options; perceived problems with crime; a significant jobs-housing imbalance; and environmental constraints, such as extreme water shortages, which have the potential to restrict all types of development in the Antelope Valley.

Planning Area Issues

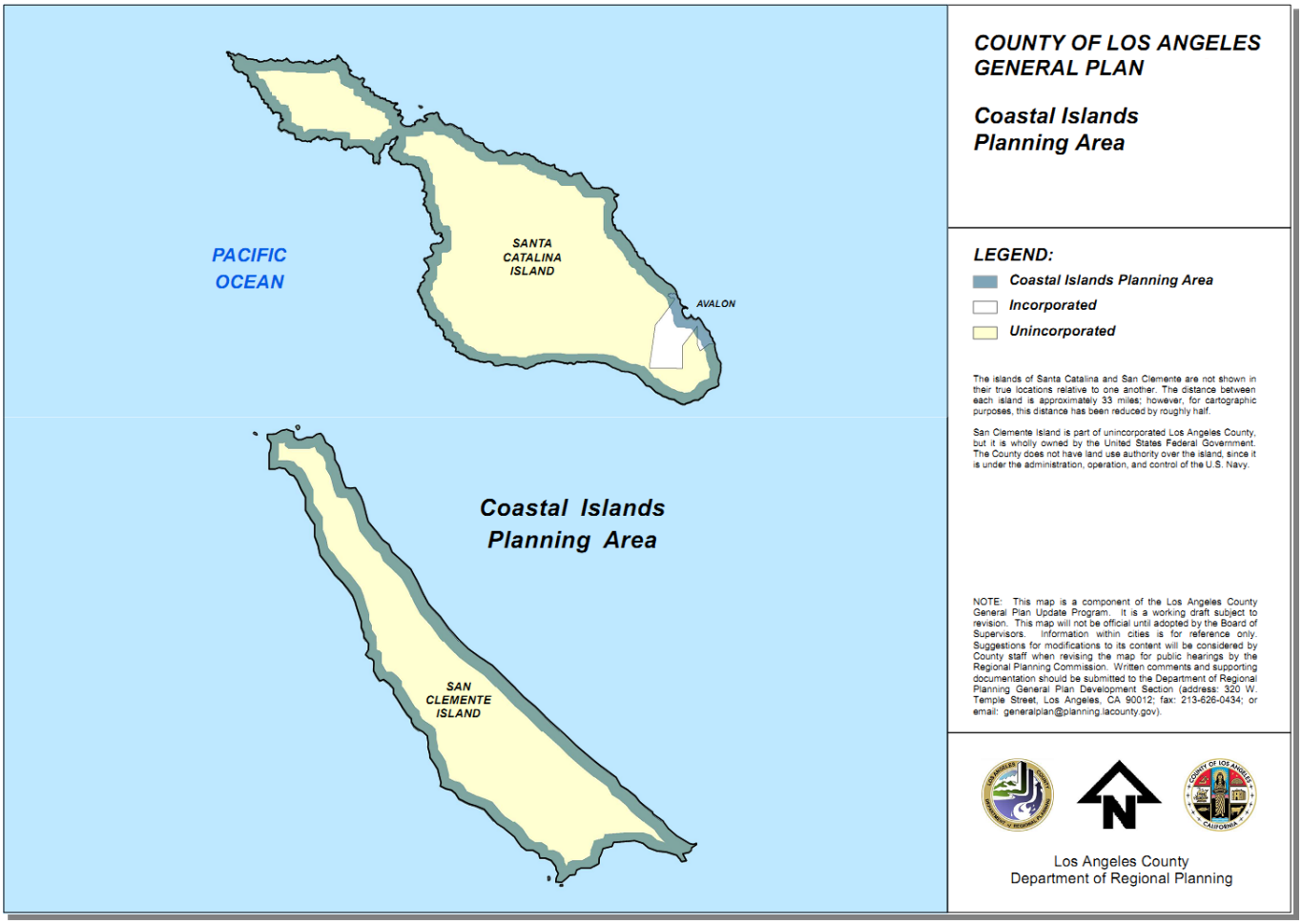
Although the Antelope Valley is predominantly rural in nature and has major constraints to development, including natural hazards, environmental issues, and infrastructure constraints (particularly lack of water), the area is projected to grow significantly in terms of population. Therefore, it is critical that existing rural communities, agriculture, natural resources, and biological diversity remain protected despite the anticipated growth. In addition, incorporating water conservation strategies and encouraging the recycling of water is important. In the planning area, water comes either from naturally occurring sources that accumulate from rain or snow, and imported surface water collected in Northern California and piped down through the State Water Project (SWP).

As thousands of acres of desert lands have been subdivided over the past decade, the population of the planning area has skyrocketed. While much of the growth has been at urban densities in and adjacent to the cities of Palmdale and Lancaster, the desirability of rural living and the availability of affordable housing has resulted in significant growth in the many unincorporated communities. In turn, many residents have had to commute farther to access greater employment opportunities. The opportunity areas in the Antelope Valley Planning Area are rural town centers. Rural town centers represent focal points and community centers, serve the daily needs of residents, and provide local employment opportunities. Rural town centers are intended to provide pedestrian-friendly environments, be accessible by a range of transportation options to reduce vehicle trips, and allow for a mix of commercial and residential uses.

Coastal Islands Planning Area

Planning Area Profile

Map 3-12: Coastal Islands Planning Area



Location

San Clemente Island lies approximately 63 miles south of Long Beach and 78 miles west of San Diego. San Clemente Island is approximately 24 miles long and 5 miles across at its widest point. It has a land area of approximately 57 square miles. Since 1934, San Clemente Island has been owned and operated by the U.S. Navy. More than a dozen range and operational areas are clustered within a 60-mile radius of San Clemente Island. The Commander-in-Chief, Naval Forces, Pacific (CINCPACFLT) is the major claimant for San Clemente Island, and Naval Air Station, North Island (NASNI) is responsible for its administration.

Santa Catalina Island is the only significantly inhabited island near the California coast. It is located approximately 22 miles south of the Palos Verdes Peninsula and 27 miles southwest of the Orange County shoreline. Santa Catalina Island is approximately 21 miles long and 8 miles wide. It has a land area of approximately 74 square miles.

Population and Demographics

San Clemente Island is officially uninhabited. There are 3,696 people on Santa Catalina Island, with only 536 people living in unincorporated areas, according to the U.S. Census. SCAG projects that the population for Santa Catalina Island will grow to approximately 7,605 residents by 2035, with the unincorporated population growing to 2,646 residents. The large majority of unincorporated residents on Santa Catalina Island identify as white or Hispanic or Latino.

Geography

Santa Catalina Island is typified by its rugged landscape and a cliffed shoreline. Level terrain is limited to the floors of a few large coastal canyons such as Avalon, Pebbly Beach, White's Landing, Middle Ranch, Two Harbors, and Emerald Bay. Mt. Orizaba, located in the central part of Santa Catalina Island, is the highest peak at 2,069 feet elevation.

Infrastructure

The City of Avalon and the unincorporated community of Two Harbors are the major ports of entry and primary population and service communities on Santa Catalina Island. The actual roadway distance is 26 miles through rugged terrain, with an average driving time of one hour and 15 minutes. In addition, Santa Catalina Island is accessed via ferry or plane. Santa Catalina Island contains the Coastal Islands Planning Area's one airport—the Catalina Airport. Roads in the unincorporated areas of Santa Catalina Island are privately owned, and access is restricted.

Economy

Over 80% of Santa Catalina Island has been set aside by the Catalina Island Conservancy, which is dedicated to programs of conservation, recreation, education, and research. The primary economic driver on Santa Catalina Island is tourism and recreational-related activities, such as boating and fishing. The majority of visitor activities in the unincorporated areas occur in the Two Harbors area, including camping and boating.

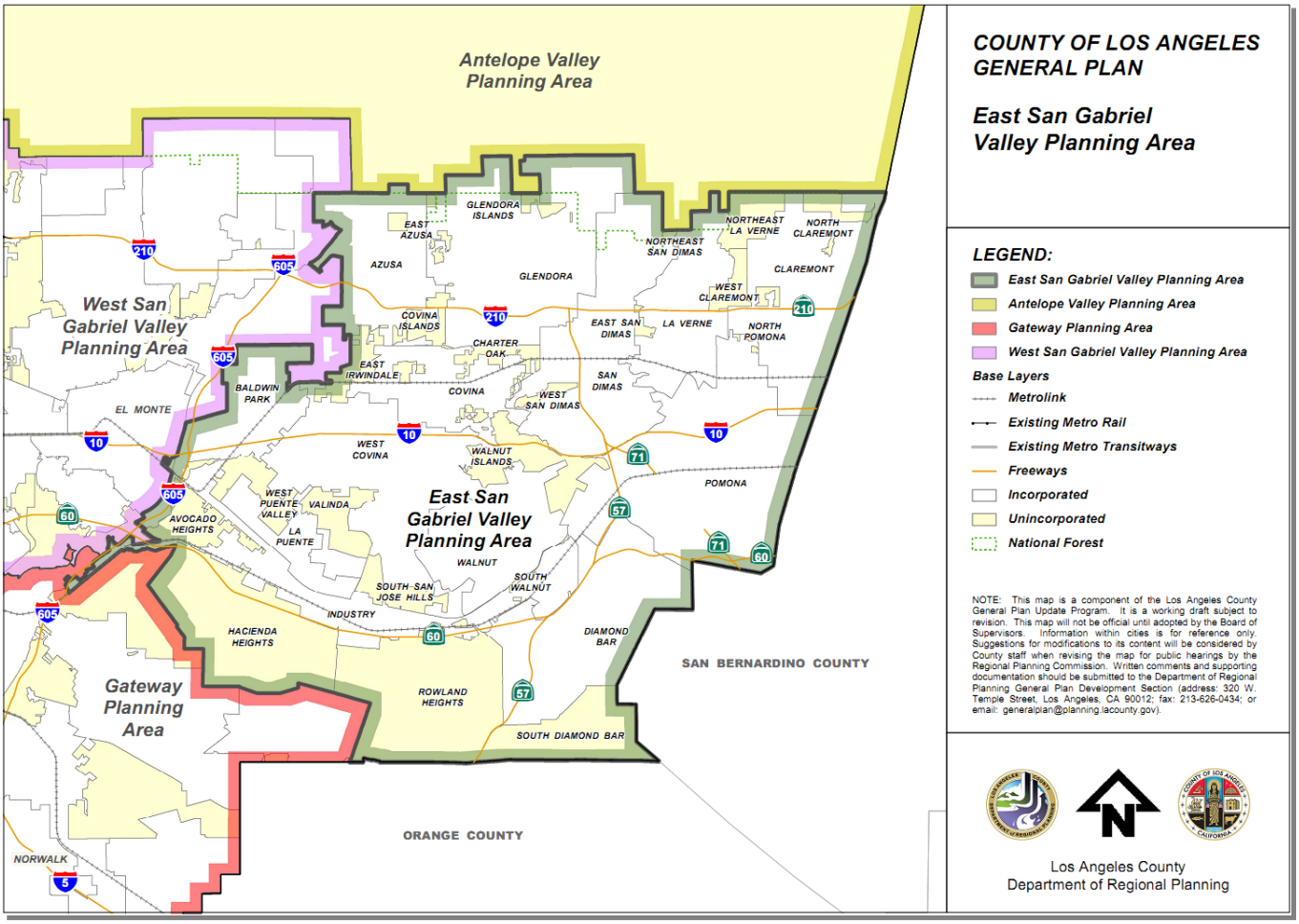
Planning Area Issues

San Clemente Island supports a number of endemic species, as well as other species of special interest. Land use activities on the Island are regulated by the United States Navy. In 1974, a 50-year open space easement agreement was signed between the county and the Santa Catalina Island Company. It calls for the preservation of Santa Catalina Island's natural character, and improvements to access and recreational opportunities. The Santa Catalina Island LCP implements the goals and requirements of this agreement and ensures that the vast majority of Santa Catalina Island will remain in its natural state for future generations to enjoy.

The 1976 California Coastal Act established the California Coastal Commission, which has the responsibility to protect and enhance California's coastal resources. The Coastal Act also established a program whereby each local governmental jurisdiction along the California coastline would be required to prepare an LCP to promote conformance with the provisions of the Coastal Act in controlling development within its portion of the coastal zone. The Santa Catalina Island LCP was created in 1983 with the goal of meeting the provisions of the California Coastal Act. The LCP provides multiple policies to improve access to and increase the range of recreational and open space activities, as well as preserve Santa Catalina Island's open space and natural resources.

East San Gabriel Valley Planning Area

Planning Area Profile
Map 3-13: East San Gabriel Valley Planning Area



Location

The East San Gabriel Valley Planning Area contains the easternmost areas of the county, south of the Angeles National Forest, north of the Orange County border, and east of the I-605. The planning area's eastern border is San Bernardino County.

Population and Demographics

SCAG projects the total population of the East San Gabriel Valley Planning Area to be approximately 1 million residents, with an estimated 274,374 in the unincorporated areas. In addition, SCAG projects that the planning area will grow to 1,298,746 residents and the unincorporated population will grow to 371,842 residents by 2035. This is a 24% change in total subregional population, and a 36% change for the unincorporated areas. The U.S. Census shows that over 50% of the population identify as "Asian" or "Some Other Race than White."

Geography

The East San Gabriel Valley Planning Area's geography is characterized by valleys and rolling, dry hills. The San Gabriel River runs along the Interstate-610 freeway and the western boundary of the planning area. The Puente Hills form the southern border for the planning area, and offer open space and recreational opportunities for the region. The northern portion of the planning area is characterized by the steep upgrade and urban-wildland interface with the Angeles National Forest and San Gabriel Mountains.

Infrastructure

The East San Gabriel Valley Planning Area is served by several major transportation infrastructure systems. The Interstate 10, Interstate/State Route 210, and State Route 60 freeways all provide east-west access, and the Interstate 605 and State Route 57 freeways provide north-south access. The planning area is also served by the Metrolink commuter rail Riverside and San Bernardino lines, and Foothill Transit provides regional bus service in the northern portion of the planning area.

Economy

Over the past few decades, the San Gabriel Valley has lost jobs in manufacturing, while gaining jobs in the international trade sectors. The biggest economic sectors in the East San Gabriel Valley Planning Area are professional and business services, retail, educational and health services, and international trade. The major educational institutions include California State Polytechnic University, Pomona; the University of La Verne; Azusa Pacific University; and the Claremont McKenna Colleges, which are important economic generators in the area.

Planning Area Issues

Transportation improvements will be critical for the long-term economic health of the East San Gabriel Valley Planning Area. The planning area is characterized primarily by single-family residence suburban development. Traffic on the major east-west freeways, including Interstate 10, Interstate 210, and State Route 60, is heavily congested during peak hours, with commuters generally traveling west in the morning for work and east in the evening to return home. The primary constraints in the planning area are a growing shortage of large blocks of developable land, and worsening traffic congestion. Many of these traditional suburbs are maturing and facing infrastructure capacity issues and limited mobility options. Specifically, solid waste and sewerage disposal are concerns: one of the primary landfills where solid waste is disposed will be closing in 2013. In addition, portions of Diamond Bar, Pomona, San Dimas, Walnut, and unincorporated areas are on septic systems, which are subject to failure and potential groundwater contamination if not properly maintained. The planning area also includes environmental and hazardous constraints. The Puente Hills, which include portions of Rowland Heights and Hacienda Heights, contain fault traces and wildfire threats. Wildfires and landslides also pose safety hazards in the foothill communities. In addition, the planning area contains multiple SEAs.

Opportunity Areas

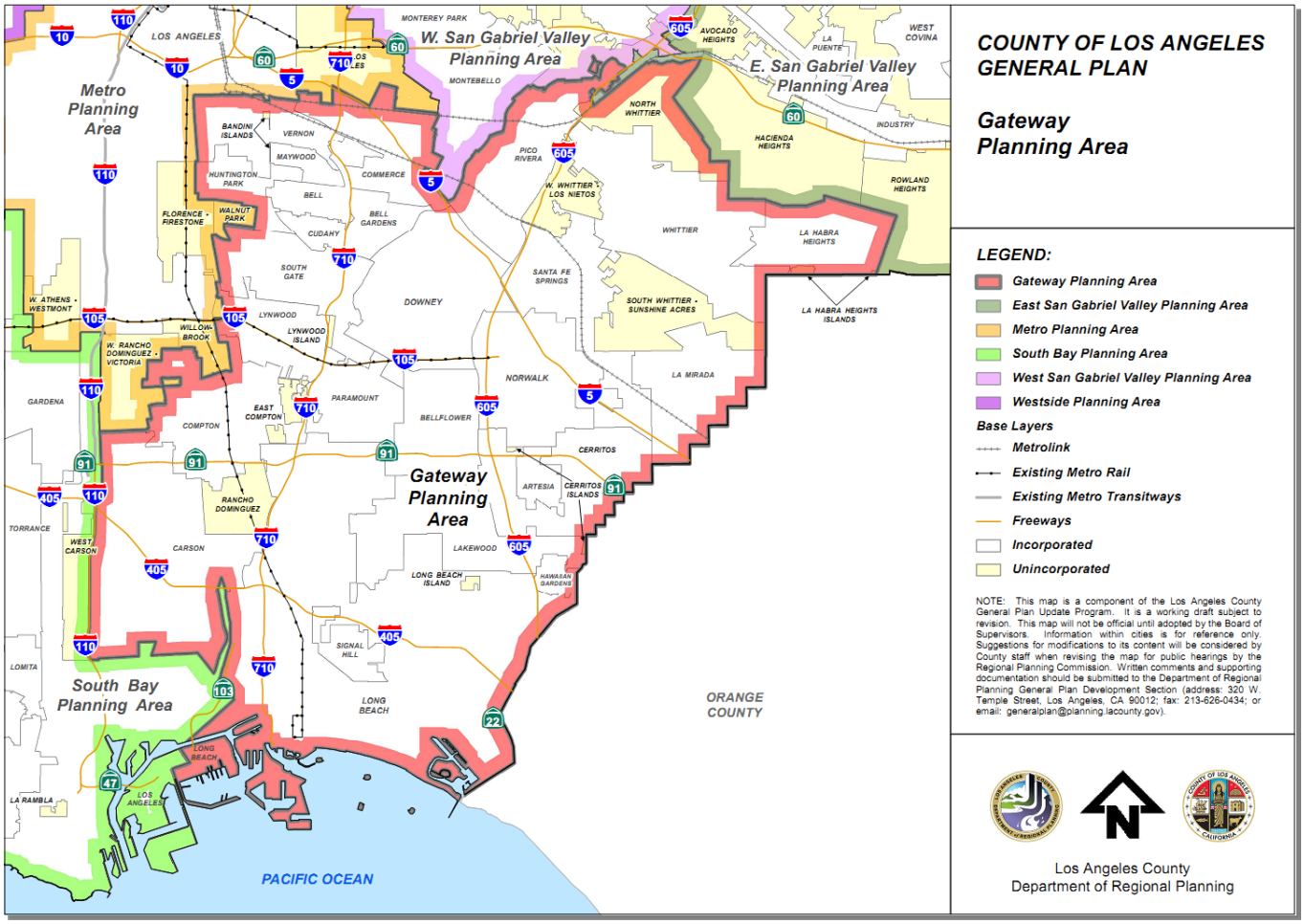
Arrow Highway is a major thoroughfare that extends across many local jurisdictions in the San Gabriel Valley, including unincorporated Los Angeles County. In the community of Charter Oak, Arrow Highway includes mostly residential and a few commercial lands uses and has the potential for improved street and pedestrian improvements. In 2008, SCAG conducted a study on multi-jurisdictional corridor planning that analyzed Arrow Highway. The purpose of the study was to develop strategies to improve multi-jurisdictional coordination, transportation linkages, economic development, and overall street design and amenities.

Located in the Covina Islands, a small portion of Arrow Highway includes a mix of commercial, light industrial, and automobile repair–related services. This area is isolated due to the San Dimas Wash to the south, and the current industrial parcels are not viable in their current state for future employment-rich uses. There are highly utilized industrial uses to the east in the City of Glendora, while residential, commercial, and public uses surround this area in other directions. The *General Plan* identifies the area at the intersection of Arrow Highway and Barranca as an "industrial flex district," with the potential to transition in the future to higher uses.

Gateway Planning Area

Planning Area Profile

Map 3-14: Gateway Planning Area



Location

The Gateway Planning Area is located in the southeastern portion of Los Angeles County. The eastern border of the planning area is Orange County. The planning area contains a number of cities, including the City of Long Beach, as well as a large corridor of industrial areas leading out of the Ports of Los Angeles and Long Beach into downtown Los Angeles. Unincorporated Rancho Dominguez consists primarily of industrially designated land.

Population and Demographics

The Gateway Planning Area is home to over 2 million residents, with only 129,247 people living in the unincorporated areas. SCAG projects a relatively slow population increase of 10% for the entire planning area by 2035. Over 50% of residents in the Gateway Planning Area identify as Hispanic or Latino.

Geography

The Gateway Planning Area is built out, with little vacant land. Much of the geography has been developed, and the planning area has a large percentage of industrial land. Both the Los Angeles and San Gabriel Rivers flow through the planning area, but there are few other distinguishing natural features remaining.

Infrastructure

The Interstate 710 freeway, which is the primary trucking route for cargo moving to and from the Ports of Los Angeles and Long Beach, has increasingly congested traffic conditions. Projects such as the Alameda Corridor demonstrate the importance of inter-jurisdictional efforts to aid the region's economic development. The planning area is also bisected by the Interstate 405, State Route 91, Interstate 5, and Interstate 105 freeways. The Port of Long Beach, combined with the Port of Los Angeles in the South Bay Planning Area, is the busiest container ports in the country, which creates high volumes of truck and cargo traffic in the Gateway Planning Area along the Interstate 710 freeway. The region is served by both Metro and Metrolink rail service.

Economy

The Gateway Planning Area has evolved from an expanse of citrus orchards to one of the most important and busiest industrial and logistical hubs in the country. This region contains the largest concentration of manufacturing jobs in the county, and is a hub for wholesale trade, warehousing, and logistics. It is also home to three heavily industrialized cities: Commerce, Santa Fe Springs, and Vernon. Although manufacturing is still a large part of the planning area's economy, over the years, the number of manufacturing jobs has declined. In addition, the planning area lacks high-technology industries and modern office and industrial space. Furthermore, because it is an older region, the planning area lacks large blocks of developable land, which constrains the growth of the region's industries.

Planning Area Issues

Industrial uses and trade and logistics from the ports are an important part of the economy of the Gateway Planning Area; however, the concentration of industrial uses and high truck traffic raises concerns over air and water pollution. As a large economic center with high-wage jobs, it is important to balance environmental and economic concerns in the planning area.

The planning area also suffers from a lack of open spaces and recreational opportunities. In certain communities there is also a lack of multifamily housing opportunities, and there are areas of urban decay that are in need of revitalization efforts.

Opportunity Areas

The Gateway Planning Area has opportunities for future planning efforts to improve its economic health. Atlantic Avenue and East Compton Boulevard are major commercial corridors with local-serving uses in the community of East Rancho-Dominguez.

The area is also part of a county redevelopment area, and may have potential investment opportunities to help activate and revitalize the corridor and neighborhood center.

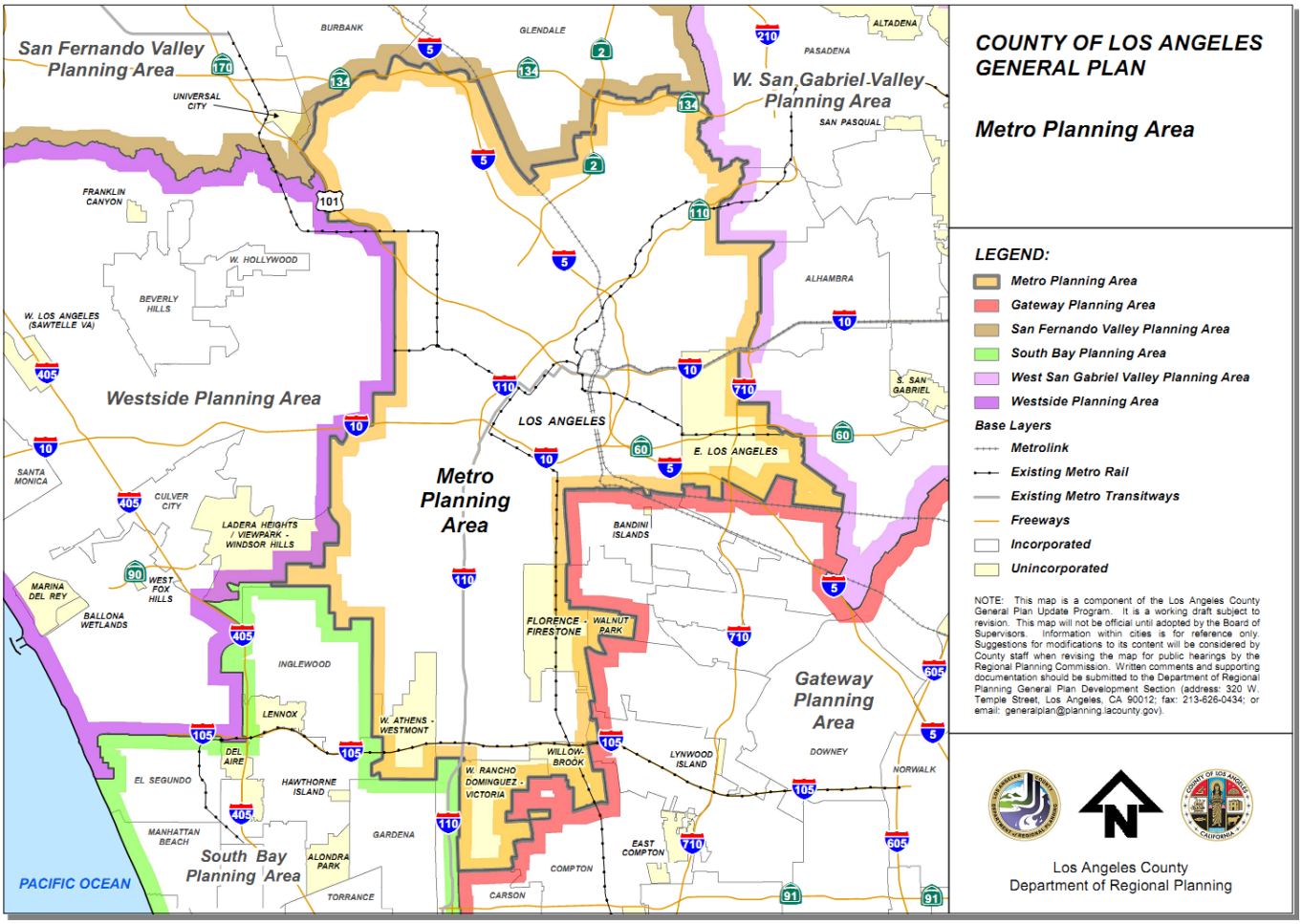
In the industrial community of Rancho Dominguez, the area around the Del Amo Blue Line Metro station could be leveraged to encourage a transit-oriented jobs district, where employees can ride the Metro to work.

Whittier Boulevard in West Whittier is a major commercial corridor in which recent streetscape improvements have reactivated the street and could spur future redevelopment opportunities.

Metro Planning Area

Planning Area Profile

Map 3-15: Metro Planning Area



Location

The Metro Planning Area is located in the geographic center of the county. The Metro Planning Area is also home to and heavily defined by its proximity to downtown Los Angeles, which includes major corporations and professional firms, tourist and convention hotels, restaurants, retail, and the largest concentration of government offices outside of Washington, D.C.

Population and Demographics

The Metro Planning Area is one of the most densely and heavily populated areas of the county. SCAG estimates that there are over 1,800,000 residents in the planning area, over 530,000 households, and over 769,000 jobs. The unincorporated areas of the planning area contain 316,978 people, or approximately 17% of the total planning area population. However, the percent total of households and jobs in the unincorporated areas is much lower, with 74,968 households and 58,267 jobs. SCAG projects that the Metro Planning Area will have a relatively low change in population by the year 2035, rising to approximately 2 million residents (353,336 in unincorporated areas). There has been an ongoing demographic shift in population in the planning area, from black and toward Hispanic or Latino. Approximately 80% of the unincorporated planning area identifies as Hispanic or Latino.

Geography

The majority of the planning area is heavily developed and urbanized, with little variation in elevation. There are no large areas of natural open space. All open space areas are contained with parks and recreational areas. The concrete-lined Los Angeles River and the Compton Creek tributary flow through the planning area, but there are few other distinguishing geographic features. However, there is an opportunity to "green" these areas and deal with the Los Angeles River to make it an asset Infrastructure.

The Metro Planning Area is transit-rich, in both bus service and rail transit. The planning area is also a heavily transit-dependent population. However, the planning area still suffers from a number of mobility issues, including the need for improved pedestrian safety, the need for more bicycle facilities, and traffic congestion.

The presence of industrial districts in the planning area provides a strong foundation for job recovery and job growth. The Metro Blue Line traverses South Los Angeles on a north-south route, with stops in the heart of Willowbrook and three stops in Florence-Firestone. The Metro Green Line travels east-west along the Interstate 105 freeway, with stops in Willowbrook, Westmont-West Athens, and Lennox. Furthermore, the Gold Line runs along the Third Street corridor in unincorporated East Los Angeles, which presents additional opportunities for transit-oriented development. Many of these districts present opportunities for reinvestment and jobs.

Economy

The Metro Planning Area has seen significant losses in the manufacturing sector over the past 20 years, and little to no overall economic or job growth. It is estimated that current unemployment rates in some unincorporated communities are very high. The State Employment Development Department estimates Florence-Firestone to have a 25% unemployment rate, and West Athens-Westmont to have a 15% unemployment rate. The East Los Angeles area has had very little recent economic growth, coupled with a significant loss of manufacturing, which had been a historically stable economic presence in the area, in addition to government employment and educational and health services.

Planning Area Issues

Communities in the Metro Planning Area are urbanized and generally characterized by challenging physical and economic conditions. In terms of land use issues, several residential communities abut industrial uses creating, land use conflicts.

Although housing affordability is an issue throughout Los Angeles County, the Metro Planning Area, in particular, faces issues of overcrowding. In addition, the planning area contains very few natural areas and open spaces. Many of the constraints and challenges for planning and economic development are located in South Los Angeles. Although infill opportunities exist, many sites have a combination of environmental issues that affect their redevelopment potential. Much of the South Los Angeles area is characterized by economically disadvantaged conditions that further hamper private investment and redevelopment. Public investment in redevelopment activities will be an important factor in the economic turnaround of South Los Angeles area. For example, many opportunities exist for instituting public-private partnerships to revitalize many of the older, commercial corridors with pedestrian amenities and mixed uses.

There are two major economic opportunities arising in the East Los Angeles region. First is a joint effort between the City of Los Angeles and the county to combine redevelopment project areas in each jurisdiction to focus development on businesses that serve the nearby County-USC Hospital. Second is the expansion of the Gold Line to East Los Angeles to foster residential and commercial growth around the new light rail stations. The East Los Angeles 3rd Street Specific Plan, outlining new incentives and form-based codes for transit-oriented development, is currently under way. There are also planning initiatives under way in Florence-Firestone, and the King-Drew Medical Center area in Willowbrook.

Opportunity Areas

The Metro Planning Area has a number of opportunity areas. East Los Angeles is an older, urban community, rich in history and culture. The community's transit center opportunity area covers an area along 3rd Street and includes four transit stations along the Metro Gold Line. This area is ripe for "Complete Street" improvements, as well as pedestrian-scale and mixed-use development that incorporate local commercial-serving uses and multifamily housing.

The community of Florence-Firestone is home to many opportunity areas. Central Avenue, once a hub of jazz culture, is currently in need of investment and redevelopment. The 3-mile corridor is along the western border of the Florence-Firestone community, and abuts the City of Los Angeles. The northern portion of the corridor is primarily composed of industrial and auto-related uses; the southern portion of the corridor is predominantly commercial and residential. An abundant amount of vacant and underutilized land, coupled with the City of Los Angeles' efforts in the corridor, and the location of the Slauson, Florence and Firestone Blue Line stations, make the area prime targets for focused planning efforts, including transit-oriented development, and economic revitalization opportunities.

Florence Avenue and Pacific Boulevard are active local commercial corridors bordering the City of Huntington Park and the City of South Gate. The area supplies much of the retail, restaurants, and services offered to the surrounding residents. These corridors are considered opportunity areas because of their proximity to the Florence Metro Blue Line Station and the opportunity for increased design, pedestrian, and bicyclist improvements, such as street trees, lighting, and bicycle lanes.

The transit center around the Vermont Metro Green Line station in West Athens-Westmont presents an opportunity to capitalize on infrastructure investments in a community with high ridership. Vermont Avenue has the potential for increased economic vitality through the creation of employment-rich activities along the commercial corridors adjacent to the Metro station.

In addition, the residential areas within the transit center would benefit from increased pedestrian amenities and design improvements. The width of Vermont Avenue, in particular, provides major opportunities for pedestrian and bicyclist improvements. Imperial Highway also connects the transit center area to the areas around the intersection of Western Avenue and Imperial Highway, which provide additional opportunities for design improvements.

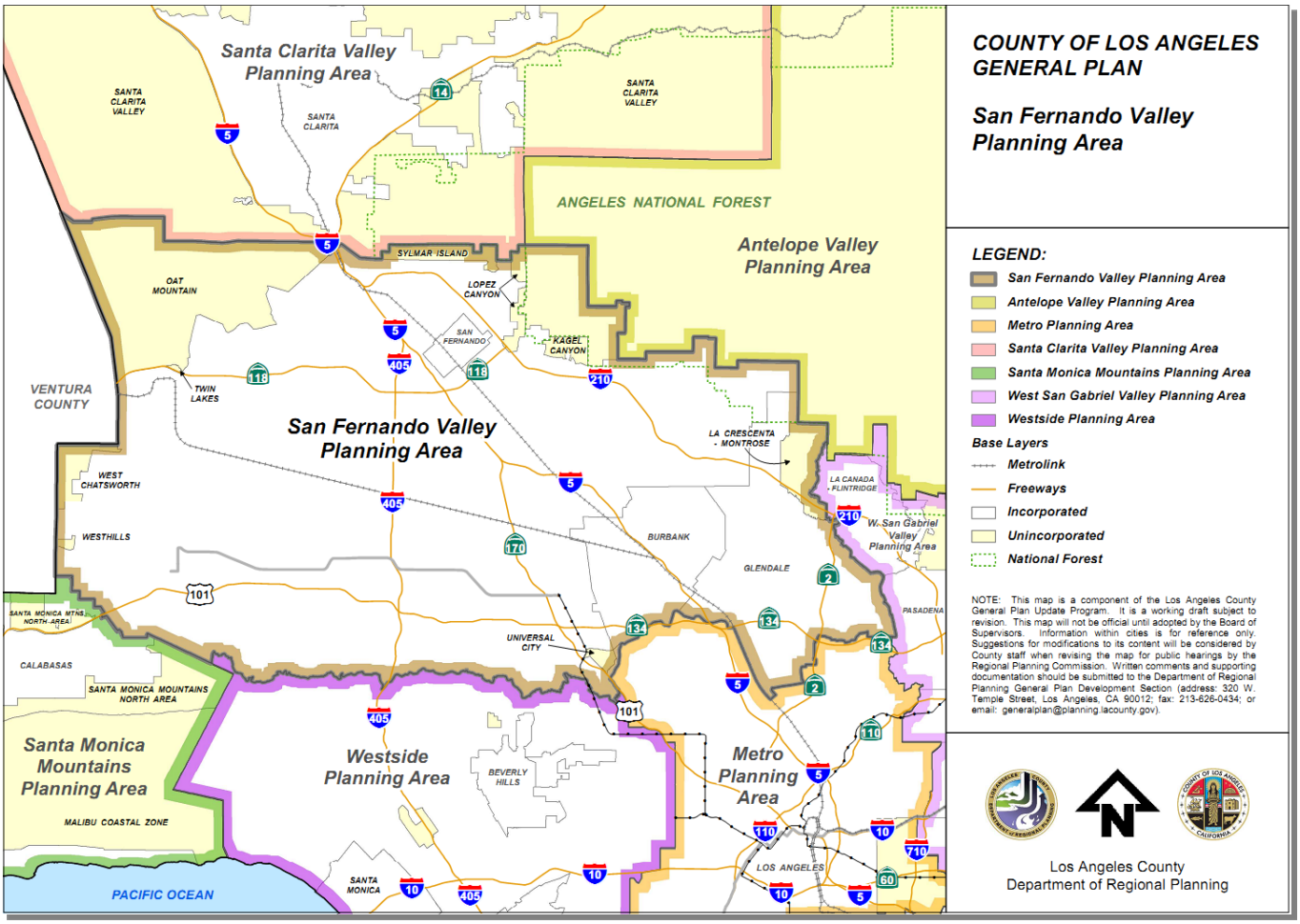
The intersection of El Segundo Boulevard and Avalon Boulevard in West Rancho Dominguez–Victoria has the potential to become an active local neighborhood center. The surrounding community is rich with public amenities, such as the Irvin Magic Johnson Park and the A.C. Bilbrew Library. In addition, the area has many multi-family sites, as well as vacant and underutilized commercial sites, along El Segundo Boulevard.

A significant opportunity area exists in Willowbrook, in the area surrounding the Martin Luther King, Jr. Multi-Service Ambulatory Care Center (MLK-MACC). The hospital is a public urgent care center and outpatient clinic that was originally founded as a major public hospital with over 500 beds; however, it was shut down in August 2007 for various reasons. Currently, an urgent care center and outpatient clinic remains operating on the site. There are plans to reopen a smaller hospital in 2013 under a partnership between the County and the University of California as a nonprofit organization. The rehabilitation and reuse of the site could be a catalyst for further redevelopment. Neighborhood amenities that support health care services and office uses, as well as connectivity with the nearby Rosa Parks/Imperial Metro Blue/Green Line station, will be important factors in future planning activities in the area.

San Fernando Valley Planning Area

Planning Area Profile

Map 3-16: San Fernando Valley Planning Area



Location

The San Fernando Valley Planning Area is bordered by the Santa Clarita Valley and the Angeles National Forest to the north, and the Santa Monica Mountains and Westside Planning Areas to the south. Ventura County is the western border of the planning area, and the San Gabriel Valley and downtown Los Angeles make up the eastern border.

Population and Demographics

There are approximately 1.5 million residents in the San Fernando Planning Area, but only about 24,000 live in unincorporated areas, which accounts for about 1.5% of the total population. SCAG estimates that the planning area will grow at a relatively slow rate over the next 25 years, to about 1.7 million residents. Out of a total of 613,000 households, only about 75,000 are estimated to be in the unincorporated areas. Seventy-five percent of residents identify as white, with the next largest group being the 17% who identify as Asian.

Geography

The San Fernando Valley Planning Area has several distinguishing geographic characteristics. Almost the entire planning area is ringed with distinct hillsides and mountain ranges, including the Santa Susana Mountains to the northwest, the Simi Hills to the west, the Santa Monica Mountains and Chalk Hills to the south, the Verdugo Mountains to the east, and the San Gabriel Mountains to the northeast. Looking southeast, high-rises from downtown Los Angeles can be seen from higher neighborhoods, passes, and parks in the San Fernando Valley.

The Los Angeles River begins at the confluence of Calabasas Creek and Bell Creek and flows eastward along the southern regions of the planning area. One of the river's two unpaved sections can be found at the Sepulveda Basin. The seasonal river, the Tujunga Wash, drains much of the western-facing San Gabriel Mountains, and passes through the Hansen Dam Recreation Center in Tujunga, flowing south along the Verdugo Mountains through the eastern communities of the planning area to join the Los Angeles River in Studio City. Mulholland Drive, which runs along the ridgeline of the Santa Monica Mountains, marks the boundary between the planning area and Hollywood and the west side of the City of Los Angeles.

Infrastructure

The development pattern in the San Fernando Planning Area is almost exclusively suburban, and the automobile is the dominant mode of transportation. Several freeways cross the planning area, most notably, Interstate 405, U.S. Route 101, State Route 118, and Interstate 5. The planning area has two Metro subway stations, in Universal City and North Hollywood, along the Metro Red Line. The Orange Line, an east-west rapid transit busway, connects the North Hollywood Metro station to points west of the planning area. Two Metrolink commuter rail lines connect the planning area to downtown Los Angeles. Amtrak's Pacific Surfliner has stations at Burbank Airport, Van Nuys, and Chatsworth. Several Metro Rapid bus lines also serve the area. California State University Northridge and four community colleges work closely with the private sector to train the valley's workforce of more than 750,000 people.

Economy

The San Fernando Valley is a major center for entertainment, tourism, professional and business services, education, health services, and manufacturing. California State University Northridge and four community colleges work closely with the private sector to train the valley's workforce of more than 750,000 people. Universal City is unincorporated land that houses the Universal Studios filming lot, and is a large economic center within the planning area.

Planning Area Issues

Only a small portion of the San Fernando Valley Planning Area is unincorporated. These communities are primarily low-density, suburban communities, with the exception of Universal City, which houses Universal Studios, and Oat Mountain, which is primarily vacant open space except for utility facilities. Many of these communities are near environmentally sensitive and hazardous areas. One of the main hazards facing these communities is wildfires—Sylmar Island, Lopez Canyon, Kagel Canyon, and large portions of La Crescenta–Montrose, Oat Mountain, Westhills, and Universal City are located in very high fire hazard severity zones. In addition, portions of the planning area include SEAs.

Economic challenges facing the planning area include an ongoing decline in manufacturing jobs, a shortage of new or improved industrial and office space, and worsening traffic congestion.

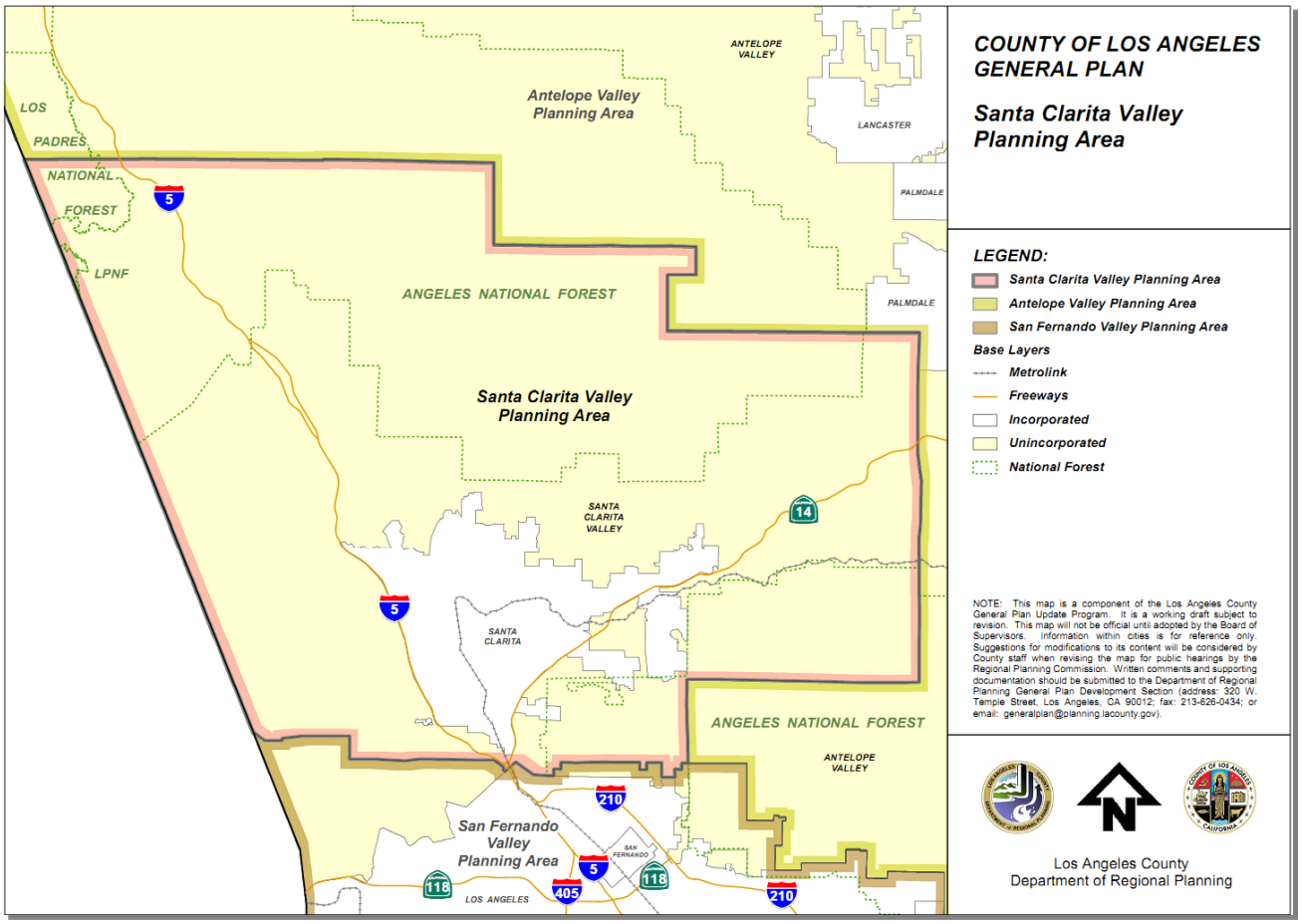
Opportunity Areas

Foothill Boulevard in La Crescenta–Montrose is an active local commercial corridor. The corridor supplies much of the retail, restaurants, and services available to the surrounding residents. As more new commercial projects are being developed in this area, this corridor is considered an opportunity area for increased design, pedestrian, and bicyclist improvements, such as street trees, lighting, and bicycle lanes.

Santa Clarita Valley Planning Area

Planning Area Profile

Map 3-17: Santa Clarita Valley Planning Area



Location

The Santa Clarita Planning Area is bordered to the west by the Ventura County line, to the north by the Los Padres and Angeles National Forests, to the east by the Angeles National Forest, and to the south by a major ridgeline that separates the Santa Clarita Valley from the San Fernando Valley. The planning area includes over 480 square miles, of which about 195 square miles are unincorporated. The planning area is located 30–40 miles northwest of downtown Los Angeles.

Population and Demographics

A significant amount of the population growth in Los Angeles County over the past two decades has occurred in the Santa Clarita Valley Planning Area. In 2000, the City of Santa Clarita was the fourth most populous city in the county. As a result of this growth, the planning area's population has diversified, with the percentage of residents who are Hispanic, Asian, African-American, and mixed ethnicity backgrounds growing by over 75% between 1990 and 2000 (from 41,555 to 73,733). Households within the planning area had a higher average household income than county residents as a whole ($83,900 in the valley compared to $63,909 as a countywide average in 2000). The population continues to reflect larger households than the countywide average, which is indicative of young families with children. Average household size increased from 2.93 to 3.09 persons per household over the census decade. In the 2000 census, the largest age group represented in the planning area was the "5 to 17" age bracket.

Almost a third of the population in the planning area was under the age of 18, and less than 10% of the population in 2000 was in the "over 65 years" age bracket.

Geography

The Santa Clarita Planning Area is framed by the San Gabriel, Santa Susana, and Sierra Pelona Mountain Ranges, and the Angeles National Forest. The Santa Clara River flows from east to west from its headwaters near Acton to the Pacific Ocean. The Santa Clarita Valley Planning Area contains multiple geographic constraints to development, including large swaths of land that are covered by steeps hillsides, SEAs, and very high fire hazard severity zones.

Infrastructure

The Santa Clarita Planning Area is located at the convergence of several major transportation and utility facilities. The Southern Pacific Railroad, the Interstate 5 and State Route 14 freeways, and two major aqueducts traverse the planning area. In addition, the Metrolink Antelope Valley Line has three station stops in the valley, located in the City of Santa Clarita. The Agua Dulce Airport is also located in the unincorporated community of Agua Dulce. Additionally, major oil, natural gas, and power lines transect the planning area.

Economy

The Santa Clarita Valley Planning Area contains a wide variety of retail, office, industrial, medical, and entertainment centers that provide employment, goods, and services to both regional and local market areas. The planning area is experiencing an increase in jobs, but not enough economic growth to achieve a jobs-housing balance. Many people in the region still commute great distances for their employment. The largest economic sectors in the planning area are professional and business services, with several growing industries that include biomedical, entertainment, technology, and aerospace manufacturing (due to the availability of land and facilities, as well as a qualified workforce). Environmental impacts and traffic congestion related to increased development activities will be a hindrance on economic development, especially the availability of water. From 1992 to 2005, almost 40,000 new jobs were created in the planning area. Between 2000 and 2005, job growth averaged about 3,900 jobs per year. Most of this job growth occurred in the manufacturing, services, retail trade, and construction sectors.

Planning Area Issues

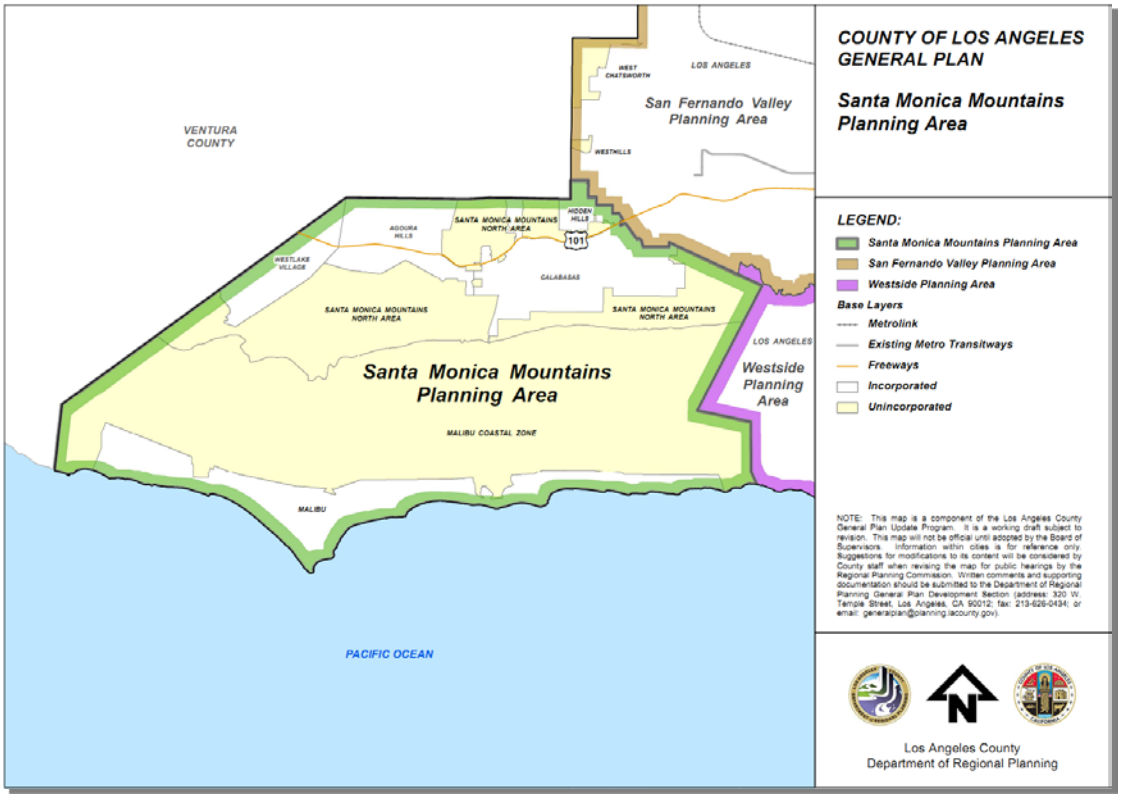
Despite the sensitive and hazardous environment, the Santa Clarita Valley Planning Area is one of the fastest growing areas in the county. In the past 10 years, approximately 33,500 housing units have been approved in the unincorporated portions of the planning area.

Due to this rapid growth, the planning area faces multiple challenges related to infrastructure planning, preservation of open space and biological diversity, jobs-housing balance, reducing vehicle miles traveled, and coordination of public services and facilities. The *Santa Clarita Valley Area Plan Update*, also known as *One Valley One Vision*, focuses on addressing these issues.

Santa Monica Mountains Planning Area

Planning Area Profile

Map 3-18: Santa Monica Mountains Planning Area



Location

The Santa Monica Mountains Planning Area covers the scenic Santa Monica Mountains and the shoreline along the Pacific Coast to the Ventura County border to the north and west, and up to the San Fernando Valley to the north. The eastern border is the Westside Planning Area and the City of Los Angeles.

Population and Demographics

The Santa Monica Mountains Planning Area is sparsely populated, with approximately 83,000 residents. Approximately 20,000 residents live in small unincorporated communities throughout the planning area. SCAG projects comparably high rates of growth for the planning area by 2035, with the total area projected to grow to approximately 114,000 total residents, and the unincorporated population to grow to approximately 33,000 residents. Almost 90% of the planning area identifies as white. SCAG estimates that the total planning area has approximately 33,000 households (7,200 in the unincorporated areas), and 62,500 jobs (approximately 17,000 in the unincorporated areas).

Geography

The Santa Monica Mountains Planning Area provides recreational opportunities, such as hiking, bicycling, birding, horse-back riding, swimming and camping, on county, federal, and state parks and beaches, as well as on privately held conservancy land. The Santa Monica Mountains contain many SEAs and sensitive environmental resource areas (SERAs).

Infrastructure

U.S. 101 and the Pacific Coast Highway (Highway 1) are the two major roads that service this planning area. There are many scenic roads throughout the planning area, two of which are state-designated scenic corridors: two portions of Mulholland Highway, and the Malibu Canyon–Las Virgenes Highway. The rural nature of the planning area precludes widespread infrastructure and public services provision, and poses constraints to new development.

Economy

Visitor-serving commercial and recreation are the primary economic activities in the planning area. The primary land uses in the Santa Monica Mountains are open space and low-density single family residential. Nodes of local-serving commercial activity are scattered among a few locations in the Santa Monica Mountains.

Planning Area Issues

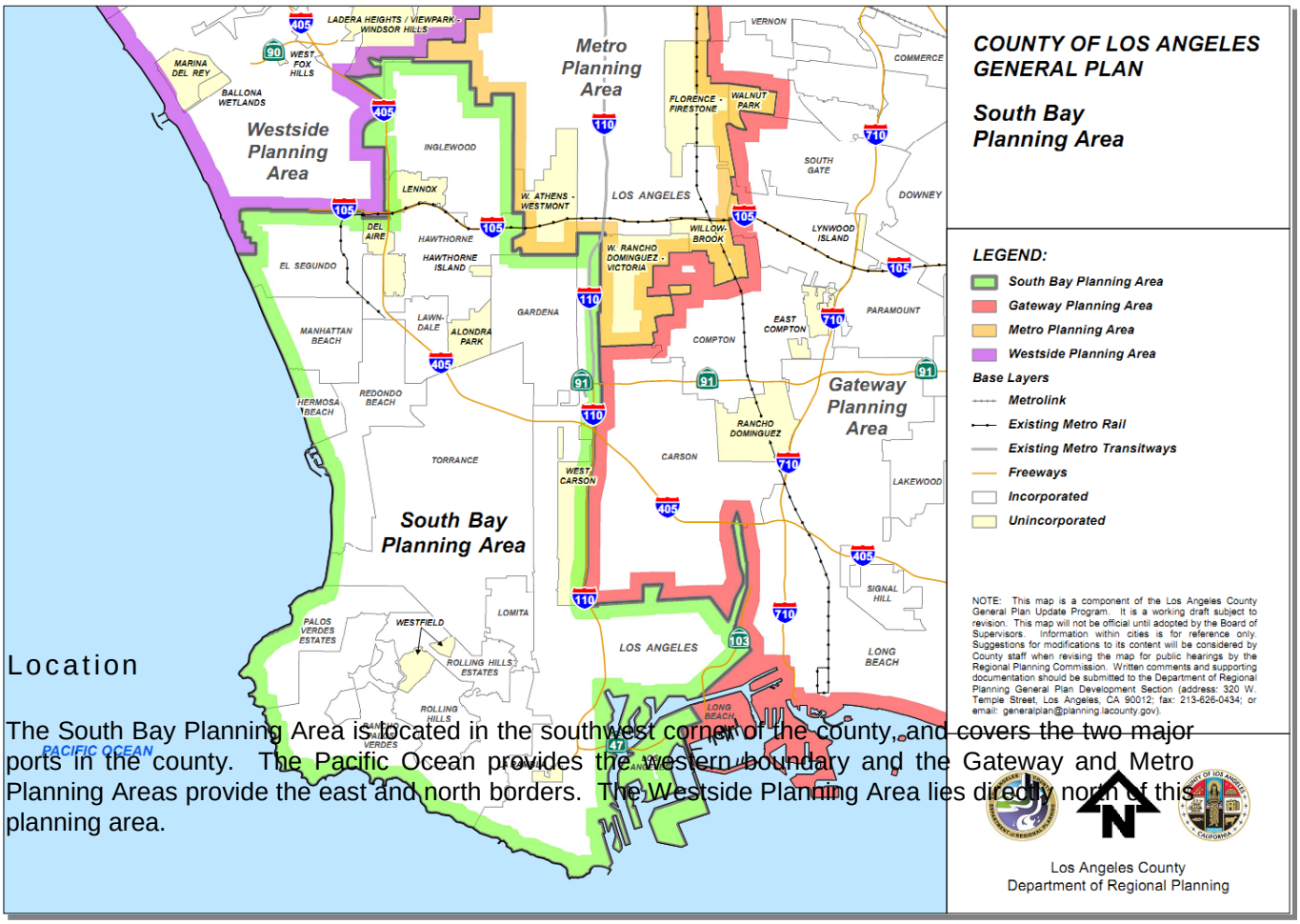
The planning area's natural beauty comes with multiple environmental issues and numerous natural hazards. The planning area contains many SEAs and SERAs, and the natural resources they contain must be protected by law. Development pressures, particularly in the Santa Monica Mountains, sometimes result in a conflict between habitat protection and development. Maintaining recreational areas, protecting environmentally sensitive lands, expanding public access to the coast, and protecting residents from natural hazards are priorities in the Santa Monica Mountains Planning Area. In addition, a majority of the planning area is designated a very high fire hazard severity zone. The Santa Monica Mountains are frequently struck by wildfires, which threaten the safety of people living along the mountains' winding, narrow roads—often in very isolated locations.

The Santa Monica Mountains are also subject to slope failure due to their geology and steep topography, a particular problem during rainstorms, which fall on hillsides that have been burned of their soil-retaining vegetation. Wildfire threats combined with limited road access pose dangers for area residents. The Santa Monica Mountains Planning Area is governed by the *General Plan*, the Santa Monica Mountains Local Coastal Program, and the *Santa Monica Mountains North Area Plan*.

South Bay Planning Area

Planning Area Profile

Map 3-19: South Bay Planning Area



Location

The South Bay Planning Area is located in the southwest corner of the county, and covers the two major ports in the county. The Pacific Ocean provides the western boundary and the Gateway and Metro Planning Areas provide the east and north borders. The Westside Planning Area lies directly north of this planning area.

Population and Demographics

The planning area has a population of approximately 424,000 residents, with only 20,500 residents living in the unincorporated areas. The total number of households in the planning area is approximately 337,000 (22,000 in the unincorporated areas). The planning area is an employment-rich region with over 423,000 jobs. Over 63 percent of the residents identify as “Hispanic or Latino” or Asian.

Geography

The majority of the planning area consists of low-level areas of the Los Angeles County basin and communities that surround the part of the Los Angeles River that empties into the Pacific Ocean at the Port of Long Beach. The Palos Verde Peninsula is covered with hills, open spaces, and affluent communities that abut dramatic cliffs and rocky shorelines along the Pacific Coast.

Infrastructure

The South Bay Planning Area is served mainly by four major freeways: Interstate 105, Interstate 405, Interstate 110, and State Route 91. The Metro Green Line also serves the South Bay Planning Area. Other transportation facilities in the region include Torrance Municipal Airport – Zamperini Field and Hawthorne Municipal Airport. The Los Angeles International Airport (LAX) is located on the northern portion of the planning area. The Port of Los Angeles is also located in the planning area.

Economy

The South Bay Planning Area is home to numerous offices for company headquarters, research and development facilities, manufacturing, health care, telecommunications, financial services, and international trade businesses. Educational institutions, such as California State University–Dominguez Hills and several community colleges, provide training and degree programs to meet the needs of industry.

Planning Area Issues

Planning issues facing the South Bay Planning Area include traffic congestion, limited public transportation options, air quality concerns, and a lack of developable land. Also, due to the region's proximity and inclusion of major transportation hubs - LAX and the Ports of Long Beach and Los Angeles - goods movement has become an important part of the planning area's economy. However, goods movement also creates planning and environmental challenges. While physical infrastructure improvements are needed to ensure that freeways and streets are adequate to serve increased truck volumes, the massive increase in cargo volume has created significant air pollution in neighboring communities. In addition, petroleum refining and flaring is a significant source of air pollution in the region.

Although manufacturing still plays an important role in the region's economy, certain communities have witnessed a decline in manufacturing/industrial uses in recent years. This creates both brownfield development potential and land use planning challenges. For instance, in unincorporated West Carson, abandoned industrial sites have been redeveloped into multifamily residential uses, creating land-use incompatibility between the new high-density residential developments and the adjacent active industrial uses. The planning area's proximity to LAX, one of the busiest airports in the world, also creates a unique land-use planning challenge to the region. Neighboring communities, including unincorporated Del Aire, will need to continue their efforts in mitigating the noise impact generated by aircraft on the predominantly single-family residential areas.

Opportunity Areas

The Crenshaw Boulevard corridor only covers a small portion of Alondra Park, but it includes a range of commercial uses, and has potential for pedestrian-scale and mixed-use development. In addition, Alondra Park is home to El Camino Community College, which makes this corridor an important connector for commuting students, faculty, and staff. Future planning efforts must be closely coordinated with the City of Gardena, which has jurisdiction over the eastern portion of Crenshaw Boulevard.

The Del Aire Opportunity Area includes the Metro Aviation Station and a corridor along Inglewood Avenue. The transit center around the Metro station provides opportunities to activate the land uses adjacent to the station and provide design improvements, including pedestrian and bicycle amenities.

Inglewood Avenue, as an existing commercial corridor with a mix of uses, including neighborhood-serving businesses, also provides opportunities for mixed-use development, as well as design improvements for pedestrians and bicyclists.

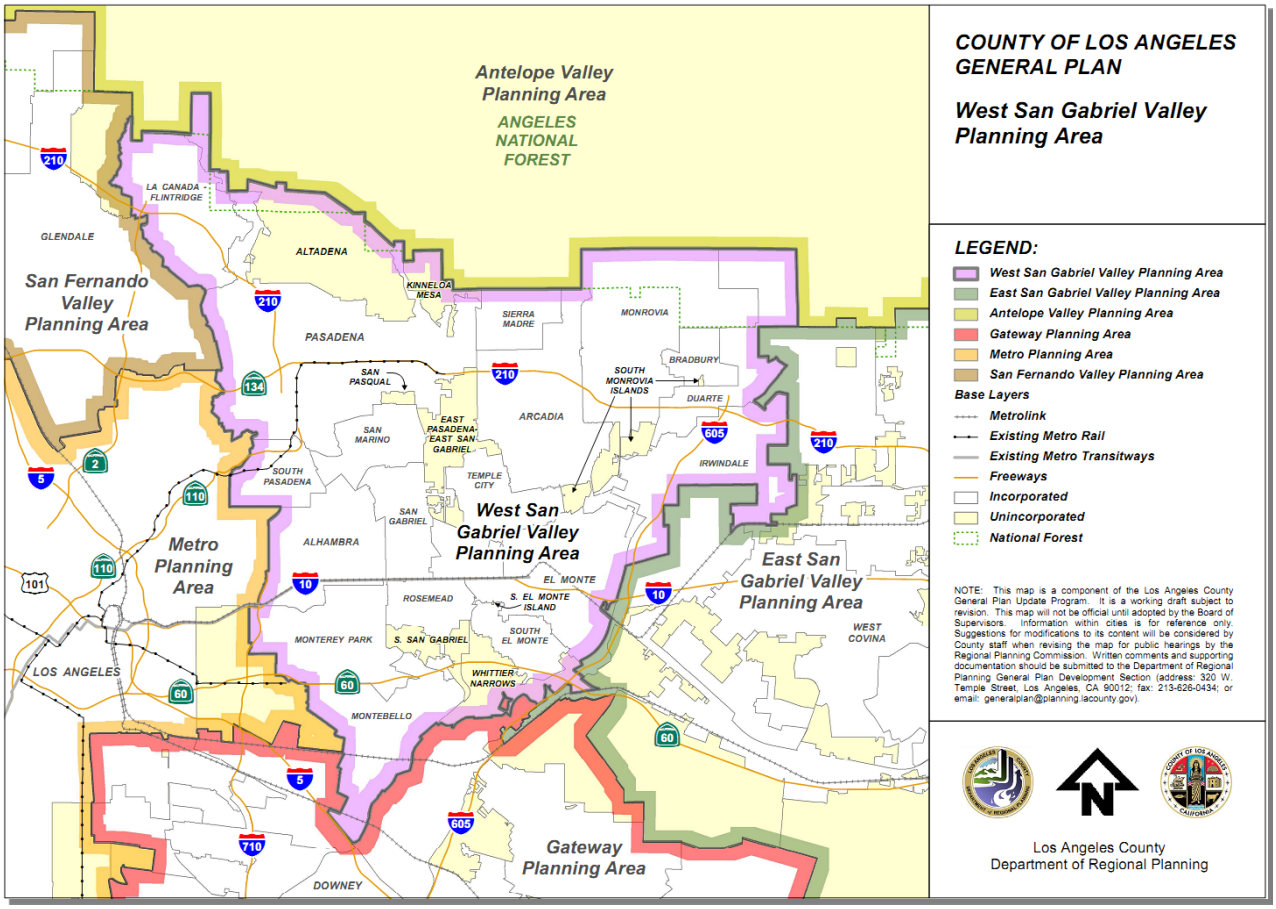
The Metro Green Line also includes the Hawthorne station in Lennox. The corridor along Hawthorne Boulevard and the area at the intersection of Hawthorne Boulevard and Lennox Boulevard, within the transit center, provide opportunities for mixed uses, as well as design improvements.

West Carson is home to many opportunity areas in the South Bay Planning Area. Portions of West Carson have undergone transition from a warehousing and distribution center servicing the Port of Los Angeles, to a higher density residential community affected by the rapid growth of the nearby City of Torrance and City of Carson. An "industrial flex district" identifies an area with an opportunity for industrial uses to transition to non-industrial uses through future planning efforts. Harbor-UCLA Medical Center, also located in West Carson, is a major employer and activity center in the area. Planned future expansions of the medical facility, as well as its proximity to the Metro Silver Line Carson Street station, provide redevelopment and infill opportunities in the surrounding neighborhoods.

West San Gabriel Valley Planning Area

Planning Area Profile

Map 3-20: West San Gabriel Valley Planning Area



Location

The Angeles National Forest is the northern border of the West San Gabriel Planning Area, while downtown Los Angeles and the Gateway Planning Area constitute the southern border. The eastern border of the planning area is roughly the Interstate 605 freeway.

Population and Demographics

The West San Gabriel Planning Area is densely populated. There are approximately 976,000 people living in the planning area. Only about 118,000 live in the unincorporated areas, many of which consist of mostly residential development. SCAG projects that the planning area will grow to around 1.1 million residents by 2035, with the unincorporated population growing to approximately 157,000 residents. The planning area is employment-rich, with a total employment base of approximately 414,000 jobs. Close to 50% of residents identify as “Hispanic or Latino” or Asian.

Geography

The planning area includes the San Gabriel Mountains and Angeles National Forest, and provides a large range of open space and recreational opportunities for area residents. The valley is named after the San Gabriel River, which flows north-south along the planning area's eastern border and the Interstate 605 freeway. The planning area is almost entirely developed, with historically suburban developments that are becoming increasingly urbanized.

Infrastructure

Two major east-west freeways, Interstate 10 and Interstate/State Route 210, run through the West San Gabriel Valley Planning Area. In addition, the Metro Gold Line traverses Pasadena and terminates adjacent to unincorporated East Pasadena–East San Gabriel. Metro has also approved the expansion of the Gold Line light rail to several communities in the planning area. Other available transit options include Foothill Transit, which operates multiple bus lines throughout the planning area. The El Monte Airport is also located in the planning area.

Economy

The West San Gabriel Valley Planning Area is employment-rich, with several major employment centers such as the Jet Propulsion Laboratory and the California Institute of Technology. The planning area is also located near downtown Los Angeles, and is the gateway for goods movement infrastructure heading east. Economic development opportunities exist in portions of the unincorporated areas of the planning area. For example, Altadena contains the West Altadena Redevelopment Area. In addition, opportunities exist in some older commercial corridors to facilitate mixed-use development and pedestrian amenities.

Planning Area Issues

The West San Gabriel Valley Planning Area consists of mature, suburban communities, including some in the foothills of the San Gabriel Mountains. Some of these communities contain environmental resources and others face hazardous constraints. Portions of the Altadena and San Gabriel Canyon SEAs cover the West San Gabriel Valley Planning Area. In addition, many of the foothill communities are designated very high fire hazard severity zones, which reflects the increased threats of wildfires and subsequent mudslides in those areas.

Many of the unincorporated areas are isolated islands of almost entirely residential development. It is important to integrate these islands into the fabric of their surrounding communities, where many of the services and daily needs of unincorporated residents are met.

Opportunity Areas

Located in the heart of Altadena, Lake Avenue (between Altadena Drive and New York Drive) is a commercial corridor with various community-serving businesses, such as retail commercial, restaurants, services, and small professional offices. The *Altadena Community Plan*, which was adopted in 1986, envisions Lake Avenue to be the principal commercial center, with commercial-residential mixed-use developments.

A portion of Valley Boulevard in Avocado Heights, located between Temple and Vineland Avenues, is identified as an industrial flex district. Although these parcels are currently used for industrial purposes, the shallow parcel sizes will make it difficult for any future high-use industrial redevelopment.

There is an opportunity to encourage the redevelopment of this area as a supportive commercial use district to adjacent, high-employment work sites.

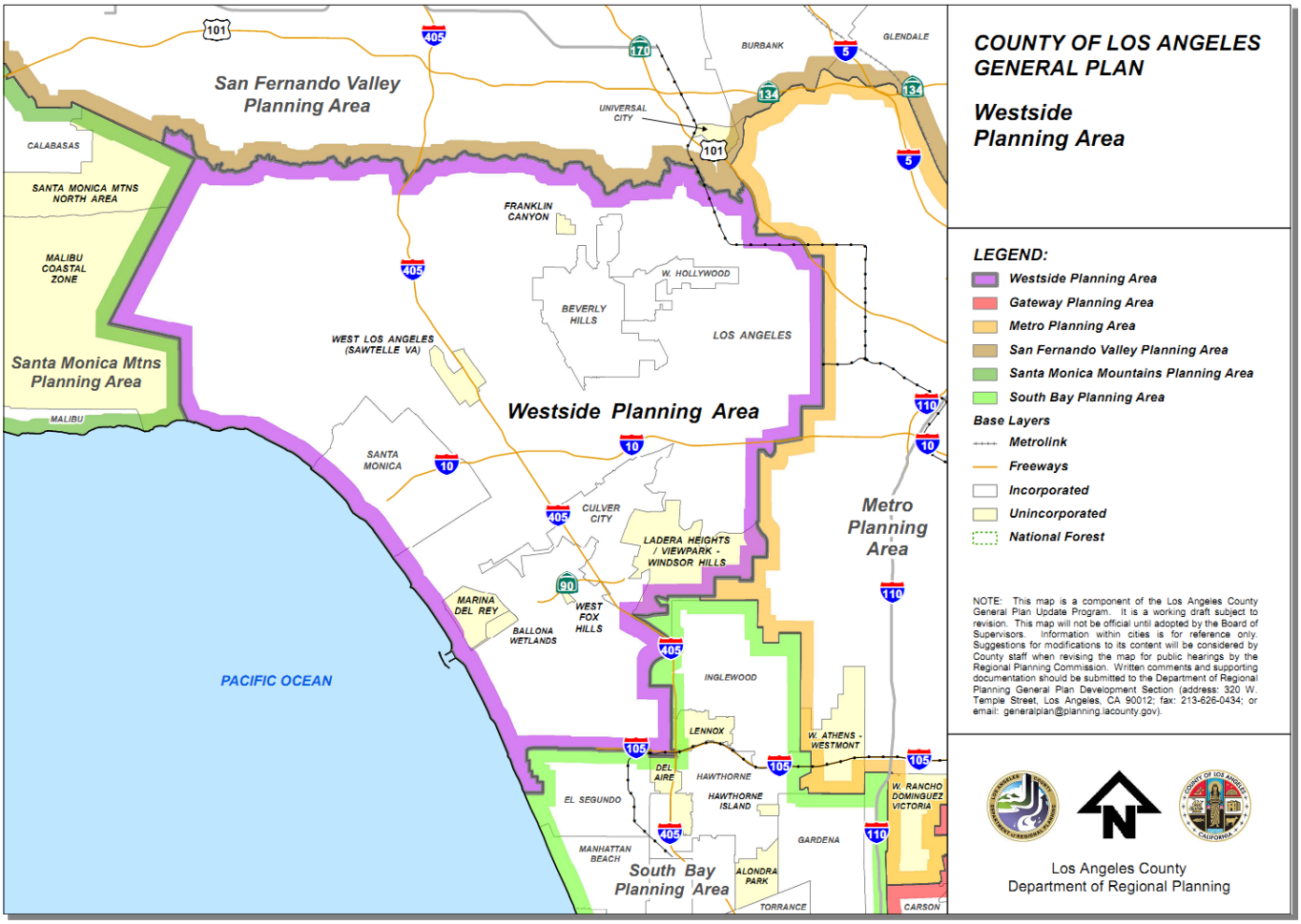
The intersection of Colorado and Rosemead Boulevard in East Pasadena, East San Gabriel is an active local commercial center. Due to its proximity to the Sierra Madre Metro Gold Line station, this area has the opportunity for increased pedestrian and bicyclist improvements, as well as more transit-oriented developments. In addition, along Rosemead Boulevard there are also a variety of retail commercial, restaurants, services, and apartment complexes. This corridor is considered an opportunity area because it can serve as an extension of the transit center opportunity area. Furthermore, the county is currently in the process of reconstructing and resurfacing this major corridor.

While Live Oak Boulevard in the unincorporated area of South Monrovia Islands only covers a few blocks, it is part of a major corridor that runs from the City of Arcadia to the west and the City of Irwindale to the east, which provides much of the retail, restaurants, and services available to the surrounding residents. This corridor is considered an opportunity area for increased design, pedestrian, and bicyclist improvements, such as street trees, lighting, and bicycle lanes.

Westside Planning Area

Planning Area Profile

Map 3-21: Westside Planning Area



Location

The Westside Planning Area covers the coastal communities along the Pacific Ocean, including Marina del Rey, as well as the west side of the City of Los Angeles and cities such as Santa Monica and Beverly Hills.

Population and Demographics

The Westside Planning Area currently has just over 1 million residents, with only about 32,000 residents living in the unincorporated areas. The majority of unincorporated residents in the planning area reside in Marina del Rey and Ladera Heights/View Park–Windsor Hills. By 2035, SCAG projects that the planning area will grow to approximately 1,144,000 people. There are currently over 468,000 households in the planning area, and it is also very employment-rich, with over 772,000 jobs. Over 56% of unincorporated residents identify as “black”. Marina del Rey is a dense community, with over 8,000 residents in a little over a 1.5–square mile area.

Geography

The planning area has a diverse landscape. The western portion of the planning area consists of a string of beaches and Marina del Rey, and the north and northeast portions consist of the Santa Monica Mountains and the City of Malibu. The planning area contains one of the few remaining wetlands in Ballona Creek. The eastern portion of the planning area includes the Baldwin Hills and Kenneth Hahn State Park, which provide open space and recreational opportunities for area residents. Marina del Rey is one of the largest, man-made small boat harbors in the United States, and is bounded on all sides by the City of Los Angeles.

Infrastructure

Opportunities for new development are being explored along planned Metro line expansions that will bring rail transit to the planning area. Although the planning area is served by multiple bus routes, it is not served by rail service, and suffers from poor traffic conditions. The Metro Expo Line, which will run through Culver City, is currently under construction, and Metro is also in the planning stages of other rail projects in this area. In addition, there are two airports in the planning area: LAX and Santa Monica Municipal Airport. Marina del Rey is a popular and highly active small boat harbor with 19 marinas with room for 5,300 boats.

Economy

The economy of the Westside Planning Area is based on the entertainment industry, leisure and hospitality services, professional services, entrepreneurialism, and design. The planning area has very low office vacancy rates, and high rents. Major education institutions and employers include the University of California, Los Angeles, and Loyola Marymount University.

Planning Area Issues

Significant environmental resources exist in the Westside Planning Area, most notably the Ballona Wetlands, which are threatened by potential sea level rise due to climate change. Marina del Rey faces traffic congestion and housing affordability issues; however, protection of the coastline and fish and wildlife resources is unique to this coastal community. Large portions of the area, including Marina del Rey, are located in a liquefaction zone. Marina del Rey is also in a tsunami hazard zone, and it is particularly susceptible to the negative impacts of climate change. In addition, most of Ladera Heights / View Park–Windsor Hills is in a very high fire hazard severity zone. There is also a fault trace running through this community. The planning area is also home to a large urban oil field in Baldwin Hills. Traffic congestion is one of the biggest issues facing the planning area. The Metro Purple Expo Line will bring light rail transit through Culver City to the west side of the City of Los Angeles, but the popular and populous northern routes are not served by rail transit. Another issue is the relatively high cost of land and housing. The planning area is seen as a very desirable place to live and do business, but there is little land for new development, and costs are high.

Opportunity Areas

The Slauson Boulevard Opportunity Area in Ladera Heights/View Park–Windsor Hills is a commercial corridor with a major commercial center at the intersection of La Brea Avenue. The area is characterized by a mix of large parcels with regional commercial activities, and small, “Main Street” style retail services and offices. Significant pedestrian improvements are needed at the intersection of La Brea Avenue to create an attractive, walkable center with linkages to nearby residential neighborhoods.

11. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): *[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

A. Does the **new or updated** plan describe land uses and development trends?

Existing Land Use Development

The following table is from the *County of Los Angeles General Plan Draft, 2012*. The table describes the different land uses within the county.

Table 3-30: Land Use Definitions within Los Angeles County

RESIDENTIAL			
Residential 2	H2	0–2 du/net ac	Purpose: Low-density, single family residences.
Residential 5	H5	0–5 du/net ac	
Residential 9	H9	0–9 du/net ac	Purpose: Single family residences.
Residential 18	H18	0–18 du/net ac	Purpose: Transitional single family and small-scale multifamily residences, including duplexes, triplexes, fourplexes, rowhouses, small lot subdivisions, and townhomes.
Residential 30	H30	0–30 du/net ac	Purpose: Medium-scale, multifamily residences, and single family residences.
Residential 50	H50	0–50 du/net ac	Purpose: Large-scale, multifamily residences, and single family residences.
Residential 100	H100	50-100 du/net ac	Purpose: Large-scale, multifamily residences.
Residential 150	H150	100-150 du/net ac	

COMMERCIAL			
Rural Commercial	CR	Commercial: Maximum FAR 0.5	Purpose: Limited commercial uses that are compatible with rural, agricultural, and low-intensity visitor-serving recreational activities, including: retail, personal, and professional services; restaurants; general stores; and professional offices.
General Commercial	CG	Residential: 0-50 du/net ac Commercial: Maximum FAR 1.0 Mixed Use: 0-50 du/net ac and FAR 1.0	Purpose: Local-serving commercial uses, such as retail sales, restaurants, personal services, and small professional office complexes; single family and multifamily residences; and residential and commercial mixed uses.
Major Commercial	CM	Residential: 30-150 du/net ac Commercial: Maximum FAR 3.0 Mixed Use: 30-150 du/net ac and FAR 3.0	Purpose: Large and intense commercial uses, such as regional and destination shopping malls and centers, tourist and recreation related commercial services, hotels, and amusement activities; multifamily residences; and residential and commercial mixed uses.
MIXED USE			
Mixed Use	MU	Residential: 0-150 du/net ac Commercial: Maximum FAR 3.0 Mixed Use: 0-150 du/net ac and FAR 3.0	Purpose: Pedestrian-friendly and community-serving uses that encourage walking, bicycling, and transit use. Commercial, residential and commercial mixed uses, multifamily residences, and limited light industrial uses.
Mixed Use – Rural	MU-R	Residential: 0-5 du/net ac Commercial: Maximum FAR 0.5 Mixed Use: 0-5 du/net ac and FAR 0.5	Purpose: Limited commercial uses that are compatible with rural, agricultural, and low-intensity visitor-serving recreational activities, including: retail; personal, and professional services; restaurants; general stores; and professional offices; and residential and commercial mixed uses.

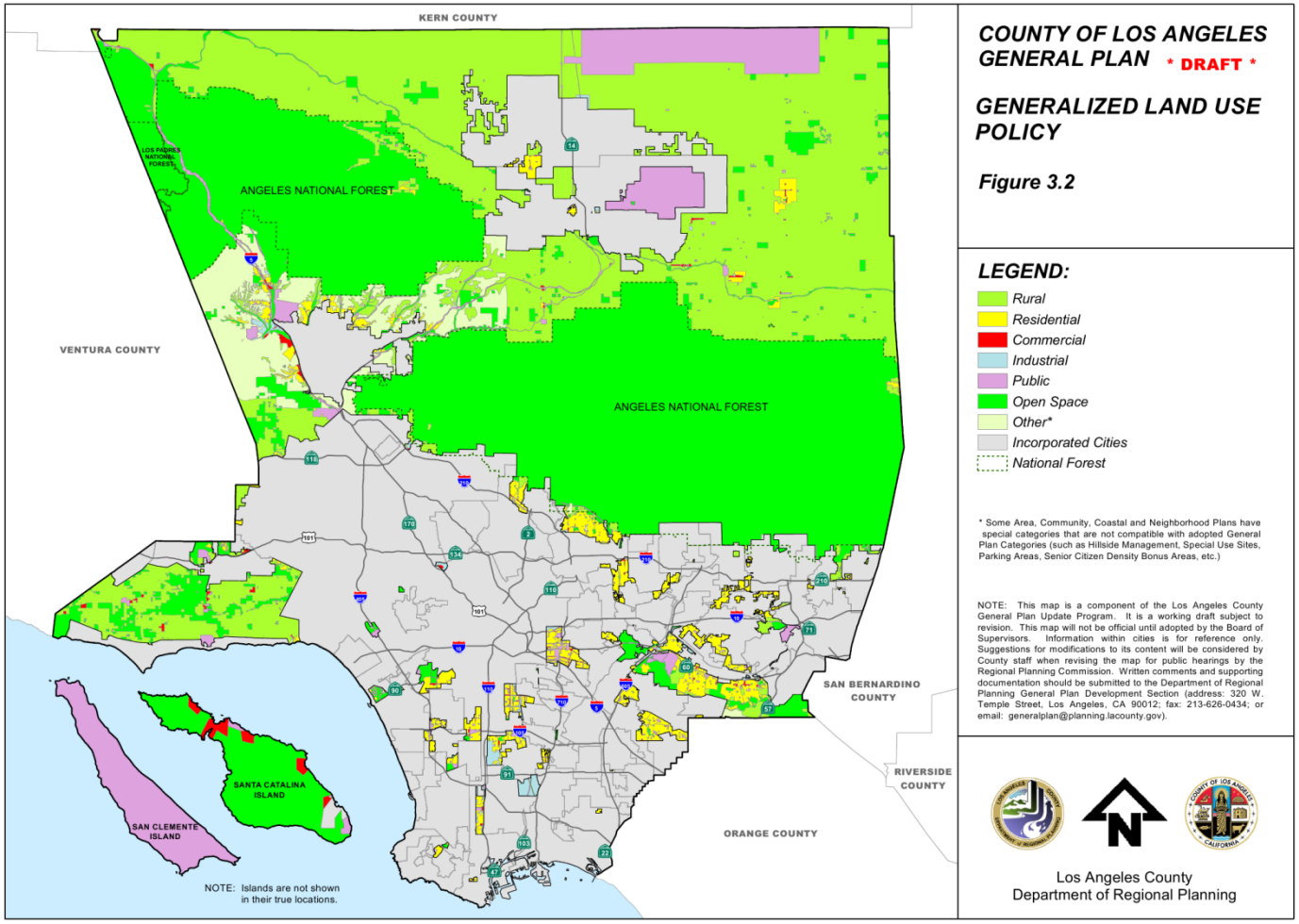
INDUSTRIAL			
Light Industrial	IL	Maximum FAR: 1.0	Purpose: Light industrial uses, such as industrial park activities, warehouses, distribution, assembly, disassembly, fabricating, finishing, manufacturing, packaging, and repairing or processing of materials, printing, commercial laundry, photographic film processing, vehicle repair garages, building maintenance shops, metal work, millwork, and cabinetry work.
Heavy Industrial	IH	Maximum FAR: 1.0	Purpose: Heavy industrial uses, including heavy manufacturing, refineries, and other labor and capital intensive industrial activities.
Industrial Office	IO	Maximum FAR: 2.0	Purpose: Employment centers with major office and business uses, such as technology and research centers, corporate headquarters, and clean industry hubs.
PUBLIC AND SEMI PUBLIC			
Public and Semi Public	P	Maximum FAR: 3.0	Purpose: Public and semi public facilities and community-serving uses, including: public buildings and campuses, schools, hospitals, cemeteries, government buildings, and fairgrounds. Airports and other major transportation facilities. Major facilities, including landfills, solid and liquid waste disposal sites, multiple use stormwater treatment facilities, and major utilities. In the event that the public use of mapped facilities is terminated, alternative uses that are compatible with the surrounding development, in keeping with community character, and consistent with the goals and policies of the General Plan, are permitted without a plan amendment. However, the proposed development must be consistent with zoning.

OPEN SPACE			
Conservation	OS-C	N/A	Purpose: The preservation of open space areas and scenic resource preservation in perpetuity. Can include passive trail networks. Applies only to land that is legally dedicated for open space and conservation efforts.
Parks and Recreation	OS-PR	N/A	Purpose: Open space recreational uses, such as regional and local parks, trails, athletic fields, community gardens, and golf courses.
National Forest	OS-NF	N/A	Purpose: Areas within the national forest and managed by the National Forest Service.
Bureau of Land Management	OS-BLM	N/A	Purpose: Areas that are managed by the Federal Bureau of Land Management.
Water	OS-W	N/A	Purpose: Bodies of water, such as lakes, reservoirs, natural waterways, and man-made infrastructure, such as drainage channels, floodways, and spillways. Includes active trail networks within or along drainage channels.
Mineral Resources	OS-MR	N/A	Purpose: Areas appropriate for mineral extraction and processing. Upon depletion of mineral resources and after the appropriate reclamation and remediation of the site, recreational uses are permitted.
Military Land	OS-ML	N/A	Purpose: Military bases and land controlled by U.S. Department of Defense.

OVERLAYS			
Transit Oriented District	TOD	Determined by the Station Area Plan for each TOD	Purpose: Pedestrian-friendly and community-serving uses near transit stops that encourage walking, bicycling, and transit use.
Special Management Areas	SMA	N/A	Purpose: Special Management Areas require additional development regulations due to the presence of natural resources, scenic resources, or identified hazards. Development regulations are necessary to prevent loss of life and property, and to protect the natural environment. Significant Ecological Areas, National Forests, Coastal Zones, Agricultural Resource Areas, Mineral Resource Zones, Hillside Management Areas, Scenic Resource Areas, Cultural Resource Areas, Seismic Hazard Zones, Flood Hazard Zones, Very High Fire Hazard Severity Zones, and Airport Influence Areas.
Specific Plan	SP	N/A	Purpose: Specific Plans contain precise guidance for land development, infrastructure, amenities and resource conservation. Specific Plans must be consistent with the General Plan. Detailed policy and/or regulatory requirements are contained within each adopted Specific Plan document.
Employment Protection Districts	EPD	N/A	Purpose: Economically viable industrial and employment-rich lands with policies to protect these areas from conversion to non-industrial uses.
Urban Centers Districts	UC	N/A	Purpose: Areas that allow a variety of uses and flexibility in development regulations and intensity of land use to create a mix of uses in a compact pattern that will promote high quality, higher intensity neighborhoods with interconnected streets, and design features that encourage pedestrian activity and transit accessibility.
OVERLAYS			
Neighborhood Districts	ND	N/A	Purpose: Neighborhood centers and nodes that are strategically located and suitable for local community-serving uses, are easily accessible and connected to surrounding residential neighborhoods, and include commercial only and residential and commercial mixed uses.
Corridors Districts	CD	N/A	Purpose: Areas along major boulevards, streets, and other important routes that provide connections between neighborhoods, jobs, and community centers. Corridors are appropriate for a mix of uses, including residential and commercial uses.

Map 3-22: Land Use

(Source: County of Los Angeles General Plan Draft, 2014*)*



Capability Assessment

Department of Public Works (DPW) Contracted Services

The DPW city services are listed below, along with the department's responsibilities.

Building and Safety Services

- Conducts plan check and issues permits on all new building and grading on private property.
- Performs building inspections.

Industrial Waste Management

- Conduct the Industrial Waste Control Program under county ordinance and adopted by cities. This includes issuing discharge permits (in conjunction with other agencies), collecting fees, making inspections, conducting plan reviews, and taking enforcement action where appropriate.

Permit Issuance and Inspection

- Issue permits for encroachment or construction in public right of way.
- Issue permits for extra-legal transport loads and film production.
- Provide inspection services to ensure permitted work complies with permit requirements, standard specifications, and approved plans.

Sewer Maintenance

- Provide sewer maintenance service for city-owned facilities that have either been annexed for maintenance purposes to the County Consolidated Sewer Maintenance District, or that are covered by a separate maintenance agreement with the department.

Street Maintenance

- Pavement maintenance
- Bridge maintenance
- Alley and drainage maintenance
- Sidewalk/driveway apron repair
- Curb and gutter repair
- Shoulder repair
- Vegetation control
- Litter and debris removal
- Call-outs, emergency response

- Monthly street inspection
- Semiannual parkway inspection
- Bridge inspections for all cities except Los Angeles and five others

Subdivision Maps: Tentative

- Review subdivision applications and recommend (condition) public works infrastructure improvements.

Subdivision Maps: Final

- Review improvements plans, certify technical accuracy of final map, and recommend approval to city council.

Traffic Advisor

- Provide advice and reports on traffic issues.
- Note: Traffic design work is included under “General Services” rather than as part of the “Traffic Advisor” services.

Traffic Operations Maintenance

- Maintain and repair traffic signs and other signs, including street name signs
- Maintain and repair streetlights, soffit lights, and other roadway and pedestrian lights
- Pavement striping and marking

Traffic Signal Maintenance

- Maintain and repair traffic signals either for (1) all traffic signals in the city, or (2) specific jurisdictionally shared intersections.
- Maintain and repair highway safety lights and illuminated street name signs associated with traffic signals.

Underground Storage Tanks

- Manage state regulatory program mandated to counties.

General Services

- Catch basin cleaning and stenciling
- Construction administration services
- Design services, including traffic design, highway design, storm drain, etc.
- Infrastructure plan checking and approval for private development

- Mapping and land surveying
- Material testing
- Project management for city-county cooperative projects administered by the county
- Soils and geology reports
- Traffic signal controller and cabinet testing and inspecting
- Traffic signal timing installation

The Hazard Mitigation Planning Advisory Committee identified current capabilities available for implementing hazard mitigation activities. The capability assessment portion of the mitigation plan identifies administrative, technical, legal, and fiscal capabilities. This includes a summary of departments and their responsibilities associated with hazard mitigation planning, as well as codes, ordinances, and plans already in place associated with hazard mitigation planning. The second part of the assessment provides the county's fiscal capabilities that may be applicable to providing financial resources to implement identified mitigation action items.

Benefit-cost Review

Benefit/cost analysis is used in hazards mitigation to determine if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Existing Institutions, Plans, Policies, and Ordinances

ELEMENT C. MITIGATION STRATEGY | C1
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

The administrative and technical capabilities of the county are shown in the table below, which identifies the staff, personnel, and department resources available to implement the actions specified in the mitigation section of the plan. Specific resources reviewed include those involving technical personnel such as planners/engineers with knowledge of land development and land management practices, engineers trained in construction practices related to building and infrastructure, planners and engineers with an understanding of natural or human-caused hazards, floodplain managers, surveyors, personnel with GIS skills, and scientists familiar with hazards in the community.

Administrative and Technical Capacity

Staff/Personnel Resources	Y/N	Department/Agency and Position
A. Planners or engineers with knowledge of land development and land management practices	Y	Department of Public Works
B. Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Y	Department of Public Works
C. Planners or engineers with an understanding of natural and/or human-caused hazards	Y	Department of Public Works
D. Floodplain manager	Y	Department of Public Works
E. Surveyors	Y	Department of Public Works
F. Staff with education or expertise to assess the community's vulnerability to hazards	Y	Department of Public Works Office of Emergency Management (OEM)
G. Personnel skilled in GIS and/or HAZUS	Y	GIS Managers – DPW OEM
H. Scientists familiar with the hazards of the community	Y	County Science Advisory Board
I. Emergency manager	Y	Office of Emergency Management
J. Grant writers	Y	OEM and other departments determine their own level of service.

Legal and Regulatory Capability

The legal and regulatory capabilities of the county are shown in the table below, which presents the existing ordinances and codes that affect the physical or built environment of the county. Examples of legal and/or regulatory capabilities can include the county's building codes, zoning ordinances, subdivision ordnances, special-purpose ordinances, growth management ordinances, site plan review, general plans, capital improvement plans, economic development plans, emergency response plans, and real estate disclosure plans.

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Does State Prohibit (Y/N)
Building code	Y	N
Zoning ordinance	Y	N
Subdivision ordinance or regulations	Y	N
Special-purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Y	N
Growth management ordinances (also called "smart" growth or anti-sprawl programs)	Y	N
Site plan review requirements	Y	N
General or comprehensive plan	Y	N
A capital improvements plan	Y	N
An economic development plan	Y	N

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Does State Prohibit (Y/N)
An emergency response plan	Y	N
A post-disaster recovery plan	Y	N
A post-disaster recovery ordinance	N	N
Real estate disclosure requirements	Y	N
2001 flood hazard mitigation plan	Y	N

Fiscal Resources

The table below shows specific financial and budgetary tools available to the county, such as community development block grants; capital improvements project funding; authority to levy taxes for specific purposes; fees for water, sewer, gas, or electric services; impact fees for homebuyers or developers for new development; ability to incur debt through general obligations bonds; and withholding spending in hazard-prone areas.

Financial Resources	Accessible or Eligible to Use (Yes/No)
Community development block grants (CDBG)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
Fees for water, sewer, gas, or electric service	Yes
Impact fees for homebuyers or developers for new developments/homes	Yes
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	Yes
Withhold spending in hazard-prone areas	Yes

Table 3-31: DPW City Services Agreement Matrix
(Source: County of Los Angeles Department of Public Works)

County of Los Angeles Department of Public Works
Services Provided to Cities
(Via Agreement)

City	✱Bridge Inspection and/or Maintenance	Building and Safety (1)	✱Storm Drain Catch Basin Cleanout	Street Maintenance	As Needed Services	Industrial Waste (1)	Permit Issuance (Excluding Transportation)	Permit Inspection (Excluding Transportation)	Permit Issuance & Inspection (Transportation)	✱Infrastructure Design and Construction - Available (1)	Consolidated Sewer Maintenance District	Sewer Maintenance (2)	✱Street Lighting Maintenance District (1)	Subdivision Maps: Final	Subdivision Maps: Tentative	Traffic Advisor	Traffic Operations Maintenance	Traffic Signal Maintenance	Traffic Signal Maintenace Shared Intersections Only	Underground Storage Tanks
Agoura Hills	■		■	■	■	■				■	■		■				■	■		■
Alhambra	■		■		■					■										■
Arcadia	■		■		■					■				■					■	■
Artesia		■			■	■				■	■			■						■
Avalon					■					■										■
Azusa	■				■					■									■	■
Baldwin Park	■				■					■	■								■	■
Bell	■				■					■		■								■
Bell Gardens			■		■	■				■	■	■	■							■
Bellflower	■				■	■				■	■									■
Beverly Hills					■	■				■			■						■	■
Bradbury			■	■	■				■	■	■					■				■
Burbank	■		■		■					■			■							
Calabasas	■		■	■	■	■				■	■	■				■	■			■
Carson	■	■	■		■	■			■	■	■	■	■	■		■	■			■
Cerritos	■	■	■	■	■	■			■	■									■	■
Claremont	■				■					■										■
Commerce	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■		■		■
Compton	■		■		■					■								■		■
Covina	■		■		■					■			■					■		■
Cudahy	■		■		■	■				■	■		■							■
Culver City	■		■		■	■				■			■							■
Diamond Bar	■		■		■	■				■	■	■								■
Downey	■				■				■	■						■	■			■
Duarte	■	■	■		■	■				■	■									■
El Monte	■		■		■				■	■										■
El Segundo	■				■					■			■				■			
Gardena	■		■		■	■				■			■		■			■		■
Glendale	■		■		■					■			■					■		
Glendora	■				■					■	■		■					■		■
Hawaiian Gardens	■		■	■	■	■				■	■							■		■
Hawthorne	■		■		■					■			■				■			■
Hermosa Beach					■					■			■					■		■
Hidden Hills			■		■					■	■						■			■
Huntington Park	■		■		■					■			■					■		■
Industry	■	■	■	■	■					■	■	■			■	■	■			■
Inglewood					■					■								■		■
Irwindale	■	■	■		■	■				■			■					■		■
La Canada Flintridge	■	■	■	■	■	■				■	■	■				■	■			■
La Habra Heights	■		■		■					■	■									■
La Mirada	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■
La Puente	■		■		■	■				■		■						■		■
La Verne	■		■		■	■				■										■
Lakewood	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■			■
Lancaster	■				■				■	■										■
Lawndale		■	■	■	■	■				■	■	■	■			■	■			■
Lomita		■	■	■	■	■	■	■	■	■	■	■	■	■	■					■
Long Beach	■				■				■	■									■	
Los Angeles (3)										■									■	
Lynwood	■				■				■	■			■						■	■
Malibu	■				■					■	■	■								■
Manhattan Beach					■					■			■				■			■
Maywood	■		■		■					■										■

County of Los Angeles Department of Public Works
Services Provided to Cities
(Via Agreement)

City	*Bridge Inspection and/or Maintenance	Building and Safety (1)	*Storm Drain Catch Basin Cleanout	Street Maintenance	As Needed Services	Industrial Waste (1)	Permit Issuance (Excluding Transportation)	Permit Inspection (Excluding Transportation)	Permit Issuance & Inspection (Transportation)	*Infrastructure Design and Construction - Available (1)	Consolidated Sewer Maintenance District	Sewer Maintenance (2)	*Street Lighting Maintenance District	Subdivision Maps: Final	Subdivision Maps: Tentative	Traffic Advisor	Traffic Operations Maintenance	Traffic Signal Maintenance	Traffic Signal Maintenance - Jurisdictionally Shared Intersections Only	Underground Storage Tanks
Monrovia	■				■					■				■						■
Montebello	■		■		■					■				■					■	■
Monterey Park	■				■	■				■			■						■	■
Norwalk	■		■		■	■				■										■
Palmdale	■				■				■	■		■	■							■
Palos Verdes Estates	■				■					■	■			■						■
Paramount	■		■		■	■	■	■	■	■	■		■							■
Pasadena	■		■		■					■				■					■	
Pico Rivera	■		■		■	■				■	■			■					■	■
Pomona	■				■					■									■	■
Rancho Palos Verdes			■		■	■				■	■									■
Redondo Beach	■				■					■				■					■	■
Rolling Hills		■			■					■	■			■	■					■
Rolling Hills Estates	■	■	■	■	■	■	■	■		■	■		■	■	■		■			■
Rosemead	■		■		■	■			■	■	■								■	■
San Dimas	■		■		■	■			■	■	■			■						■
San Fernando	■				■	■				■										
San Gabriel	■				■					■				■					■	■
San Marino	■		■		■					■				■					■	■
Santa Clarita	■				■	■				■	■						■	■		■
Santa Fe Springs	■	■	■		■				■	■	■			■					■	
Santa Monica	■				■					■				■						
Sierra Madre	■		■		■					■				■						■
Signal Hill			■		■				■	■				■						■
South El Monte			■	■	■					■	■		■							■
South Gate	■		■		■				■	■				■					■	■
South Pasadena	■				■					■				■						■
Temple City	■	■	■	■	■	■	■	■	■	■	■			■	■		■	■		■
Torrance	■				■					■				■					■	
Vernon	■				■					■				■						
Walnut	■		■	■	■	■			■	■	■		■				■	■		■
West Covina	■		■		■				■	■				■					■	■
West Hollywood			■		■	■				■		■		■				■		■
Westlake Village	■	■	■	■	■	■	■	■	■	■	■						■	■		■
Whittier	■		■		■					■			■						■	■
TOTALS:	71	17	55	17	87	37	8	8	23	88	37	3	20	45	8	6	16	18	34	77

Note: * New reporting category

(1)Building and Safety, Industrial Waste, Infrastructure Design & Construction, and Street Lighting Maintenance District services are provided through funding agreements with cities.

(2)Sewer Maintenance services are provided through the Consolidated Sewer Maintenance District or funding ageements with cities.

(3)The Department of Public Works provides street and bridge maintenance services to the City of Los Angeles through a MOU.

Table 3-32: Fire Protection Contracted Services
(Source: Los Angeles County Fire Department)

City Interface Matrix Los Angeles County Fire

City	County Fire Services Non-Contract	County Fire Services Contract	County Prevention Services	Prevention Services Contract	County Public Works Services	Public Works Services Contract	County Planning Services	Computer Interface
Acton	Y		Y					
Agoura Hills	Y			Y	Y			
Agua Dulce	Y		Y					
Alhambra					Y			
Altadena	Y		Y					
Angeles Crest	Y		Y					
Antelope Valley	Y		Y					
Arcadia					Y			
Arcadia (CO)	Y		Y					
Artesia	Y			Y		Y		
Athens	Y		Y					
Avalon					Y			
Azusa		Y		Y	Y			
Baldwin Hills	Y		Y					
Baldwin Park	Y			Y	Y			
Bassett	Y		Y					
Bell	Y			Y	Y			
Bell Gardens	Y			Y	Y			
Bellflower	Y			Y	Y			
Beverly Hills					Y			
Bradbury	Y			Y	Y			
Burbank					Y			
Calabasas	Y			Y	Y			
Canyon Country	Y		Y					
Carson	Y			Y		Y		
Castaic	Y		Y					
Catalina	Y		Y					
Cerritos	Y		Y			Y		
Chatsworth (CO)	Y		Y					
City Terrace	Y		Y					
Claremont	Y			Y	Y			
Commerce		Y		Y		Y		
Compton					Y			
Compto (CO)	Y		Y					
Covina		Y		Y	Y			
Cudahy	Y			Y	Y			
Culver City					Y			

Incorporated =Black
Unincorporated = Red

1

3.30.04

City Interface Matrix Los Angeles County Fire

City	County Fire Services Non-Contact	County Fire Services Contract	County Prevention Services	Prevention Services Contract	County Public Works Services	Public Works Services Contract	County Planning Services	Computer Interface
Diamond Bar	Y			Y	Y			
Dominguez	Y		Y					
Downey					Y			
Duarte	Y			Y		Y		
East Los Angeles	Y		Y					
Elizabeth Lake	Y		Y					
El Monte		Y		Y	Y			
El Segundo					Y			
Firestone	Y		Y					
Florence	Y		Y					
Gardena		Y		Y	Y			
Gardena (CO)	Y		Y					
Glendale					Y			
Glendora	Y			Y	Y			
Gorman	Y		Y					
Green Valley	Y		Y					
Hacienda Heights	Y		Y					
Hawaiin Gardens	Y			Y	Y			
Hawthorne		Y		Y	Y			
Hermosa Beach					Y			
Hidden Hills	Y			Y	Y			
Huntington park	Y			Y	Y			
Industry	Y			Y		Y		
Inglewood		Y		Y	Y			
Irwindale	Y			Y		Y		
La Canada-Flintridge	Y			Y		Y		
La Crescenta	Y		Y					
La Habra Heights					Y			
Lake Hughes	Y		Y					
Lakewood	Y			Y		Y		
La Mirada	Y			Y		Y		
Lancaster	Y			Y	Y			
La Puente	Y			Y	Y			
La Verne					Y			
La Verne (CO)	Y		Y					
Lawndale	Y			Y		Y		
Lennox	Y		Y					

Incorporated =Black
Unincorporated = Red

2

2-29-04

City Interface Matrix Los Angeles County Fire

City	County Fire Services Non-Contact	County Fire Services Contract	County Prevention Services	Prevention Services Contract	County Public Works Services	Public Works Services Contract	County Planning Services	Computer Interface
Lake Los	Y		Y					
Littlerock	Y		Y					
Llano	Y		Y					
Lomita	Y		Y			Y		
Long Beach					Y			
Los Angeles					Y			
Lynwood		Y		Y	Y			
Malibu	Y		Y	Y	Y			
Manhattan Beach					Y			
Marina Del Rey	Y		Y					
Maywood	Y			Y				
Monrovia					Y			
Montebello					Y			
Monterey Park					Y			
Montrose	Y		Y					
Newhall	Y		Y					
Norwalk	Y			Y	Y			
Olive View	Y		Y					
Pacoima Hills	Y		Y					
Palmdale	Y			Y	Y			
Palos Verdes Estates		Y		Y	Y			
Paramount	Y			Y	Y			
Pasadena					Y			
Pasadena (CC	Y		Y					
PearlNossom	Y		Y					
Pico Rivera	Y			Y				
Pomona		Y		Y				
Quail Lake	Y		Y					
Quartz Hill	Y		Y					
Rancho Dominguez	Y		Y					
Rancho Palos Verdes	Y			Y	Y			
Redondo Beach					Y			
Rolling Hills	Y			Y		Y		
Rolling Hills Estates	Y			Y		Y		
Rosemead	Y			Y	Y			
Rowland Heights	Y		Y					
San Dimas	Y			Y	Y			

Incorporated =Black
Unincorporated = Red

3

2-29-04

City Interface Matrix Los Angeles County Fire

City	County Fire Services Non-Contact	County Fire Services Contract	County Prevention Services	Prevention Services Contract	County Public Works Services	Public Works Services Contract	County Planning Services	Computer Interface
San Fernando					Y			
San Gabriel					Y			
San Gabriel (CC)	Y		Y					
San Marino					Y			
San Pedro (CC)	Y		Y					
Santa Clarita	Y			Y	Y			
Santa Fe Springs						Y		
Santa Monica					Y			
Saugus	Y		Y					
Sierra Madre					Y			
Signal Hill	Y			Y	Y			
South El Monte	Y		Y		Y			
South Gate	Y			Y	Y			
South Pasadena					Y			
South San Gabriel	Y		Y					
Stevenson Ranch	Y		Y					
Temple City	Y			Y		Y		
Torrance					Y			
Torrance (CC)	Y		Y					
Topanga	Y		Y					
Universal City	Y		Y					
Valencia	Y		Y					
Valinda	Y		Y					
Valyermo	Y		Y					
Val Verde	Y		Y					
Vasquez Rocks	Y		Y					
Vernon					Y			
Walnut	Y			Y	Y			
Walnut Park	Y		Y					
West Covina					Y			
West Hollywood	Y			Y	Y			
Westlake Village	Y			Y		Y		
Whittier	Y			Y	Y			
Whittier (CC)	Y		Y					
Willowbrook	Y		Y					
Wilmington (CC)	Y		Y					
Windsor Hills	Y		Y					

Incorporated =Black
Unincorporated = Red

4

2-29-04

Table 3-33: Critical Facilities List
(Source: County of Los Angeles CEO - ITS GIS Department)

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	Station 32	Azusa	County fire station	X				X		
1	Station 26	La Puente	County fire station	X				X		
1	Station 87	Industry	County fire station	X				X		
1	Sheriff-Bassett Storefront Substation	La Puente	Sheriff substation	X				X		
1	Industry Station	Industry	Sheriff station	X						
1	Station 43	La Puente	County fire station	X						
1	Station 118	City of Industry	County fire station	X						
1	PW Road – Div. #116 Maintenance Yard	City of Industry	Maintenance/operations	X						
1	PW Road – Div. #416 Maintenance Yard Office	City of Industry	Maintenance/operations	X						
1	Station 40	Pico Rivera	County fire station	X				X	500	
1	PW Flood – Riverview Maintenance Yard	Montebello	Maintenance/operations	X				X	100	
1	Station 169	El Monte	County fire station	X				X		
1	Station 167	El Monte	County fire station	X				X		
1	Station 166	El Monte	County fire station	X				X		
1	Station 168	El Monte	County fire station	X				X		
1	El Monte Airport-Maintenance Building 13	El Monte	Airport/heliport	X				X		

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	South El Monte City Hall Presence	South El Monte	Sheriff substation	X				X		
1	Station 90	So. El Monte	County fire station	X				X		
1	Station 4	Rosemead	County fire station	X				X		
1	Rosemead City Hall Presence	Rosemead	Sheriff substation	X						
1	Station 42	Rosemead	County fire station	X						
1	Station 145	Rowland Heights	County fire station	X						
1	ISD – Departmental Operations Center	Los Angeles	Maintenance/operations		X					
1	ISD – Eastern Ave. Complex Emergency Generator	Los Angeles	Maintenance/operations		X					
1	ISD – Eastern Ave. Complex Vehicle Repair Shops	Los Angeles	Maintenance/operations		X					
1	Sheriff – Eastern Complex Fleet Services Office	Los Angeles	Maintenance/operations		X					
1	City Terrace Substation	Los Angeles	Sheriff substation	X						
1	Station 188		County fire station	X						
1	Station 187		County fire station	X						
1	187 – Fire Station 187 – Dispatch Center	Pomona	Maintenance/operations	X						
1	Walnut Station	Walnut	Sheriff station	X						
1	Station 146	Walnut	County fire station	X						

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	Station 61	Walnut	County fire station	X						
1	Station 54	South Gate	County fire station	X				X	500	
1	PW Flood – Imperial Yard	South Gate	Maintenance/operations	X				X	500	
1	Station 57	South Gate	County fire station	X				X	500	
1	Station 163	Bell	County fire station	X				X		
1	Station 165	Huntington Park	County fire station	X				X		
1	Station 27	Commerce	County fire station	X				X		
1	Fire – Fire Prevention Div./Forestry Div. Headquarters	City of Commerce	Maintenance/operations	X				X		
1	Fire – Hazardous Materials Division Headquarters	City of Commerce	Maintenance/operations	X				X		
1	Station 39	Bell Gardens	County fire station	X				X		
1	Pico Rivera Station	Pico Rivera	Sheriff station	X				X	500	
1	Station 103	Pico Rivera	County fire station	X				X	500	
1	Station 25	Pico Rivera	County fire station	X				X	500	
1	PW Flood – Rio Hondo Yard	Pico Rivera	Maintenance/operations	X				X	500	
1	Station 186		County fire station					X		
1	Station 182	Pomona	County fire station					X		
1	Station 183	Pomona	County fire station					X		

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	Station 181	Pomona	County fire station					X		
1	Station 185	Pomona	County fire station					X		
1	PW Flood – Longden Yard	Irwindale	Maintenance/operations					X		
1	PW Sewer – East Yard Dressing Rooms	Irwindale	Maintenance/operations					X		
1	Station 29	Baldwin Park	County fire station					X		
1	Animal Control #4 – Administration Building	Baldwin Park	Maintenance/operations					X		
1	PW Road – Baldwin Park Maintenance Yard	Baldwin Park	Maintenance/operations					X		
1	PW Road – Maint. Dist. 1 Office	Baldwin Park	Maintenance/operations					X		
1	Station 48	Irwindale	County fire station					X		
1	Med. Ctr. – Hospital Heliport	Los Angeles	Airport/heliport					X		
1	Med. Ctr. – LAC+USC Medical Center (New Hospital)	Los Angeles	Hospital					X		
1	PW Central Yard – Division Administration	Los Angeles	Maintenance/operations					X		
1	Station 164	Huntington Park	County fire station					X		
1	Commerce Citadel Substation	Commerce	Sheriff substation					X		
1	Med. Ctr. – Women's and Children's Hospital	Los Angeles	Hospital							

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	Station 184	Pomona	County fire station							
1	Sheriff's HQ Station	Monterey Park	Sheriff station							
1	Laguna Regulating Basin	Alhambra	Dam/debris basin							
1	PW Road – Div. #417 Maintenance Yard	Walnut	Maintenance/operations							
1	East Los Angeles Station	East Los Angeles	Sheriff station							
1	Station 1	Los Angeles	County fire station							
1	Station 3	Los Angeles	County fire station							
1	ISD/ITS – Eastern Avenue Microwave Site	Los Angeles	Communications							
1	Public Works – Van Pelt Bridge Maintenance Yard	East Los Angeles	Maintenance/operations							
1	PW Road – Div. #142 Maintenance Yard Office	East Los Angeles	Maintenance/operations							
1	Sheriff – Central Communications Center	Los Angeles	Maintenance/operations							
1	CAO – County Emergency Operations Center (EOC)	Los Angeles	Maintenance/operations							
1	Fire – Command & Control Facility	Los Angeles	Maintenance/operations							
1	Fire – Headquarters Communications/Transmitter	Los Angeles	Communications							
1	Fire – Headquarters Water Tank No.1	Los Angeles	Water tank							
1	Fire – Headquarters Water Tank No.2	Los Angeles	Water tank							

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
1	Station 50	Commerce	County fire station							
1	Station 22	Commerce	County fire station							
1	Fire – Hazard Materials Emergency Disposal Team	City of Commerce	Maintenance/operations							
2	PW Sewer – South Yard Office	Los Angeles	Maintenance/operations	X				X		
2	Station 105	Compton	County fire station	X				X	500	
2	Station 10	Carson	County fire station	X					500	
2	Station 127	Carson	County fire station	X					500	
2	Station 148		County fire station	X				X	500	
2	Compton Gateway Towne Center Satellite Station	Compton	Sheriff substation	X				X	500	
2	Compton Station	Compton	Sheriff station	X				X	500	
2	Station 16	Los Angeles	County fire station	X				X		
2	PW Road – Div. #141/241 Maintenance Yard	Los Angeles	Maintenance/operations	X				X		
2	Century Station	Lynwood	Sheriff station	X				X		
2	Station 147		County fire station	X				X		
2	Station 41	Los Angeles	County fire station	X				X		
2	ML King – Main Hospital/Acute Unit Building	Los Angeles	Hospital	X				X		

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
2	Compton Airport – Admin. Building 8	Compton	Airport/heliport	X						
2	Carson Station	Carson	Sheriff station	X					500	
2	ISD – Dist. 3 Facilities Operations Service Bldg.	Culver City	Maintenance/operations	X				X		
2	PH Health – Wilshire Metroplex Building	Los Angeles	Maintenance/operations							
2	PW Flood – 83rd St. Maintenance Yard	Westchester	Maintenance/operations							
2	PW Road – Div. #233/333/433 Maintenance Yard	Westchester	Maintenance/operations							
2	PW Road – Maint. District 3 Office	Westchester	Maintenance/operations							
2	Ladera Center Substation	Los Angeles	Sheriff substation							
2	Station 38	Los Angeles	County fire station							
2	Station 58	Los Angeles	County fire station							
2	ISD/ITS – Baldwin Hills Microwave Site	Los Angeles	Communications							
2	Station 172	Inglewood	County fire station							
2	Station 171	Inglewood	County fire station							
2	Station 173	Inglewood	County fire station							
2	Station 170		County fire station							
2	South Los Angeles Station	Los Angeles	Sheriff station							
2	Station 14	Los Angeles	County fire station							

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
2	Station 18	Inglewood	County fire station							
2	Station 162	Hawthorne	County fire station							
2	Station 161	Hawthorne	County fire station							
2	Station 160	Hawthorne	County fire station							
2	Station 95	Gardena	County fire station							
2	Station 159	Gardena	County fire station							
2	Station 158	Gardena	County fire station							
2	Sheriff – Lawndale Substation	Lawndale	Sheriff substation							
2	Station 21	Lawndale	County fire station							
2	PW Road – Div. #232 Maintenance Yard	Lawndale	Maintenance/operations							
2	Station 116	Carson	County fire station							
2	Station 36	Carson	County fire station							
2	Animal Control #3 – Administration Building	Carson	Maintenance/operations							
3	Lopez Dam	Sylmar	Dam/debris basin			X		X		X
3	West Hollywood Station	West Hollywood	Sheriff station	X						
3	Station 7	West Hollywood	County fire station	X						
3	Station 125	Calabasas	County fire station		X					X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
3	Malibu Admin. Center – Sheriff's Helicopter Pad	Malibu	Airport/heliport	X				X		X
3	PW Road – Div. #336 Maint. Yd. Office	Malibu	Maintenance/operations	X						X
3	Station 88	Malibu	County fire station	X			X			
3	PW Road – Div. #339/539 Agoura Maintenance Yard	Agoura	Maintenance/operations	X				X		X
3	Station 69	Topanga	County fire station		X					X
3	Animal Control #7 – Administration Building	Agoura Hills	Maintenance/operations							X
3	Lost Hills Station	Agoura Hills	Sheriff station							X
3	Station 68	Calabasas	County fire station							X
3	Sheriff – Lost Hills Communications Tower	Agoura Hills	Communications							X
3	Camp 8	Malibu	County fire camp							X
3	Camp 13	Malibu	County fire camp							X
3	Station 65	Agoura	County fire station							X
3	Station 67	Calabasas	County fire station							X
3	Station 72	Malibu	County fire station							X
3	ISD/ITS – Castro Peak Microwave Site	Malibu	Communications							X
3	ISD/ITS – Topanga Peak Microwave Site	Topanga	Communications							X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
3	Station 99	Malibu	County fire station							X
3	Station 70	Malibu	County fire station							X
3	PW Flood – Saticoy Yard	North Hollywood	Maintenance/operations					X	100	
3	Station 144	Westlake Village	County fire station					X		
3	ISD – Dist. 2 Facilities Operations Service Bldg.	Los Angeles	Maintenance/operations					X		
3	Whiteman Airport – Control Tower	Pacoima	Airport/heliport					X		
3	PW Flood – Hansen Yard Office	Sun Valley	Maintenance/operations					X		
3	Station 89	Agoura Hills	County fire station							
3	Universal Citywalk Substation	Universal City	Sheriff substation							
3	Station 51	Universal City	County fire station							
3	Station 8	West Hollywood	County fire station							
3	Station 71	Malibu	County fire station							
4	Station 194		County fire station	X						X
4	Station 91	Hacienda Heights	County fire station	X						X
4	Lakewood Station	Lakewood	Sheriff station	X				X	500	
4	Station 45	Lakewood	County fire station	X				X	500	
4	Aero Station	Long Beach	Sheriff station	X						

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
4	Sheriff – Aero Bureau Main Hangar & Admin. Bldg	Long Beach	Maintenance/operations	X						
4	Station 30	Cerritos	County fire station	X				X	500	
4	Station 34	Hawaiian Gardens	County fire station	X				X	500	
4	Station 94	Lakewood	County fire station	X				X	500	
4	PW Flood – Alamitos Maintenance Yard	Long Beach	Maintenance/operations	X				X	500	
4	Cerritos Station	Cerritos	Sheriff station	X				X		
4	Station 35	Cerritos	County fire station	X				X		
4	Station 120	Diamond Bar	County fire station	X						
4	Downey Admin. Ctr. – Administrative Center Bldg.	Downey	Maintenance/operations	X				X	500	
4	Station 23	Bellflower	County fire station	X				X	500	
4	Animal Control #1 – Downey Shelter Admin. Bldg.	Downey	Maintenance/operations	X				X	500	
4	PW Road – Hollydale Div. #445 Maintenance Yard	Downey	Maintenance/operations	X				X	500	
4	PW Road – Maintenance District No.4 Office	Downey	Maintenance/operations	X				X	500	
4	Sheriff – Paramount Substation	Paramount	Sheriff substation	X				X	500	
4	Station 31	Paramount	County fire station	X				X	500	

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
4	PW WWD #29 LADWP Emergency Via Dolce Connection	Marina del Rey	Maintenance/operations	X			X		500	
4	Station 110	Marina del Rey	County fire station	X			X	X		
4	Marina del Rey Station	Marina del Rey	Sheriff station	X			X	X		
4	PW WWD #29 – LADWP Emergency Mindanao Connection	Marina del Rey	Maintenance/operations	X				X		
4	Station 115	Norwalk	County fire station	X				X	500	
4	Sheriff – Bellflower Substation	Bellflower	Sheriff substation	X				X	500	
4	Station 98	Bellflower	County fire station	X				X	500	
4	Station 20	Norwalk	County fire station	X				X		
4	Norwalk Station	Norwalk	Sheriff station	X						
4	ISD/ITS – Rio Hondo Microwave Site	City Of Industry	Communications							X
4	Sheriff – Puente Hills Nike Communications Site	Rowland Heights	Communications							X
4	Station 2	Palos Verdes Estates	County fire station							X
4	Station 53	Rancho Palos Verdes	County fire station							X
4	ISD/ITS – San Pedro Hill Microwave Site	Rancho Palos Verdes	Communications							X
4	Station 56	Rolling Hills	County fire station							X
4	ISD/ITS – Blackjack Peak Microwave Site	Santa Catalina Island	Communications							X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
4	Avalon Station	Avalon	Sheriff station							X
4	Sheriff – New Isthmus Substation and Residence	Two Harbors	Sheriff substation							X
4	Harbor/UCLA Med. Center – Family Medicine Clinic	Harbor City	Hospital							
4	Station 121	Diamond Bar	County fire station							
4	Station 119	Walnut	County fire station							
4	Station 17	Whittier	County fire station							
4	Station 59	Whittier	County fire station							
4	Station 28	Whittier	County fire station							
4	Whittier County Community Substation	Whittier	Sheriff substation							
4	Station 96	Whittier	County fire station							
4	Station 15	Whittier	County fire station							
4	PW Road – Div. #146 Maintenance Yard	South Whittier	Maintenance/operations							
4	Sheriff – Central Supply Warehouse	South Whittier	Maintenance/operations							
4	PW Flood – El Segundo Yard	El Segundo	Maintenance/operations							
4	La Mirada Substation	La Mirada	Sheriff substation							
4	Station 49	La Mirada	County fire station							
4	PW Flood – Redondo Yard Office	Redondo Beach	Maintenance/operations							

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
4	Station 122	Lakewood	County fire station							
4	Station 60		County fire station							
4	Lomita Station	Lomita	Sheriff station							
4	Station 6	Lomita	County fire station							
4	Station 83	Rancho Palos Verdes	County fire station							
4	Station 106	Rolling Hills Estate	County fire station							
5	Olive View – Main Hospital Building	Sylmar	Hospital			X				
5	Station 140	Leona Valley	County fire station	X		X				X
5	PW Road – Div. #558a Jackson Lake Maintenance Yd.	Big Pines	Maintenance/operations			X				X
5	Station 74	San Fernando	County fire station			X				X
5	Sheriff – Gorman Substation	Gorman	Sheriff substation			X				
5	Camp 11	Acton	County fire camp		X					X
5	Sawpit Dam	Monrovia	Dam/debris basin		X			X		X
5	PW Flood – Morris Dam	Azusa	Dam		X			X		X
5	Station 97	Azusa	County fire station		X					X
5	Sawpit DB	Monrovia	Dam/debris basin	X				X		X
5	PW Road – Div. #514 Maintenance Yard	La Crescenta	Maintenance/operations	X						X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Big Tujunga No. 1		Dam/debris basin		X			X		
5	Big Dalton DB	Glendora	Dam/debris basin	X				X		X
5	Little Dalton DB	Glendora	Dam/debris basin	X						X
5	Puddingstone Diversion Dike	La Verne	Dam/debris basin	X				X		
5	Station 78	Palmdale	County fire station	X						X
5	Sheriff – Littlerock Presence	Littlerock	Sheriff substation	X						
5	Station 114	Palmdale	County fire station	X						
5	Station 132	Santa Clarita	County fire station		X					X
5	PW Road – Div. #553 Maintenance Yard Shop	Santa Clarita	Maintenance/operations	X					100	X
5	Station 107	Canyon Country	County fire station	X					100	
5	Station 123	Canyon Country	County fire station	X					100	X
5	PW Road – San Antonio Maintenance Yard	Claremont	Maintenance/operations		X					X
5	Thompson Creek Dam	Claremont	Dam/debris basin	X				X		X
5	PW Flood – Thompson Creek Dam	Claremont	Dam	X				X		X
5	Thompson Creek Dam	Claremont	Dam/debris basin	X				X		
5	Big Santa Anita Dam	Monrovia	Dam/debris basin		X					X
5	PW Flood – Santa Anita Dam (Big)	Monrovia	Dam		X					X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Eaton Wash Dam		Dam/debris basin	X				X		
5	PW Flood – Eaton Wash Dam and Reservoir	Pasadena	Dam	X				X		
5	PW Flood – Eaton Maintenance Yard	Pasadena	Maintenance/operations	X						
5	Santa Anita DB	Arcadia	Dam/debris basin	X				X		X
5	Sierra Madre Dam	Sierra Madre	Dam/debris basin	X						X
5	Camp 12	Saugus	County fire camp		X					X
5	Station 149	Castaic	County fire station	X				X		X
5	Animal Control #6-Office	Castaic	Maintenance/operations	X				X		X
5	PW Road – Div. #556 Maint. Yd. Office	Castaic	Maintenance/operations	X				X		X
5	PW Flood – Santa Clara Flood Maintenance Yard	Santa Clarita	Maintenance/operations	X						X
5	PW Flood – Santa Clara Yard Gas Shack	Santa Clarita	Maintenance/operations	X						X
5	Station 76	Valencia	County fire station	X				X		
5	Santa Clarita Valley Station	Valencia	Sheriff station	X						
5	Station 126	Santa Clarita	County fire station	X						
5	Magic Mountain Substation	Valencia	Sheriff substation	X						
5	Station 108	Santa Clarita	County fire station	X						X
5	Station 111	Valencia	County fire station	X				X		

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Station 102	Claremont	County fire station	X						
5	ISD/ITS – Earl Canyon Microwave Site	La Canada Flintridge	Communications		X					X
5	Camp 2	La Canada Flintridge	County fire camp	X						
5	Station 82	La Canada Flintridge	County fire station	X						
5	PW Flood – Puddingstone Dam & Reservoir	San Dimas	Dam		X					X
5	Air Operations 24-Hour Multi-Mission Squad	La Verne	Maintenance/operations	X				X		
5	Sheriff – Metro Link East	La Verne	Maintenance/operations	X				X		
5	Sheriff – Los Pinetos Peak Communications Site	Santa Clarita	Communications		X					X
5	Olive View – Helicopter Pad	Sylmar	Airport/heliport	X						X
5	Station 157	Green Valley	County fire station						500	X
5	Station 81	Agua Dulce	County fire station						100	X
5	Cogswell Dam	Pasadena	Dam/debris basin					X		X
5	PW Flood – Cogswell Dam/Reservoir	Monrovia	Dam					X		X
5	San Gabriel No. 1	Azusa	Dam/debris basin					X		X
5	San Gabriel No. 1	Azusa	Dam/debris basin					X		X
5	PW Flood –San Gabriel Dam/Reservoir	Azusa	Dam					X		X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Devil's Gate Dam	Pasadena	Dam/debris basin					X		X
5	Morris Dam	La County	Dam/debris basin					X		X
5	Morris Dam	La County	Dam/debris basin					X		X
5	PW Flood – Sawpit Dam & Reservoir	Monrovia	Dam					X		X
5	San Dimas Dam	La Verne	Dam/debris basin					X		X
5	Station 62	Claremont	County fire station					X		X
5	Live Oak Dam	Claremont	Dam/debris basin					X		X
5	PW Flood – Pacoima Dam/Reservoir	Newhall	Dam					X		X
5	ISD/ITS – Hauser Peak Microwave Site	Palmdale	Communications							X
5	ISD/ITS – Mount McDill Microwave Site	Palmdale	Communications							X
5	Station 104	Santa Clarita	County fire station							X
5	Station 75	Chatsworth	County fire station							X
5	PW Flood – Sierra Madre Dam	Sierra Madre	Dam							X
5	Camp 14	Saugus	County fire camp							X
5	Camp 16	Palmdale	County fire camp							X
5	Camp 19	Azusa	County fire camp							X
5	Camp 17	La Verne	County fire camp							X
5	Camp 9	Santa Clarita	County fire camp							X

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Station 80	Acton	County fire station							X
5	Station 77	Gorman	County fire station							X
5	Station 156	Valencia	County fire station							X
5	ISD/ITS –Lake Hughes Microwave Site	Lake Hughes	Communications							X
5	ISD/ITS – Lower Blue Ridge Microwave Site	Big Pines	Communications							X
5	ISD/ITS – Mount Disappointment Microwave Site	Altadena	Communications							X
5	ISD/ITS – Portal Ridge Microwave Site	Lake Hughes	Communications							X
5	ISD/ITS – Whitaker Middle Peak Microwave Site	Castaic	Communications							X
5	Public Works – Mount Wilson Radio Antenna Tower	Mount Wilson	Communications							X
5	Public Works – Mount Wilson Radio Facility Bldg.	Mount Wilson	Communications							X
5	PW Flood – Rubio Yard	Altadena	Maintenance/operations							X
5	PW Flood – San Dimas Dam/Reservoir	La Verne	Dam							X
5	PW Road – Div. #559b Maintenance Yard	Mount Wilson	Maintenance/operations							X
5	ISD/ITS– Johnstone Peak Microwave Site	San Dimas	Communications							X
5	PW Road – Div. #558 Maint. Yard Cement	Littlerock	Maintenance/operations						500	

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
	Container									
5	Lancaster Station	Lancaster	Sheriff station						500	
5	Station 33	Lancaster	County fire station						500	
5	PW WWD #04 – North Administration Building	Lancaster	Maintenance/operations						500	
5	Sheriff – Lancaster Communications Tower	Lancaster	Communications						500	
5	Station 131	Palmdale	County fire station					X	500	
5	Station 117	Lancaster	County fire station						500	
5	Station 135		County fire station						500	
5	Station 93		County fire station						500	
5	Station 37	Palmdale	County fire station						500	
5	ISD/ITS – Palmdale Microwave Site	Palmdale	Communications						500	
5	PW Road – Div. #557 Maintnce Yard Office/Garage	Palmdale	Maintenance/operations						500	
5	PW Road – Palmdale Maintenance Dist. No. 5 Bldg.	Palmdale	Maintenance/operations						500	
5	High Desert – Main Hospital Building	Lancaster	Hospital					X	500	
5	Station 130	Lancaster	County fire station						500	
5	Sheriff – Quartz Hill Community Substation	Quartz Hill	Sheriff substation						500	

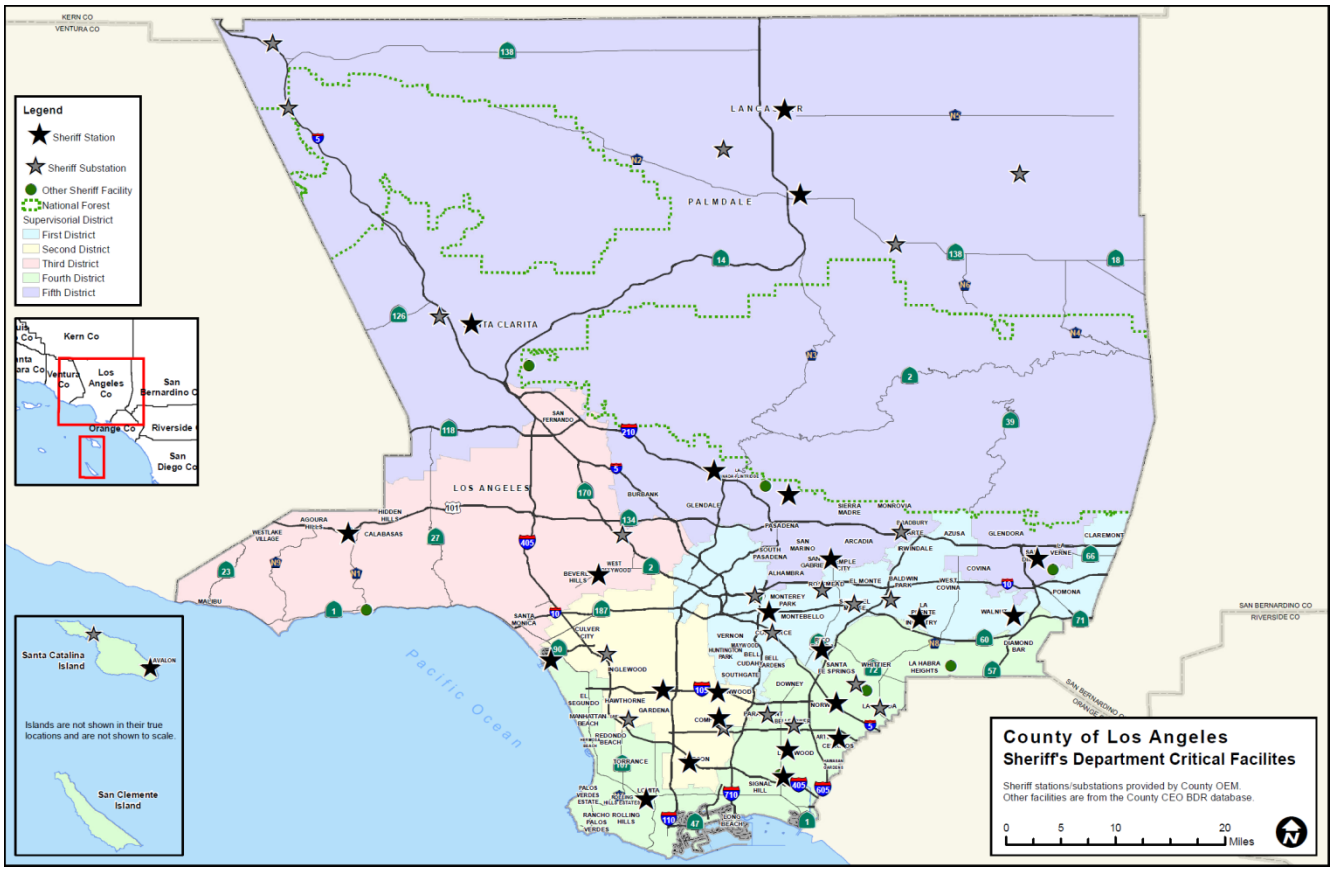
District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Station 84	Quartz Hill	County fire station						500	
5	PW Road – Div. #551 Maintenance Yard	Quartz Hill	Maintenance/operations						500	
5	Station 112	Lancaster	County fire station						500	
5	Station 73	Newhall	County fire station						100	
5	Sheriff – Pyramid Lake Substation	Gorman	Sheriff substation						100	
5	Animal Control #5 – Administration	Lancaster	Maintenance/operations					X		
5	Fox Airfield – ISD/ITS Maintenance Building 8	Lancaster	Maintenance/operations					X		
5	Fox Airfield – FAA Control Tower	Lancaster	Airport/heliport					X		
5	Station 44	Duarte	County fire station					X		
5	Sheriff – Duarte Substation	Duarte	Sheriff substation					X		
5	PW Eaton Yard – Maintenance Office	Pasadena	Maintenance/operations					X		
5	Station 101	Claremont	County fire station					X		
5	Station 153	Covina	County fire station					X		
5	Station 152	Covina	County fire station					X		
5	Station 154	Covina	County fire station					X		
5	Station 85	Glendora	County fire station					X		
5	Puddingstone Res.	San Dimas	Dam/debris basin					X		

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Pacoima Dam	Sunland	Dam/debris basin					X		
5	Station 134	Lancaster	County fire station							
5	Station 129	Lancaster	County fire station							
5	Palmdale Station	Palmdale	Sheriff station							
5	Station 24	Palmdale	County fire station							
5	Station 136	Palmdale	County fire station							
5	PW WWD #04 – M/5e Water Tank	Palmdale	Water tank							
5	PW WWD #04-M/62w Water Tank	Palmdale	Water tank							
5	PW WWD #04-M8/75w Water Tank	Palmdale	Water tank							
5	Station 66		County fire station							
5	PW Flood – Devil's Gate Dam	Pasadena	Dam							
5	Station 19	La Cañada Flintridge	County fire station							
5	Station 5	San Gabriel	County fire station							
5	Temple Station	Temple City	Sheriff station							
5	Station 47	Temple City	County fire station							
5	PW Road – Div. #519 Maintenance Yard	Temple City	Maintenance/operations							
5	Public Works Headquarters Fuel Tanks	Alhambra	Maintenance/operations							
5	Public Works Headquarters Gas Station	Alhambra	Maintenance/operations							

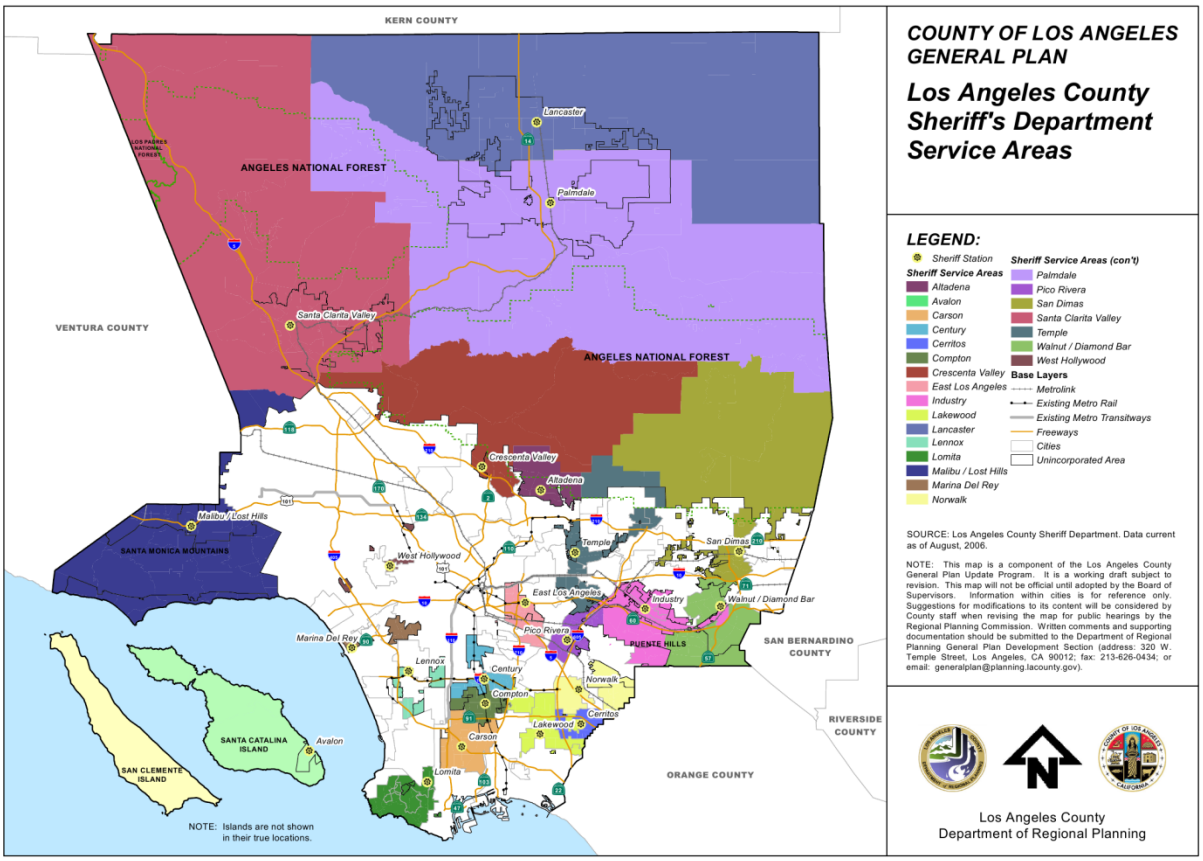
District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Sheriff – Lake Los Angeles Substation	Lake Los Angeles	Sheriff substation							
5	Crescenta Valley Station	La Crescenta	Sheriff station							
5	Altadena Station	Altadena	Sheriff station							
5	Station 92	Littlerock	County fire station							
5	Station 79	Pearblossom	County fire station							
5	Station 124	Stevenson Ranch	County fire station							
5	Station 12	Altadena	County fire station							
5	Station 11	Altadena	County fire station							
5	Station 63	La Crescenta	County fire station							
5	ISD/ITS – Bald Mountain Microwave Site	Gorman	Communications							
5	ISD/ITS – Blue Rock Microwave Tower	Lancaster	Communications							
5	ISD/ITS – Oat Mountain Microwave Site #1	Chatsworth	Communications							
5	ISD/ITS – Oat Mountain Nike Microwave Site #3	Chatsworth	Communications							
5	ISD/ITS – Tejon Peak Microwave Site	Gorman	Communications							
5	PW Fleet – Altadena Maintenance Yard Office	Altadena	Maintenance/operations							
5	PW Flood – Pickens Yard	La Crescenta	Maintenance/operations							
5	PW Road – Div. #555 Yard Office/Shop	Lancaster	Maintenance/operations							

District	Name	Postal City	Type	Liquefaction Zone	Landslide Zone	Seismic Zone	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
5	Sheriff – Altadena Maintenance Garage	Altadena	Maintenance/operations							
5	Station 151	Glendora	County fire station							
5	Station 86	Glendora	County fire station							
5	Big Dalton Dam	Azusa	Dam/debris basin							
5	PW Road – Div. #518 Maintenance Yard	Glendora	Maintenance/operations							
5	San Dimas Station	San Dimas	Sheriff station							
5	Station 64	San Dimas	County fire station							
5	Station 141	San Dimas	County fire station							
5	ISD/ITS – San Dimas Microwave Site	San Dimas	Communications							
5	PW Road – Div. #112 Maintenance Yard (Trans.)	San Dimas	Maintenance/operations							
	Station 191	La Habra	County fire station							
	Station 192	La Habra	County fire station							
	Station 193	La Habra	County fire station							

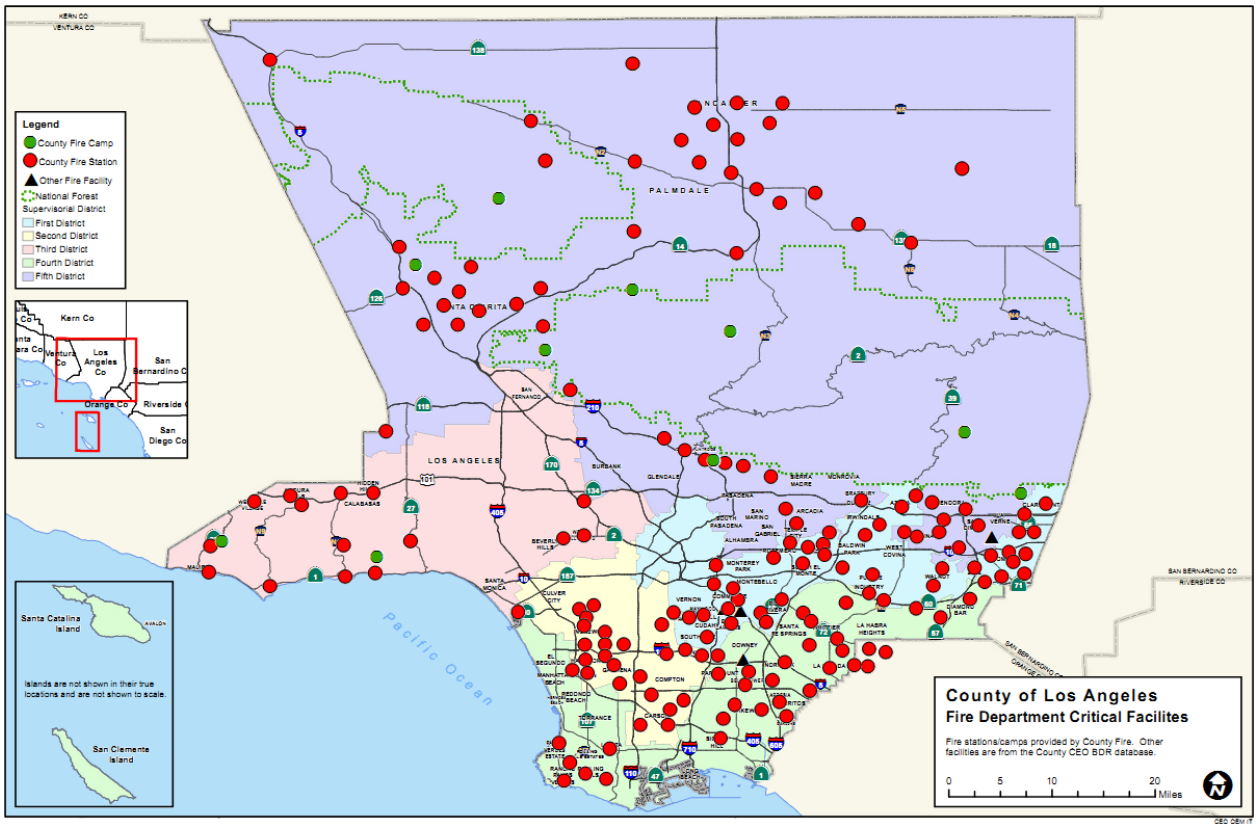
Map 3-23: Sheriff Station Locations
(Source: County of Los Angeles General Plan Draft 2012)



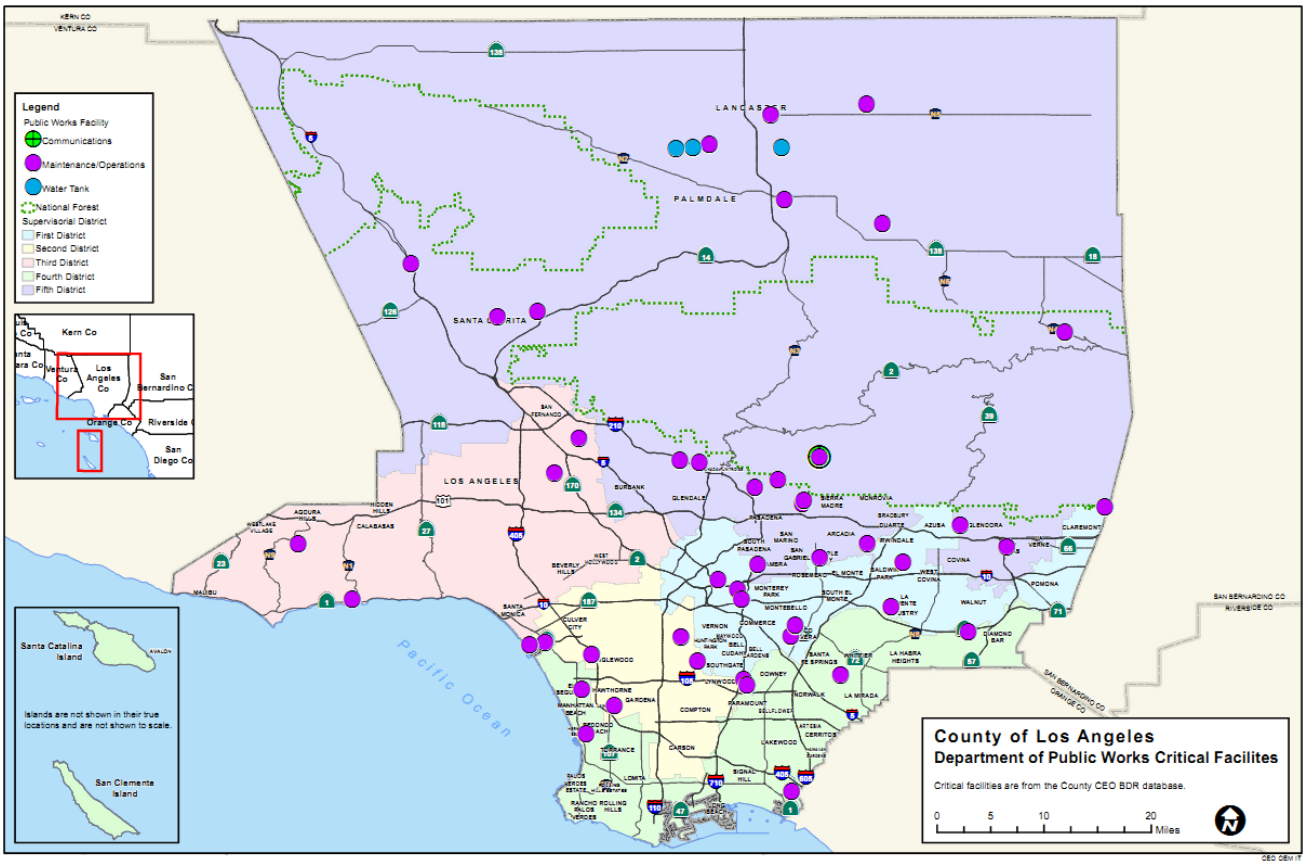
Map 3-24: Los Angeles County Sheriff's Department Service Areas
(Source: County of Los Angeles General Plan Draft 2012)



Map 3-25: Fire Department Organization
(Source: County of Los Angeles General Plan Draft 2012)



Map 3-26: Department of Public Works Critical Facilities
(Source: County of Los Angeles General Plan Draft 2014)



Map 3-27: Fire Battalions and Fire Stations
(Source: County of Los Angeles General Plan Draft 2014)

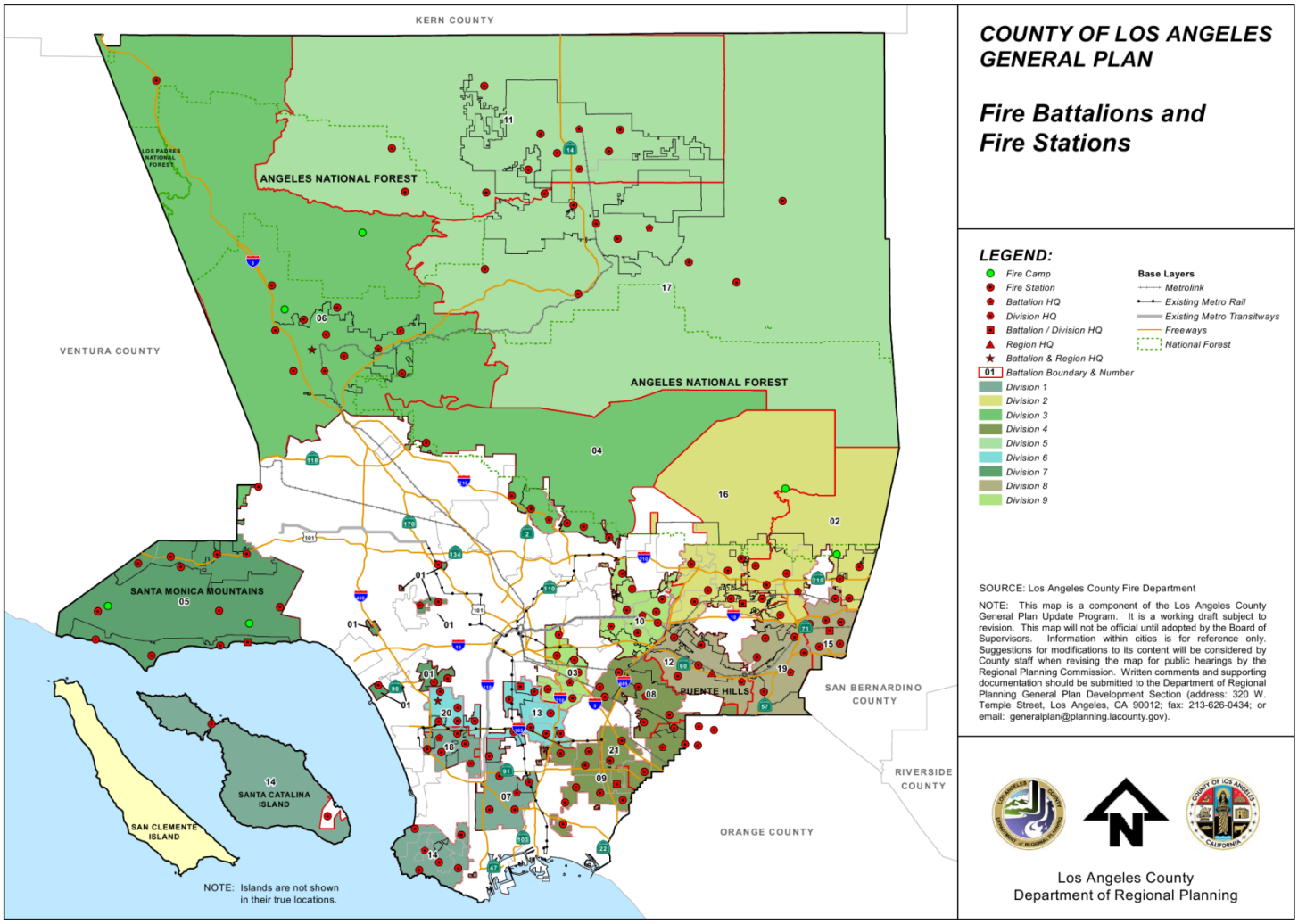


Table 3-34: Five Year Fire Data

(Source: Los Angeles County Fire Department – 2003 LA County Fire Department Statistics)

	2003	2002	2001	2000	1999
Acreage Burned	14,350	120,075	3,355	1,374	8,814
Fire Incidents					
Structures	1,953	1,988	2,088	1,918	1,875
Vehicles	3,229	3,336	3,582	2,914	2,838
Rubbish	2,990	3,232	3,029	2,447	2,085
Brush/Grass	1,073	1,242	1,126	1,303	1,335
Outside Storage	51	64	73	682	703
Miscellaneous Property	1,933	2,148	2,013	699	300
Totals	11,229	12,010	11,911	9,963	9,136
EMS Incidents	174,307	170,072	166,305	156,218	146,977
Victims Treated	196,788	194,249	188,302	160,272	146,877
Other Incidents					
False Alarms	30,702	28,462	26,666	24,923	27,403
Smoke Scares	2,541	2,406	1,667	2,072	1,167
Vehicle Accidents	17,195	17,708	17,425	8,986	4,549
Totals	87,450	82,790	82,055	67,534	65,708
TOTAL INCIDENTS	272,986	264,872	260,271	233,716	221,821
Losses in Dollars					
Improvements	$68,635,761	$56,513,065	$112,358,262	$51,883,670	$40,174,382
Contents	42,196,731	28,850,591	25,246,374	33,011,561	23,961,964
Vehicle/Contents	18,151,572	17,661,360	17,616,138	13,160,336	10,573,546
Miscellaneous Property	1,649,560	984,618	308,450	548,461	220,216
TOTAL DOLLARS LOST	$130,633,624	$104,009,634	$155,529,244	$99,604,028	$74,930,108

	2003	2002	2001	2000	1999
Lifeguard					
Ocean Rescues	10,603	8,362	8,038	11,765	9,408
Medical Calls	20,710	11,006	12,976	20,354	9,703
Boat Rescues (Distress)	843	797	872	928	847
Missing Persons	1,424	1,386	1,490	1,533	1,470
Resuscitations	485	553	749	481	431
Drowning	1	6	3	1	2
Beach Attendance	50,568,438	48,028,661	50,117,518	53,980,751	53,858,470

Emergency Responsibilities

The Los Angeles County Fire Department's mission is to "proudly protect lives and property and the environment providing prompt, skillful, cost-effective protection and life safety services". This includes response to emergencies of all types: fires, floods, earthquakes, wildland fires, hazardous materials incidents, civil disturbances, emergency medical rescues, urban search and rescue incidents, and ocean lifeguard rescues.

The Los Angeles County Fire Department is designated as the administering agency for hazardous materials for the county. The Los Angeles County Fire Chief is designated as Region I coordinator during major emergencies, and is primarily responsible for the overall coordination and dispatch of mutual aid fire and rescue resources.

Internal Services Department

Dave Lambertson, Interim Director
1100 N. Eastern Avenue, Los Angeles 90063

The Internal Services Department supports other county departments by providing a full-range of in-house, contracted, and advisory services in the areas of purchasing, contracting, facilities, information technology, and other essential support and administrative services.

ISD is organized into four primary service areas: Administrative and Finance Service (AFS), Facilities Operations Services (FOS), Information Technology Services (ITS), and Purchasing and Central Services (P&CS). These services are provided by mandated authority or at the pleasure of the county departments. The primary service areas are organized as follows:

Administration and Finance Service (AFS)

Administration and Finance Service (AFS) provides administrative support to ISD in the areas of human resources, billing, budgeting, and other administrative areas.

Facilities Operations Services (FOS)

The Facilities Operations Services (FOS) is organized into three specialized areas that provide building and energy-related services to county departments, as follows:

- FOS–Alterations and Improvements: provides carpentry, electrical, masonry, mill rights, painting, roofing, sheet metal, and project management and job order contracting services.
- FOS–Maintenance Operations: provides building alarms, elevator, general maintenance, heat and frost insulation, locksmith, plumbing, and refrigeration services.
- FOS–Other: provides administration, custodial services and energy management services.

Information Technology Services (ITS)

Information Technology Services (ITS) plans, develops, operates, and maintains computer applications, systems and networks, and telecommunications systems for county departments. The three specialized areas of ITS provide the following services:

ITS– Administration and Customer Assistance offers general ITS administration, data center project, and infrastructure resource planning services.

- ITS–Customer Application Branch delivers information systems planning, contract management, Web design and Internet application development, systems development and maintenance, project management, and application "rightsizing" support and services.

- ITS–Computer Service Branch provides systems operations and production support, distributed operations support, office information systems services, microfiche, CD-ROM preparation and laser printer services, and Internet access and Web service support, and operates help desk and customer service hotlines for various county departments.

- ITS–Telecommunications Branch provides telecommunications consultation services, network design, installation, maintenance and operations services, radio systems design, implementation, maintenance and support services, and communications system design, installation, maintenance, and support services.

Purchasing and Central Services (P&CS)

ISD is formally designated as the official purchasing agent for the County of Los Angeles, and ISD Purchasing and Center Services (P&CS) acts as both an integrator and facilitator in providing purchasing, contract processing, equipment maintenance, mail, parking, reprographic, and fleet maintenance services to county departments; maintains the County and Management Information System (CAMIS); solicits bids from vendors that can provide these goods and services to the county; and offers guidance and training on procurement matters to county departments, Fleet Management, Parking, P&CS Administration, Mail Sorter, Materials Management, and Reprographics.

- P&CS–Services negotiates and manages master agreements, processes purchase orders for specific goods and services upon department request, manages annual blanket purchase orders for departments, and develops and maintains vendor lists

Emergency Responsibilities

During an emergency, it is the primary responsibility of the Internal Services Department (ISD) to gather safety assessment information relative to county facilities and report their status to the CEOC. Additionally, ISD must determine if county facilities are mechanically safe for occupancy. Then, if feasible, ISD facilitates the repair or alterations of damaged/unsafe county facilities to safe operating levels, or secures them.

Under the Standardized Emergency Management Systems (SEMS), ISD is also the head of the Logistics Section of the CEOC for the Los Angeles County Operational Area. ISD supports other emergency services by providing and repairing communications; by providing and repairing vehicles and off-highway equipment; by providing fuel, water, and temporary power; by providing procurement support for essential emergency supplies; and by maintaining and/or restoring computer operations to support critical applications required for the operation of the county. ISD provides a liaison with utilities (except water) concerning the status of electrical, natural gas, and telecommunications systems. ISD is also the transportation coordinator for mass transportation resources such as the Metropolitan Transit Authority (MTA).

Disaster Management Areas

Because of the county's size, demographic diversity, and population, it is divided into areas specifically for coordinating disaster-related programs, responses, and recovery. Below are lists of the Los Angeles County Disaster Management Areas.

Each area hires its own Disaster Management Area Coordinator [DMAC]. This person is responsible for coordinating emergency management–related programs, projects, and issues with the County Office of Emergency Management and the Cal OES, as well as with each other.

LOS ANGELES COUNTY DISASTER MANAGEMENT AREA COORDINATORS (DMACS) DUTY STATEMENT

Policy Statement—The first priority of any DMAC will be to the cities within his/her own Area; second priority will be assistance to the other Areas and cities within and to the Los Angeles County Operational Area (Op Area) Emergency Operations Center (EOC) (OAEOC) —City Liaison post. Response to assistance requests will be to Areas of greatest need.

NON-EMERGENCY ROLE

Mission Statement—Coordinate with Area cities in planning for preparedness, mitigation and recovery from emergencies/disasters.

Minimum Responsibilities/Services

- Disseminate emergency management information received from the County/County Op Area to the Area cities.
- Work with the Op Area in development and submission of required EMPG documents.
- Cooperate and participate with the Op Area and the County Office of Emergency Management (OEM) in operational planning, exercises and training affecting Area jurisdictions.
- Coordinate and communicate with other disaster services organizations during disasters.
- Attend pertinent federal, state, Op Area and other training programs, workshops and seminars to improve emergency programs; brief Area cities on essential or relevant information.
- Represent the Area at appropriate meetings, including Op Area, state, federal, private and non-profit organizations.

Optional Responsibilities/Services as Directed by the Area Board

- Organize, conduct and assist in training programs, conferences, etc.
- Using available federal, state and local guidance, coordinate and assist, as appropriate, in the development of member cities' emergency plans, programs and policies.
- Conduct regular board meetings/workshops on relevant topics.
- Provide public information materials to member cities, general public, schools and businesses; respond to public inquiries; maintain an audio visual library and maintain information on resources available during a disaster.
- Assist member cities in preparation and revisions of necessary ordinances and resolutions and other paperwork required by FEMA, State OES and/or Op Area.
- Assist member cities in planning and organizing preparedness exercises, as requested.

Minimum Responsibilities/Services (Cont.)

- Liaison with the Sheriff's Department, Emergency Operations Bureau (EOB) and Station Coordinator; Red Cross Chapter(s); Los Angeles County (OEM) and other county departments; State OES and FEMA. Coordinate with these agencies in special projects or programs.
- Prepare annual budget information; maintain all financial records.
- Maintain all records necessary for participation in EMPG funding.

Optional Responsibilities/Services as Directed by the Area Board (Cont.)

- Consult with and provide expertise for member cities who are developing Emergency Operation Centers (EOCs), including information on appropriate displays, supplies, communications systems, etc., as requested.
- Maintain the Area office, including record keeping, Area-wide information file, correspondence, and all clerical and secretarial duties.

DMAC Mutual Aid

- Subject to availability, provide backup services for absent Area Coordinator. Respond to urgent information requests and disseminate critical information to cities in the absence of their DMAC.

Note: The amount of time given to any one activity will vary depending on the annual emergency management focus and emergency activations.

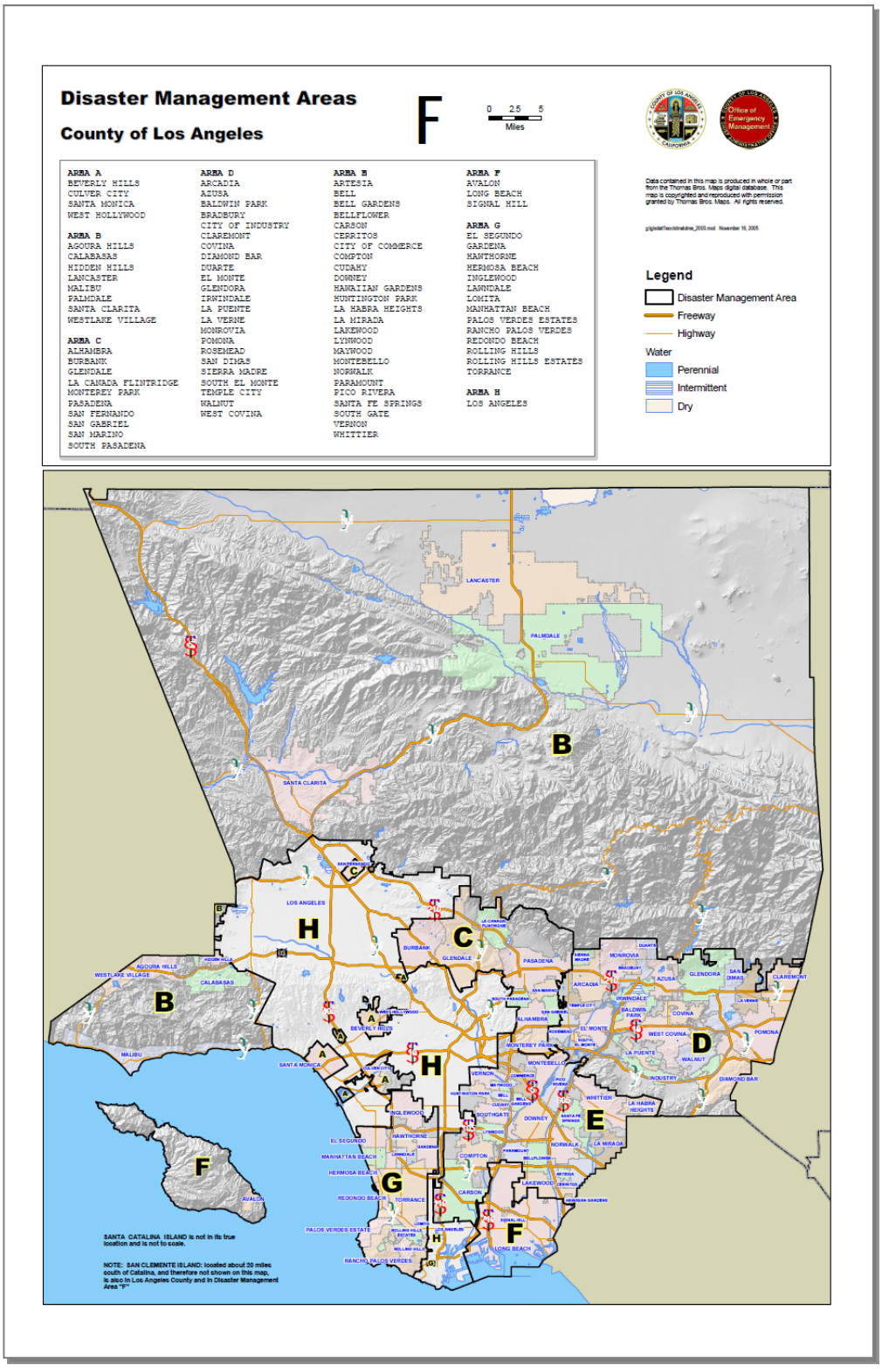
EMERGENCY ROLE

(Minimum Responsibility)

Mission Statement—Advocate for Area cities and liaison with the Los Angeles County Operational Area (Op Area) Emergency Operations Center (EOC) (OAEOC) as necessary; assist other Areas as requested; staff City Liaison post at OAEOC.

- Check in with Area cities to quickly determine the impact of the emergency/disaster.
- Provide a quick Area status report to the OAEOC to supplement individual cities' reports. This is not a detailed or formal report. It should be considered outside the normal reporting system and will provide the OAEOC with an indication of where potential problems might exist as well as indicate which Disaster Management Area Coordinators (DMACs) might be in the best position to directly provide staffing to assist the most heavily impacted Area(s) and the OAEOC (staffing may come from the DMAC or from a city within the DMAC's Area).
- Get feedback from the OAEOC as to which DMAC Areas appear to be most heavily impacted and which appear least impacted. Feedback will include a recommendation from the OAEOC as to which DMAC should provide staffing to the OAEOC (staffing may come from the DMAC or from a city within the DMAC's Area).
- DMAC or selected city provides shift staffing to the OAEOC to represent concerns of cities, to ensure that the needs and concerns of cities are properly represented in the OAEOC, and to participate, as appropriate, in the development of solutions affecting cities.

Map 3-28: Disaster Management Area Coordinators Map
(Source: County of Los Angeles CEO - OEM Web Site)



Health Care

Hospitals

Table 3-35: Largest Licensed Hospitals in Los Angeles County
(Source: Office of Statewide Health Planning and Development, Calif. Health & Human Services Agency)

Name	City	Capacity
Cedars Sinai Medical Center	Los Angeles	896
Ronald Reagan UCLA Medical Center	Los Angeles	466
Children's Hospital of Los Angeles	Los Angeles	603
Long Beach Memorial Medical Center	Long Beach	420
St. Mary Medical Center	Long Beach	387
Huntington Memorial Hospital	Pasadena	585
Kaiser Foundation Hospital – Sunset	Los Angeles	396
Methodist Hospital of Southern California	Arcadia	434
Pomona Valley Hospital Medical Center	Pomona	415
Providence Saint Joseph Medical Center	Burbank	360
Presbyterian Intercommunity Hospital	Whittier	409
Northridge Hospital Medical Center	Northridge	371
Glendale Adventist Medical Center – Wilson Terrace	Glendale	357
Kaiser Foundation Hospital – Downey	Downey	352
USC University Hospital	Los Angeles	401
Good Samaritan Hospital-Los Angeles	Los Angeles	380
Torrance Memorial Medical Center	Torrance	361
Antelope Valley Hospital Medical Center	Lancaster	390
Valley Presbyterian Hospital	Van Nuys	350

Table 3-36: County of Los Angeles Licensed Hospital Bed Capacity

(Source: Department of Public Health – Licensing and Certification)

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
Alhambra Hospital Medical Center	6	7	88	0	0	0	17	0	0	118	8	26
Antelope Valley Medical Center	21	0	251	48	48	22	0	0	0	390	55	26
Barlow Respiratory Hospital	0	0	99	0	0	0	0	0	6	105	0	0
Bellflower Medical Center	5	5	85	0	17	0	0	32	0	144	3	0
Beverly Hospital	12	13	156	10	18	15	0	0	0	224	20	0
Brotman Medical Center	10	10	245	0	14	0	32	70	18	399	12	21
California Hospital Medical Center	28	8	177	26	37	12	0	0	0	288	27	31
Casa Colima Hospital for Rehabilitation Medicine	0	0	0	0	0	0	68	0	0	68	0	0
Catalina Island Medical Center	0	0	8	0	0	0	0	0	0	8	0	4
Cedars Sinai Medical Center	120	12	583	45	64	31	29	51	12	947	42	29
Centinela Freeman Regional Medical Center, Centinela Campus	19	12	244	9	29	0	32	0	0	345	44	24
Centinela Freeman Regional Medical Center, Memorial Campus	0	0	0	0	0	0	0	0	0	0	0	0
Centinela Freeman Regional Medical Center, Marina Campus	0	0	0	0	0	0	0	0	0	0	16	0
Century City Doctor's Hospital	10	8	124	0	0	0	0	34	0	176	0	0
Children's Hospital of Los Angeles	108	0	26	98	0	343	28	0	0	603	29	0
Citrus Valley Medical Center, Intercommunity	8	14	116	0	0	0	0	30	0	168	16	25
Citrus Valley Medical Center, Queen of the Valley	12	6	197	40	40	18	12	0	0	325	30	0

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
City of Angels Medical Center – Downtown Campus	0	0	0	0	0	0	0	0	0	0	0	0
City of Hope National Medical Center	18	0	181	0	0	18	0	0	0	217	0	0
Coast Plaza Doctors Hospital	4	3	98	0	0	0	0	0	0	105	8	12
Community & Mission Hospital of Huntington Park (Florence)	0	0	62	0	27	20	0	0	0	109	0	0
Community & Mission Hospital of Huntington Park (Slauson)	4	0	77	0	0	0	0	0	0	81	0	0
Community Hospital of Gardena	0	0	0	0	0	0	0	0	0	0	0	0
Community Hospital of Long Beach	20	10	100	20	13	0	0	28	0	191	21	17
Del Amo Hospital	0	0	0	0	0	0	0	0	0	0	0	0
Doctors Hospital of West Covina	3	0	24	0	0	0	0	0	0	27	0	24
Downey Community Hospital	8	10	147	7	20	7	0	0	0	199	24	0
Earl & Lorraine Miller Children's Hospital	0	0	0	0	0	0	0	0	0	0	0	0
East Los Angeles Doctors Hospital	4	6	71	0	14	7	0	0	0	102	8	25
East Valley Hospital	5	5	67	0	30	0	0	21	0	128	7	0
Encino Tarzana, Encino Campus	22	0	62	0	0	0	25	13	0	122	8	28
Encino Tarzana, Tarzana Campus	17	10	154	21	29	18	0	0	0	249	19	0
Foothill Presbyterian Hospital	9	9	74	0	13	0	0	0	0	105	23	0
Garfield Medical Center	14	8	106	20	34	0	28	0	0	210	21	0
Glendale Adventist Medical Center	22	10	253	14	30	0	28	60	0	417	36	40
Glendale Memorial Hospital Health Center	12	12	180	13	24	0	14	49	0	304	15	30

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
Good Samaritan Hospital	58	10	235	23	31	0	23	0	0	380	12	28
Greater El Monte Community Hospital	5	5	59	0	19	16	0	0	0	104	9	13
Harbor/UCLA Medical Center	0	0	0	0	0	0	0	0	0	0	63	0
Henry Mayo Newhall Memorial Hospital	12	6	152	0	15	0	19	23	0	227	25	27
Hollywood Community Hospital	5	3	92	0	0	0	0	59	0	159	20	0
Hollywood Presbyterian Medical Center	28	8	221	15	34	11	28	0	0	345	0	89
Huntington Memorial Hospital	39	0	378	51	56	25	24	41	12	626	37	0
Kaiser – Baldwin Park	12	0	187	20	50	0	0	0	0	269	39	0
Kaiser – Bellflower	38	0	182	49	66	17	0	0	0	352	52	0
Kaiser – Harbor City	10	10	171	10	34	0	0	0	0	235	37	0
Kaiser – Los Angeles	80	32	176	33	43	32	0	68	0	464	45	0
Kaiser – Panorama City	24	0	128	24	42	0	0	0	0	218	34	0
Kaiser – West Los Angeles	33	0	227	17	28	0	0	0	0	305	35	0
Kaiser – Woodland Hills	11	11	191	18	24	7	0	0	0	262	27	0
Kindred – La Mirada	6	0	88	0	0	0	24	0	0	118	0	0
Kindred – Los Angeles	5	0	76	0	0	0	0	0	0	81	0	0
Kindred – San Gabriel	6	0	70	0	0	0	0	0	0	76	0	0
LAC+USC Medical Center	0	0	0	0	0	0	0	0	0	0	108	0
Lakewood Regional Medical Center	8	23	122	0	0	0	19	0	0	172	14	0
Lancaster Community Hospital	0	0	0	0	0	0	0	0	0	0	8	0
Little Company of Mary – San Pedro Hospital	12	22	104	0	0	0	20	25	48	231	15	125

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
Little Company of Mary Hospital	28	0	230	34	22	13	0	0	0	327	28	115
Long Beach Memorial Medical Center	61	0	317	0	0	0	42	0	0	420	63	42
Los Angeles Community Hospital	6	0	57	0	16	12	0	0	0	91	0	39
Los Angeles Metropolitan Medical Center	4	4	91	0	16	0	0	98	0	213	4	0
Martin Luther King Jr./Drew Medical Center	0	0	0	0	0	0	0	0	0	0	0	0
Memorial Hospital of Gardena	5	5	70	0	23	0	0	0	0	103	13	69
Methodist Hospital of Southern California	9	10	329	17	24	15	20	0	10	434	22	26
Mid-Valley Hospital (No data)	0	0	0	0	0	0	0	0	0	0	0	0
Miracle Mile	0	0	17	0	0	0	0	0	0	17	0	0
Mission Community Hospital	5	5	75	0	0	0	0	0	114	199	9	0
Monterey Park Hospital	4	0	83	0	8	6	0	0	0	101	5	0
Motion Picture & Television Hospital	4	0	57	0	0	0	0	0	0	61	0	189
Monrovia Community Hospital	4	0	45	0	0	0	0	0	0	49	0	0
Northridge Hospital Medical Center	24	22	218	22	35	14	36	40	0	411	26	24
Norwalk Community Hospital	6	0	37	0	0	7	0	0	0	50	4	0
Olive View Medical Center	0	0	0	0	0	0	0	0	0	0	23	0
Olympia Medical Center	6	6	192	0	0	0	0	0	0	204	16	21
Orthopaedic Hospital (No data)	0	0	0	0	0	0	0	0	0	0	0	0
Pacific Alliance Hospital	9	0	100	0	10	0	23	0	0	142	0	0
Pacific Hospital of Long Beach	8	8	55	0	13	0	0	73	0	157	7	27
Pacifica Hospital of the Valley	7	0	48	0	16	24	0	38	0	133	7	98

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
Pomona Valley Hospital Medical Center	26	12	206	53	84	34	0	0	0	415	50	38
Presbyterian Intercommunity Hospital	24	0	268	34	32	34	17	0	0	409	57	35
Promise Hospital – East L.A. Campus	2	2	27	0	0	5	0	0	0	36	0	0
Promise Hospital - Suburban Campus	7	5	165	0	0	0	0	0	0	177	0	34
Providence Holy Cross Medical Center	12	12	245	5	35	0	13	0	0	322	35	48
Providence St. Joseph Medical Center	38	16	237	20	24	0	25	0	0	360	37	54
Rancho Los Amigos Medical Center	0	0	0	0	0	0	0	0	0	0	0	0
San Dimas Community Hospital	4	4	49	0	7	0	0	0	0	64	8	29
San Gabriel Valley Medical Center	19	0	130	12	29	0	0	38	0	228	14	41
Santa Monica/UCLA Medical Center	26	0	233	16	26	15	0	0	0	316	21	0
Sherman Oaks Community Hospital	8	8	66	0	0	0	0	19	30	131	7	22
Shriners Hospital for Children	0	0	30	0	0	30	0	0	0	60	0	0
St. Francis Medical Center	36	0	164	29	71	14	0	0	0	314	52	30
St. John's Hospital Health Center	23	0	196	18	29	0	0	0	0	266	27	0
St. Mary Medical Center	39	8	218	25	25	28	46	0	0	389	26	80
St. Vincent Medical Center	67	0	253	0	0	0	19	0	0	339	0	27
Temple Community Hospital	6	6	138	0	0	0	0	0	0	150	0	20
Torrance Memorial Medical Center	24	8	250	25	28	20	0	0	6	361	35	40
Tri-City Regional Medical Center	13	5	89	0	0	0	0	0	0	107	8	0
UCLA Medical Center	120	12	234	32	13	44	11	0	0	466	31	0
USC Kenneth Norris Jr. Cancer Hospital	13	0	47	0	0	0	0	0	0	60	0	0

GEOGRAPHIC REGION / HOSPITAL	ICU	CCU	MED/SURG	NICU	PERINATAL	PEDS	REHAB	PSYCH	OTHER*	TOTAL	ED	SKILLED
USC University Hospital	84	0	317	0	0	0	0	10	0	411	0	0
Valley Presbyterian Hospital	30	0	188	32	58	25	17	0	0	350	26	0
Verdugo Hills Hospital	6	6	92	0	12	0	0	24	0	140	13	18
Veterans Administration Hospital – Long Beach	0	0	0	0	0	0	0	0	0	0	0	0
Veterans Administration Hospital – West L.A.	0	0	0	0	0	0	0	0	0	0	0	0
Vista Hospital of San Gabriel Valley	0	0	0	0	0	0	0	0	0	0	0	0
Vista Hospital of South Bay	0	0	0	0	0	0	0	0	0	0	0	20
West Hills Medical Center	25	0	157	11	24	0	0	0	8	225	14	24
White Memorial Medical Center	39	8	150	28	24	28	16	33	0	326	29	27
Whittier Hospital Medical Center	16	0	112	0	28	0	0	0	0	0	11	22
TOTAL	1810	480	13196	1044	1675	987	755	977	264	21032	1800	1903

Section 4:

Risk Assessment

Table of Contents

Section 4 – Risk Assessment 1

What Is a Risk Assessment? 1

1) Hazard Identification 1

Calculated Priority Risk Index (CPRI) 2

CPRI Hazard Ratings by District 4

2) Profiling Hazard Events 7

3) Vulnerability Assessment/Inventory of Existing Assets 7

4) Risk Analysis 7

5) Assessing Vulnerability/Analyzing Development Trends 8

Federal Requirements for Risk Assessment 8

Critical and Essential Facilities 9

Development Patterns 33

History of Disaster Declarations 35

Summary 43

Section 4 – Risk Assessment

What Is a Risk Assessment?

Conducting a risk assessment can provide information regarding the location of hazards; the value of existing land and property in hazard locations; and an analysis of risks to life, property, and the environment that may result from natural, technological, and human-caused hazard events. Specifically, the five levels of a risk assessment are:

1) Hazard Identification
2) Profiling Hazard Events
3) Vulnerability Assessment/Inventory of Existing Assets
4) Risk Analysis
5) Assessing Vulnerability/Analyzing Development Trends

1) Hazard Identification

This section is the description of the geographic extent, potential intensity, and the probability of occurrence of a given hazard. Maps are used in this plan to display hazard identification data. The County of Los Angeles has identified seven major hazards that have the potential to cause significant damage to the geographic area. These hazards— earthquakes, floods, wildfire, liquefaction, landslide, tsunami, and dam failure—were identified through an extensive process involving research of existing documents and input from the Planning Advisory Committee. The geographic extent of each of these hazards has been identified by the County of Los Angeles, utilizing the maps and data contained in the county's general plan and the county's emergency operations plan. Utilizing FEMA's Calculated Priority Risk Index (CPRI) ranking technique, the Planning Advisory Committee concluded that all of the identified hazards posed a significant threat against the county. The hazard ranking system is described in Table 4-1, while the actual ranking is shown in Table 4-2.

Presidential Declaration: Prior to a presidential declaration of disaster being issued, the same basic criteria must be met by the state. A presidential declaration may provide qualifying federal funds to state and local governments. The funds may provide a wide variety of relief, depending on the extent and types of disaster. At this level of declaration, the federal government may reimburse 75% of the costs associated with overtime, mileage, and other expenses directly attributable to responses. The state is responsible for reimbursing 75% of the remaining 25% (a net of 18.75%), and the local government is responsible for the remaining 6.25%.

Table 4-1: Presidential Disaster Declarations In Los Angeles County*
(Source: http://www.fema.gov/news/disaster_totals_annual.fema#markS)

Declaration Number	Date	Disaster Description	Constant 2009 $
1577	02/04/2005	Severe storms, flooding, debris flows, and mudslides	319,020,087
1585	04/14/2005	Severe storms, flooding, landslides, mud and debris flows	92,772,575
1689	03/13/2007	Severe freeze	10,872,037
1731	10/24/2007	Wildfires	220,940,365
1810	11/18/2008	Wildfires	39,755,514
1884	3/8/2010	California Severe Winter Storms, Flooding, and Debris and Mud Flows	27,657,432

**Costs shown are statewide for each incident in year 2009 dollars, not for this one county.*

By law, each identified natural risk identified in this plan must specify the vulnerability and the impact on the jurisdiction. In this section, there are paragraphs entitled "Vulnerability" and "Impact". *Vulnerability* refers to the population and geography affected by a catastrophic event because of the hazard. *Impact* refers to dollar losses to facilities and infrastructure of the County of Los Angeles. These figures (derived from data in the hazard-specific sections) are estimations and represent a worst-case scenario, based on a catastrophic event because of the hazard.

A hazard can be defined as a condition that has the potential to result in equipment or system failure, human injury, death, or damage to property or the environment. Hazards are divided into two categories: natural or technological. Natural hazards include events such as earthquakes, wildfires, and floods, while human-caused events include terrorism, weapons of mass destruction, and civil unrest. Technological hazards include events such as transportation accidents, illegal disposal, and equipment failures during manufacturing, storage, transportation, and use of hazardous materials.

A risk assessment is the process of evaluating the degree of harm a hazard presents. Risk assessments are utilized in developing emergency response plans and procedures, designing and modifying safety systems, identifying needed resources, conducting training and exercises, and minimizing damage and liability. The categories used in the risk assessment matrix submitted by the Planning Advisory Committee are defined below.

Calculated Priority Risk Index (CPRI)

The Calculated Priority Risk Index is a FEMA-recommended ranking method that allows disparate hazard categories to be compared. CPRI is obtained by assigning values to risk categories:

- Probability (45%)
- Magnitude/Severity (30%)
- Warning Time (15%)
- Duration (10%)

For each of the risk categories, there are four varying degrees of risk from which to choose: 1, 2, 3, or 4. Zero (0) is the value used when an option is not assigned.

Table 4-2: Calculated Priority Risk Index
(Source: FEMA Emergency Management Institute Emergency Planning Course)

CPRI Category	Degree of Risk			Assigned Weighting Factor
Probability	Unlikely	Extremely rare, with no documented history of occurrences or events. Annual probability of less than 1 in 1,000 years (<0.1%).	1	45%
	Possible	Rare occurrences. Annual probability of between 1 in 100 years and 1 in 1,000 years (0.1%-1%).	2	
	Likely	Occasional occurrences, with at least 2 or more documented historic events. Annual probability of between 1 in 10 years and 1 in 100 years (1%-10%).	3	
	Highly Likely	Frequent events, with a well-documented history of occurrence. Annual probability of greater than 1 every year (>10%).	4	
Magnitude/ Severity	Negligible	Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries or illnesses are treatable with first aid and there are no deaths. Negligible loss of quality of life. Shutdown of critical public facilities for less than 24 hours.	1	30%
	Limited	Slight property damage (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability, and there are no deaths. Moderate loss of quality of life. Shutdown of critical public facilities for more than 1 day and less than 1 week.	2	
	Critical	Moderate property damage (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least 1 death. Shutdown of critical public facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	Severe property damage (greater than 50% of critical and non-critical facilities and infrastructure). Injuries and illnesses result in permanent disability and multiple deaths. Shutdown of critical public facilities for more than 1 month.	4	
Warning Time	More than 24 hours	Population will receive greater than 24 hours of warning.	1	15%
	12–24 hours	Population will receive 12–24 hours of warning.	2	

CPRI Category	Degree of Risk			Assigned Weighting Factor
	6–12 hours	Population will receive 6–12 hours of warning.	3	
	Less than 6 hours	Population will receive less than 6 hours of warning.	4	
Duration	Less than 6 hours	Disaster event will last less than 6 hours.	1	10%
	Less than 24 hours	Disaster event will last 6–24 hours.	2	
	Less than 1 week	Disaster event will last between 24 hours and 1 week.	3	
	More than 1 week	Disaster event will last more than 1 week	4	

CPRI Hazard Ratings by District

Following is the overall CPRI ranking results by Board of Supervisors districts:

Chart 4-1: CPRI Rankings for All Districts

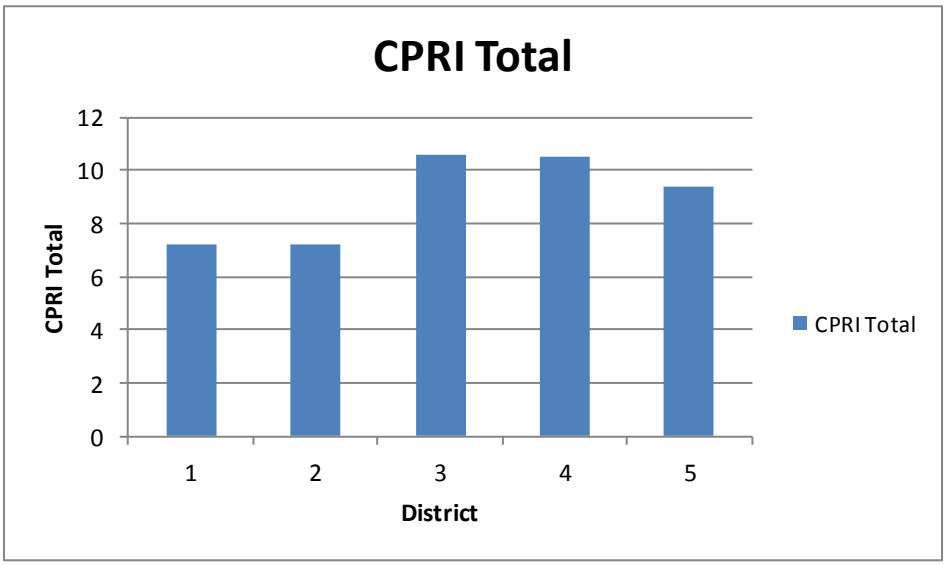


Table 4-3: CPRI for Board of Supervisorial District 1

	Probability		Magnitude/Severity		Warning Time		Duration		
	Score	Weight (45%)	Score	Weight (30%)	Score	Weight (15%)	Score	Weight (10%)	Weighted Total
Earthquake	3	1.35	4	1.2	4	0.6	1	0.1	3.25
Flood	2	0.9	3	0.9	3	0.45	3	0.3	2.55
Wildfire	1	0.45	1	0.3	4	0.6	1	0.1	1.45
Tsunami (N/A)									
CPRI Total									7.25

Table 4-4: CPRI for Board of Supervisorial District 2

	Probability		Magnitude/Severity		Warning Time		Duration		
	Score	Weight (45%)	Score	Weight (30%)	Score	Weight (15%)	Score	Weight (10%)	Weighted Total
Earthquake	3	1.35	4	1.2	4	0.6	1	0.1	3.25
Flood	2	0.9	3	0.9	3	0.45	3	0.3	2.55
Wildfire	1	0.45	1	0.3	4	0.6	1	0.1	1.45
Tsunami (N/A)									
CPRI Total									7.25

Table 4-5: CPRI for Board of Supervisorial District 3

	Probability		Magnitude/Severity		Warning Time		Duration		
	Score	Weight (45%)	Score	Weight (30%)	Score	Weight (15%)	Score	Weight (10%)	Weighted Total
Earthquake	3	1.35	1	0.3	4	0.6	1	0.1	2.35
Flood	2	0.9	3	0.9	3	0.45	3	0.3	2.55
Wildfire	3	1.35	3	0.9	4	0.6	3	0.3	3.15
Tsunami	2	0.9	3	0.9	4	0.6	1	0.1	2.5
CPRI Total									10.55

Table 4-6: CPRI for Board of Supervisorial District 4

	Probability		Magnitude/Severity		Warning Time		Duration		
	Score	Weight (45%)	Score	Weight (30%)	Score	Weight (15%)	Score	Weight (10%)	Weighted Total
Earthquake	3	1.35	4	1.2	4	0.6	1	0.1	3.25
Flood	3	1.35	3	0.9	3	0.45	3	0.3	3.00
Wildfire	1	0.45	2	0.6	4	0.6	1	0.1	1.75
Tsunami	2	0.9	3	0.9	4	0.6	1	0.1	2.50
CPRI Total									10.50

Table 4-7: CPRI for Board of Supervisorial District 5

	Probability		Magnitude/Severity		Warning Time		Duration		
	Score	Weight (45%)	Score	Weight (30%)	Score	Weight (15%)	Score	Weight (10%)	Weighted Total
Earthquake	3	1.35	4	1.2	4	0.6	1	0.1	3.25
Flood	3	1.35	3	0.9	3	0.45	3	0.3	3.00
Wildfire	3	1.35	3	0.9	4	0.6	3	0.3	3.15
Tsunami (N/A)									
CPRI Total									9.40

Table 4-8: CPRI Totals for All Board of Supervisor Districts

Board of Supervisorial District	Earthquake	Flood	Wildfire	Tsunami	CPRI Total
Board of Supervisorial District 1	3.25	2.55	1.45	N/A	7.25
Board of Supervisorial District 2	3.25	2.55	1.45	N/A	7.25
Board of Supervisorial District 3	2.35	2.55	3.15	2.50	10.55
Board of Supervisorial District 4	3.25	3.00	1.75	2.50	10.5
Board of Supervisorial District 5	3.25	3.00	3.15	N/A	9.40

2) Profiling Hazard Events

This process describes the causes and characteristics of each hazard and what part of the county's facilities, infrastructure, and environment may be vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in the hazard-specific analysis (see sections 5–9). Table 4-9 indicates a generalized perspective of the region's vulnerability of the various hazards according to extent (or degree), location, and probability.

Table 4-9: Vulnerability: Location, Extent, and Probability for County of Los Angeles

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))
ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often)*
Earthquake	Entire project area	The Southern California Earthquake Center (SCEC) in 2007 concluded that there is a 99.7 % probability that an earthquake of M6.7 or greater will hit California within 30 years.[1]	Moderate
Flood	Throughout project area	Potential 100- and 500-year flood inundation zones, as well as tsunami Inundation areas along the coast	Moderate
Wildfire	Throughout the northern 2/3 of the project area	The affected areas are classified as Very High Fire Hazard Severity Zones. Over half the county could be affected.	High
Tsunami	Coastal regions	Up to 40 foot run-up along coastal region.	Low
* Probability is defined as: Low = 1:1,000 years, Moderate = 1:100 years, High = 1:10 years			
[1] Uniform California Earthquake Rupture Forecast			

3) Vulnerability Assessment/Inventory of Existing Assets

This is a combination of hazard identification with an inventory of the existing (or planned) property developments and populations exposed to a hazard. Critical facilities are of particular concern because these locations provide essential equipment or provide services to the general public that are necessary to preserve important public safety, emergency response, and disaster recovery functions. The critical facilities have been identified and are illustrated in Table 4-11: County of Los Angeles Critical Facilities Vulnerable to Hazards.

4) Risk Analysis

Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are (a) magnitude of the harm that may result, and (b) the likelihood of the harm occurring.

Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses have been included in the hazard assessment. Data was available to make vulnerability determinations in terms of dollar losses for only the earthquake hazard. The mitigation actions matrix (Section 10: Mitigation Strategies) includes an action item to expand the vulnerability assessment in the next plan update.

5) Assessing Vulnerability/Analyzing Development Trends

This step provides a general description of county facilities and contents in relation to the identified hazards so that mitigation options can be considered in land-use planning and future land-use decisions. This mitigation plan provides a comprehensive description of the character of the County of Los Angeles in Section 3: Community Profile. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of the County of Los Angeles can help in identifying potential problem areas; it can also serve as a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification, using data and information from city, county, state, or federal sources.

Regardless of the data available for hazard assessments, there are numerous strategies the county can take to reduce risk. These strategies are described in the action items detailed in the mitigation actions matrix (Section 10: Mitigation Strategies). Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure.

Federal Requirements for Risk Assessment

Federal regulations for local mitigation plans (44 C.F.R. Section 201.6(c) (2)) require a risk assessment. This risk assessment requirement is intended to provide information that will help communities identify and prioritize mitigation activities that will reduce losses from the identified hazards. There are four significant hazards profiled in the mitigation plan. The federal criteria for risk assessment and information on how the mitigation plan meets those criteria are outlined in Table 4-10: Federal Criteria for Risk Assessment below.

Table 4-10: Federal Criteria for Risk Assessment

Section 322 Plan Requirement	How is this addressed?
Identifying Hazards	Each hazard section includes an inventory of the best available data sources that identify hazard areas. To the extent that data is available, the existing maps identifying the location of the hazard were utilized. The executive summary and the risk assessment of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, causes, and characteristics of the hazard in the county.
Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section provides information on vulnerable areas within the county. Mitigation actions for each hazard can be found in Section 10: Mitigation Strategies.
Assessing Vulnerability: Estimating Potential Losses	The risk assessment identifies key critical facilities that provide services to the county. Assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.
Assessing Vulnerability: Analyzing Development Trends	Section 3: Community Profile provides a description of the population trends and transportation patterns.

Critical and Essential Facilities

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Facilities *critical* to government response activities (i.e., life safety and property and environmental protection) may include local government 911 dispatch centers, local government emergency operations centers, local police and fire stations, local public works facilities, local communications centers, schools (shelters), and hospitals. Facilities that, if damaged, could cause serious secondary impacts are also considered "critical". A hazardous materials facility is one example of this type of critical facility.

Essential facilities are those facilities that are vital to the continued delivery of key county services, or that may significantly affect the county's ability to recover from the disaster. These facilities include schools (hosting shelters), and buildings such as jails, law enforcement centers, public services buildings, community corrections centers, courthouses, juvenile services buildings, and other public facilities.

Table 4-11: County of Los Angeles Critical Facilities Vulnerable to Hazards

(This table illustrates critical facilities and the vulnerability of those facilities to the identified hazards.)

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 32	605 N. Angeleno Avenue	1	X				X		
County fire station	Station 26	15336 E. Elliott Avenue	1	X				X		
County fire station	Station 87	140 S. Second Avenue	1	X				X		
Sheriff substation	Sheriff – Bassett Storefront Substation	13308 E Valley Blvd.	1	X				X		
Sheriff station	Industry Station	150 N. Hudson Ave.	1	X						
County fire station	Station 43	921 S. Stimson Avenue	1	X						
County fire station	Station 118	17056 Gale Avenue	1	X						
Maintenance/ operations	PW Road – Div. #116 Maintenance Yard	14959 E. Proctor Ave.	1	X						
Maintenance/ operations	PW Road – Div. #416 Maintenance Yard Office	14959 E. Proctor Ave.	1	X						
County fire station	Station 40	4864 S. Durfee Avenue	1	X				X	500	
Maintenance/ operations	PW Flood-Riverview Maintenance Yard	603 Riverview Rd.	1	X				X	100	
County fire station	Station 169	5112 N. Peck Rd.	1	X				X		
County fire station	Station 167	11567 Bryant Road	1	X				X		
County fire station	Station 166	3615 Santa Anita Ave.	1	X				X		
County fire station	Station 168	3207 Cogswell Rd.	1	X				X		
Airport/heliport	El Monte Airport –Maintenance Building 13	4233 N Santa Anita Ave.	1	X				X		
Sheriff substation	South El Monte City Hall Presence	1443 N. Santa Anita Ave.	1	X				X		
County fire station	Station 90	10115 E. Rush Street	1	X				X		

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 4	2644 N. San Gabriel Blvd.	1	X				X		
Sheriff substation	Rosemead City Hall Presence	8301 Garvey Ave.	1	X						
County fire station	Station 42	9319 E. Valley Blvd.	1	X						
County fire station	Station 145	1525 S. Nogales Avenue	1	X						
Maintenance/ operations	ISD – Departmental Operations Center	1104 N. Eastern Ave.	1		X					
Maintenance/ operations	ISD – Eastern Ave. Complex Emergency Generator	1110 N. Eastern Ave.	1		X					
Maintenance/ operations	ISD – Eastern Ave. Complex Vehicle Repair Shops	1104 N. Eastern Ave.	1		X					
Maintenance/ operations	Sheriff – Eastern Complex Fleet Services Office	1104 N. Eastern Ave.	1		X					
Sheriff substation	City Terrace Substation	4100 City Terrace Dr.	1	X						
County fire station	Station 188	18-A Village Loop Rd.	1	X						
County fire station	Station 187	3325 Temple Ave.	1	X						
Maintenance/ operations	187 – Fire Station 187 – Dispatch Center	3325 W. Temple Ave.	1	X						
Sheriff station	Walnut Station	21695 Valley Bl.	1	X						
County fire station	Station 146	20604 E. Loyalton Drive	1	X						
County fire station	Station 61	20011 La Puente Road	1	X						
County fire station	Station 54	4867 Southern Avenue	1	X				X	500	

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Maintenance/ operations	PW Flood – Imperial Yard	5525 E. Imperial Hwy.	1	X				X	500	
County fire station	Station 57	5720 Gardendale Street	1	X				X	500	
County fire station	Station 163	6320 Pine Ave.	1	X				X		
County fire station	Station 165	3255 Saturn Ave.	1	X				X		
County fire station	Station 27	6031 Rickenbacker Road	1	X				X		
Maintenance/ operations	Fire – Fire Prevention Div./Forestry Div. Headquarters	5823 Rickenbacker Rd.	1	X				X		
Maintenance/ operations	Fire – Hazardous Materials Division Headquarters	5825 Rickenbacker Rd.	1	X				X		
County fire station	Station 39	7000 Garfield Avenue	1	X				X		
Sheriff station	Pico Rivera Station	6631 S. Passons Blvd.	1	X				X	500	
County fire station	Station 103	7300 S. Paramount Blvd.	1	X				X	500	
County fire station	Station 25	9209 E. Slauson Avenue	1	X				X	500	
Maintenance/ operations	PW Flood – Rio Hondo Yard	8020 E Washington Blvd.	1	X				X	500	
County fire station	Station 186	280 E. Bonita Ave.	1					X		
County fire station	Station 182	1059 N. White Ave.	1					X		
County fire station	Station 183	710 N. San Antonio Ave.	1					X		
County fire station	Station 181	590 S. Park Ave.	1					X		
County fire station	Station 185	925 Lexington Ave.	1					X		
Maintenance/ operations	PW Flood – Longden Yard	160 E Longden Ave	1					X		
Maintenance/ operations	Pw Sewer – East Yard Dressing Rooms	2849 S. Myrtle Ave.	1					X		

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 29	14334 E. Los Angeles Street	1					X		
Maintenance/ operations	Animal Control #4 – Administration Building	4275 N. Elton Ave.	1					X		
Maintenance/ operations	PW Road – Baldwin Park Maintenance Yard	14747 E. Ramona Blvd.	1					X		
Maintenance/ operations	PW Road – Maint. Dist. 1 Office	14747 E. Ramona Blvd.	1					X		
County fire station	Station 48	15546 E. Arrow Hwy.	1					X		
Airport/heliport	Med Ctr. – Hospital Heliport	1635 Marengo St.	1					X		
Hospital	Med Ctr. – LAC+USC Medical Center (New Hospital)	1200 N. State St	1					X		
Maintenance/ operations	PW Central Yard –Div. Administration	1525 Alcazar St.	1					X		
County fire station	Station 164	6301 S. Santa Fe Ave.	1					X		
Sheriff substation	Commerce Citadel Substation	100 Citadel Dr.	1					X		
Hospital	Med Ctr. – Women's and Children's Hospital	1240 N. Mission Rd.	1							
County fire station	Station 184	1980 W. Orange Grove Ave.	1							
Sheriff station	Sheriffs HQ Station	4700 Ramona Blvd.	1							
Dam/debris basin	Laguna Regulating Basin		1							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Maintenance/ operations	PW Road – Div. #417 Maintenance Yard	19865 S. Walnut Dr.	1							
Sheriff station	East Los Angeles Station	5019 E. Third St.	1							
County fire station	Station 1	1108 N. Eastern Avenue	1							
County fire station	Station 3	930 S. Eastern Avenue	1							
Communications	ISD/ITS – Eastern Avenue Microwave Site	1318 N. Eastern Ave.	1							
Maintenance/ operations	Public Works – Van Pelt Bridge Maintenance Yard	1126 Van Pelt Ave.	1							
Maintenance/ operations	PW Road – Div. #142 Maintenance Yard Office	4304 Eugene St.	1							
Maintenance/ operations	Sheriff – Central Communications Center	1277 N. Eastern Ave.	1							
Maintenance/ operations	CAO –County Emergency Operations Center (EOC)	1275 N. Eastern Ave.	1							
Maintenance/ operations	Fire – Command & Control Facility	1320 N. Eastern Ave.	1							
Communications	Fire – Headquarters Communications/ Transmitter	1320 N. Eastern Ave.	1							
Water tank	Fire – Headquarters Water Tank No.1	1320 N. Eastern Ave.	1							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Water tank	Fire – Headquarters Water Tank No.2	1320 N. Eastern Ave.	1							
County fire station	Station 50	2327 S. Saybrook Avenue	1							
County fire station	Station 22	928 S. Gerhart Avenue	1							
Maintenance/ operations	Fire – Hazard Materials Emergency Disposal Team	6971 E. Bandini Blvd.	1							
Maintenance/ operations	PW Sewer – South Yard Office	1129 E. 59th St.	2	X				X		
County fire station	Station 105	18915 S. Santa Fe Avenue	2	X				X	500	
County fire station	Station 10	1860 E. Del Amo	2	X					500	
County fire station	Station 127	2049 E. 223rd Street	2	X					500	
County fire station	Station 148	4264 MLK Blvd.	2	X				X	500	
Sheriff substation	Compton Gateway Towne Center Satellite Station	1633 S. Alameda St.	2	X				X	500	
Sheriff station	Compton Station	310 S. Willowbrook Ave.	2	X				X	500	
County fire station	Station 16	8010 S. Compton Avenue	2	X				X		
Maintenance/ operations	PW Road – Div. #141/241 Maintenance Yard	2120 E. 90th St	2	X				X		
Sheriff station	Century Station	11703 Alameda St.	2	X				X		
County fire station	Station 147	3161 E. Imperial Highway	2	X				X		
County fire station	Station 41	1815 E. 120th Street	2	X				X		
Hospital	M.L. King – Main Hospital/Acute Unit Building	12021 S. Wilmington Ave.	2	X				X		

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Airport/heliport	Compton Airport –Admin. Building #8	901 W. Alondra Blvd.	2	X						
Sheriff station	Carson Station	21356 S. Avalon Blvd.	2	X					500	
Maintenance/ operations	ISD – Dist. 3 Facilities Operations Service Bldg.	11236 Playa Ct.	2	X				X		
Maintenance/ operations	PH Health – Wilshire Metroplex Building	3530 Wilshire Blvd.	2							
Maintenance/ operations	PW Flood – 83rd St. Maintenance Yard	5520 W. 83rd St.	2							
Maintenance/ operations	PW Road – Div. #233/333/433 Maintenance Yard	5530 W. 83rd St.	2							
Maintenance/ operations	PW Road – Maint. District 3 Office	5530 W. 83rd St.	2							
Sheriff substation	Ladera Center Substation	5357 W. Centinela Ave.	2							
County fire station	Station 38	3907 W. 54th Street	2							
County fire station	Station 58	5757 S. Fairfax Avenue	2							
Communications	ISD/ITS – Baldwin Hills Microwave Site	4100 S. La Cienega Blvd.	2							
County fire station	Station 172	810 Centinela Ave.	2							
County fire station	Station 171	141 W. Regent St.	2							
County fire station	Station 173	9001 S. Crenshaw	2							
County fire station	Station 170	10701 S. Crenshaw	2							
Sheriff station	South Los Angeles Station	1310 W. Imperial Hwy.	2							
County fire station	Station 14	1401 W. 108th Street	2							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 18	4518 W. Lennox Blvd.	2							
County fire station	Station 162	12151 Crenshaw Blvd.	2							
County fire station	Station 161	4475 West El Segundo Blvd.	2							
County fire station	Station 160	5323 West Rosecrans Avenue	2							
County fire station	Station 95	137 W. Redondo Beach Blvd.	2							
County fire station	Station 159	2030 W. 135th Street	2							
County fire station	Station 158	1650 W. 162nd Street	2							
Sheriff substation	Sheriff – Lawndale Substation	15331 S. Prairie Ave.	2							
County fire station	Station 21	4312 W. 147th Street	2							
Maintenance/ operations	PW Road – Div. #232 Maintenance Yard	4055 W. Marine Ave.	2							
County fire station	Station 116	755 E. Victoria Street	2							
County fire station	Station 36	127 W. 223rd Street	2							
Maintenance/ operations	Animal Control #3 – Administration Building	216 W. Victoria St.	2							
Dam/debris basin	Lopez Dam		3			X		X		X
Sheriff station	West Hollywood Station	780 N. San Vicente Blvd.	3	X						
County fire station	Station 7	846 N. San Vincente Blvd.	3	X						
County fire station	Station 125	5215 N. Las Virgenes Road	3		X					X
Airport/heliport	Malibu Admin. Center – Sheriff's Helicopter Pad	23555 W. Civic Center Way	3	X				X		X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Maintenance/ operations	PW Road – Div. #336 Maint Yard Office	3637 Winter Canyon Rd.	3	X						X
County fire station	Station 88	23720 W. Malibu Road	3	X			X			
Maintenance/ operations	PW Road – Div. #339/539 Agoura Maintenance Yard	29773 W. Mulholland Hwy.	3	X				X		X
County fire station	Station 69	401 S. Topanga Canyon Blvd.	3		X					X
Maintenance/ operations	Animal Control #7 – Administration Building	29525 W. Agoura Rd.	3							X
Sheriff station	Lost Hills Station	27050 Agoura Rd.	3							X
County fire station	Station 68	24130 Calabasas Road	3							X
Communications	Sheriff – Lost Hills Communications Tower	27050 W. Agoura Rd.	3							X
County fire camp	Camp 8	1900 S. Rambla Pacifico	3							X
County fire camp	Camp 13	1250 S. Encinal Canyon Road	3							X
County fire station	Station 65	4206 N. Cornell Road	3							X
County fire station	Station 67	25801 Piuma Road	3							X
County fire station	Station 72	1832 S. Decker Road	3							X
Communications	ISD/ITS – Castro Peak Microwave Site	928 S. Latigo Canyon Rd.	3							X
Communications	ISD/ITS – Topanga Peak Microwave Site	23835 Saddle Peak Rd.	3							X
County fire station	Station 99	32550 Pacific Coast Highway	3							X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 70	3970 Carbon Canyon Road	3							X
Maintenance/ operations	PW Flood – Saticoy Yard	13436 Saticoy St.	3					X	100	
County fire station	Station 144	31981 W. Foxfield Drive	3					X		
Maintenance/ operations	ISD – Dist. 2 Facilities Operations Service Bldg.	13811 Del Sur St.	3					X		
Airport/heliport	Whiteman Airport –Control Tower	12653 Osborne St.	3					X		
Maintenance/ operations	PW Flood – Hansen Yard Office	11950 Branford St.	3					X		
County fire station	Station 89	29575 Canwood St.	3							
Sheriff substation	Universal Citywalk Substation	100 Universal City Plaza	3							
County fire station	Station 51	3900 N. Lankersheim Blvd.	3							
County fire station	Station 8	7643 W. Santa Monica Blvd.	3							
County fire station	Station 71	28722 W. Pacific Coast Hwy.	3							
County fire station	Station 194	1401 S. Beach Blvd.	4	X						X
County fire station	Station 91	2691 S. Turnbull Canyon Road	4	X						X
Sheriff station	Lakewood Station	5130 N. Clark Ave.	4	X				X	500	
County fire station	Station 45	4020 Candlewood Street	4	X				X	500	
Sheriff station	Aero Station	3235 Lakewood Blvd.	4	X						
Maintenance/ operations	Sheriff – Aero Bureau Main Hangar & Admin. Bldg.	4324 Donald Douglas Dr.	4	X						
County fire station	Station 30	19030 Pioneer Blvd.	4	X				X	500	

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 34	21207 S. Norwalk Blvd.	4	X				X	500	
County fire station	Station 94	6421 E. Turnergrove Street	4	X				X	500	
Maintenance/ operations	PW Flood – Alamitos Maintenance Yard	881 Iroquois Ave.	4	X				X	500	
Sheriff station	Cerritos Station	18135 Bloomfield Ave.	4	X				X		
County fire station	Station 35	13717 Artesia Blvd.	4	X				X		
County fire station	Station 120	1051 S. Grand Avenue	4	X						
Maintenance/ operations	Downey Admin. Ctr. – Administrative Center Bldg.	9150 E. Imperial Hwy.	4	X				X	500	
County fire station	Station 23	9548 E. Flower Street	4	X				X	500	
Maintenance/ operations	Animal Control #1 –Downey Shelter Admin. Bldg.	11258 Garfield Ave.	4	X				X	500	
Maintenance/ operations	PW Road – Hollydale Div. #445 Maintenance Yard	11282 Garfield Ave.	4	X				X	500	
Maintenance/ operations	PW Road – Maintenance District No. 4 Office	11282 Garfield Ave.	4	X				X	500	
Sheriff substation	Sheriff – Paramount Substation	15001 Paramount Blvd.	4	X				X	500	
County fire station	Station 31	7521 E. Somerset Blvd.	4	X				X	500	
Maintenance/ operations	PW WWD #29 – LADWP Emergency Via Dolce Connection	3900 Via Dolce	4	X			X		500	

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 110	4433 Admiralty Way	4	X			X	X		
Sheriff station	Marina del Rey Station	13851 Fiji Way	4	X			X	X		
Maintenance/ operations	PW WWD #29-LADWP Emergency Mindanao Connection	4705 Lincoln Blvd.	4	X				X		
County fire station	Station 115	11317 Alondra Blvd.	4	X				X	500	
Sheriff substation	Sheriff – Bellflower Substation	16615 Bellflower Blvd.	4	X				X	500	
County fire station	Station 98	9814 Maplewood Avenue	4	X				X	500	
County fire station	Station 20	12110 E. Adoree Street	4	X				X		
Sheriff station	Norwalk Station	12355 Civic Center Dr.	4	X						
Communications	ISD/ITS – Rio Hondo Microwave Site	3300 Workman Mill Rd.	4							X
Communications	Sheriff – Puente Hills Nike Communications Site	Vantage Pointe Dr.	4							X
County fire station	Station 2	340 Palos Verdes Drive W.	4							X
County fire station	Station 53	6124 W. Palos Verdes Drive S.	4							X
Communications	ISD/ITS – San Pedro Hill Microwave Site	3860 Crest Rd.	4							X
County fire station	Station 56	12 Crest Road West	4							X
Communications	ISD/ITS – Blackjack Peak Microwave Site		4							X
Sheriff station	Avalon Station	215 Sumner Ave.	4							X
Sheriff substation	Sheriff – New Isthmus Substation and Residence	17 Two Harbors Rd.	4							X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Hospital	Harbor/UCLA Med. Center – Family Medicine Clinic	1403 W. Lomita Blvd.	4							
County fire station	Station 121	346 Armitos	4							
County fire station	Station 119	20480 E. Pathfinder Road	4							
County fire station	Station 17	12006 Hadley Street	4							
County fire station	Station 59	10021 Scott Avenue	4							
County fire station	Station 28	7733 Greenleaf Avenue	4							
Sheriff substation	Whittier County Community Substation	13525 B Telegraph Rd.	4							
County fire station	Station 96	10630 S. Mills Avenue	4							
County fire station	Station 15	11460 Santa Gertrudes	4							
Maintenance/ operations	PW Road – Div. #146 Maintenance Yard	13671 Telegraph Rd.	4							
Maintenance/ operations	Sheriff – Central Supply Warehouse	14205 Telegraph Rd.	4							
Maintenance/ operations	PW Flood – El Segundo Yard	2155 El Segundo Blvd.	4							
Sheriff substation	La Mirada Substation	13716 La Mirada Blvd.	4							
County fire station	Station 49	13820 S. La Mirada Blvd.	4							
Maintenance/ operations	PW Flood – Redondo Yard Office	615 E. Anita St.	4							
County fire station	Station 122	2600 Greenmeadow Road	4							
County fire station	Station 60	2300 East 27th Street	4							
Sheriff station	Lomita Station	26123 S. Narbonne Ave.	4							
County fire station	Station 6	25517 S. Narbonne Avenue	4							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 83	83 Miraleste Plaza	4							
County fire station	Station 106	413 Indian Peak Road	4							
Hospital	Olive View – Main Hospital Building	14445 Olive View Dr.	5			X				
County fire station	Station 140	8723 Elizabeth Lake Road	5	X		X				X
Maintenance/ operations	PW Road – Div. #558a Jackson Lake Maintenance Yd.	22201 Big Pines Hwy.	5			X				X
County fire station	Station 74	12587 N. Dexter Park Road	5			X				X
Sheriff substation	Sheriff – Gorman Substation	49819 Gorman Post Rd.	5			X				
County fire camp	Camp 11	8800 W. Soledad Canyon Road	5		X					X
Dam/debris basin	Sawpit Dam		5		X			X		X
Dam	PW Flood – Morris Dam	9500 San Gabriel Canyon Rd.	5		X			X		X
County fire station	Station 97	18453 E. Sierra Madre Avenue	5		X					X
Dam/debris basin	Sawpit DB		5	X				X		X
Maintenance/ operations	PW Road – Div. #514 Maintenance Yard	3916 Dunsmore Ave.	5	X						X
Dam/debris basin	Big Tujunga No. 1		5		X			X		
Dam/debris basin	Big Dalton DB		5	X				X		X
Dam/debris basin	Little Dalton DB		5	X						X
Dam/debris basin	Puddingstone Diversion Dike		5	X				X		
County fire station	Station 78	17021 Elizabeth Lake Road	5	X						X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Sheriff substation	Sheriff – Littlerock Presence	7826 Pearblossom Hwy.	5	X						
County fire station	Station 114	39939 N. 170th Street East	5	X						
County fire station	Station 132	29310 San Canyon Road	5		X					X
Maintenance/ operations	PW Road – Div. #553 Maintenance Yard Shop	17931 Sierra Hwy.	5	X					100	X
County fire station	Station 107	18239 W. Soledad Canyon	5	X					100	
County fire station	Station 123	26321 N. Sand Canyon Road	5	X					100	X
Maintenance/ operations	PW Road – San Antonio Maintenance Yard	5150 N. Mount Baldy Rd.	5		X					X
Dam/debris basin	Thompson Creek Dam		5	X				X		X
Dam	PW Flood – Thompson Creek Dam	4100 Cobal Canyon Mtwy.	5	X				X		X
Dam/debris basin	Thompson Creek Dam		5	X				X		
Dam/debris basin	Big Santa Anita Dam		5		X					X
Dam	PW Flood – Santa Anita Dam (big)	2230 Santa Anita Canyon Rd.	5		X					X
Dam/debris basin	Eaton Wash Dam		5	X				X		
Dam	PW Flood – Eaton Wash Dam and Reservoir	2986 E. New York Dr.	5	X				X		

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Maintenance/ operations	PW Flood – Eaton Maintenance Yard	2986 E. New York Dr.	5	X						
Dam/debris basin	Santa Anita DB		5	X				X		X
Dam/debris basin	Sierra Madre Dam		5	X						X
County fire camp	Camp 12	29300 The Old Road	5		X					X
County fire station	Station 149	31770 Ridge Route	5	X				X		X
Maintenance/ operations	Animal Control #6 –Office	31044 N. Charlie Canyon Rd.	5	X				X		X
Maintenance/ operations	PW Road – Div. #556 Maint. Yd. Office	27624 W. Parker Rd.	5	X				X		X
Maintenance/ operations	PW Flood – Santa Clara Flood Maintenance Yard	21190 Centre Pointe Pkwy.	5	X						X
Maintenance/ operations	PW Flood – Santa Clara Yard Gas Shack	21190 Centre Pointe Pkwy.	5	X						X
County fire station	Station 76	27223 Henry Mayo Drive	5	X				X		
Sheriff station	Santa Clarita Valley Station	23740 Magic Mtn. Pkwy.	5	X						
County fire station	Station 126	26320 Citrus Dr.	5	X						
Sheriff substation	Magic Mountain Substation	26101 Magic Mountain Pkwy.	5	X						
County fire station	Station 108	28799 N. Rock Canyon Dr.	5	X						X
County fire station	Station 111	26829 Seco Canyon Road	5	X				X		
County fire station	Station 102	4370 N. Sumner Avenue	5	X						
Communications	ISD/ITS – Earl Canyon Microwave Site	0 Earl Canyon Mtwy.	5		X					X
County fire camp	Camp 2	4810 N. Oak Grove Drive	5	X						

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 82	352 W. Foothill Blvd.	5	X						
Dam	PW Flood – Puddingstone Dam & Reservoir	150 E. Puddingstone Dr.	5		X					X
Maintenance/ operations	Air Operations 24-Hr. Multi-Mission Squad	1889 McKinley Ave.	5	X				X		
Maintenance/ operations	Sheriff – Metro Link East	1805 McKinley Ave.	5	X				X		
Communications	Sheriff – Los Pinetos Peak Communications Site		5		X					X
Airport/heliport	Olive View – Helicopter Pad	14445 Olive View Dr.	5	X						X
County fire station	Station 157	15921 Spunky Canyon Road	5						500	X
County fire station	Station 81	8710 W. Sierra Highway	5						100	X
Dam/debris basin	Cogswell Dam		5					X		X
Dam	PW Flood – Cogswell Dam/Reservoir	13500 E. Devil's Canyon Dam	5					X		X
Dam/debris basin	San Gabriel No. 1		5					X		X
Dam/debris basin	San Gabriel No. 1		5					X		X
Dam	PW Flood – San Gabriel Dam/ Reservoir	9700 San Gabriel Canyon Rd.	5					X		X
Dam/debris basin	Devil's Gate Dam		5					X		X
Dam/debris basin	Morris Dam		5					X		X
Dam/debris basin	Morris Dam		5					X		X
Dam	PW Flood – Sawpit Dam & Reservoir	1300 N. Canyon	5					X		X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Dam/debris basin	San Dimas Dam		5					X		X
County fire station	Station 62	3701 N. Mills Avenue	5					X		X
Dam/debris basin	Live Oak Dam		5					X		X
Dam	PW Flood – Pacoima Dam/Reservoir	15300 N. Pacoima Canyon Rd.	5					X		X
Communications	ISD/ITS – Hauser Peak Microwave Site		5							X
Communications	ISD/ITS – Mount Mcdill Microwave Site		5							X
County fire station	Station 104	Soledad Canyon/Valley Bus Ctr.	5							X
County fire station	Station 75	23310 Lake Manor Drive	5							X
Dam	PW Flood – Sierra Madre Dam	900 Brookside Ln.	5							X
County fire camp	Camp 14	35100 San Francisquito Canyon	5							X
County fire camp	Camp 16	26652 N. Angeles Forest Hwy.	5							X
County fire camp	Camp 19	22550 East Fork Road	5							X
County fire camp	Camp 17	6555 Stephens Ranch Road	5							X
County fire camp	Camp 9	21521 N. Sand Canyon Road	5							X
County fire station	Station 80	1533 W. Sierra Highway	5							X
County fire station	Station 77	46833 Peace Valley Road	5							X
County fire station	Station 156	24505 Copper Hill Drive	5							X
Communications	ISD/ITS – Lake Hughes Microwave Site		5							X

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Communications	ISD/ITS – Lower Blue Ridge Microwave Site		5							X
Communications	ISD/ITS – Mount Disappointment Microwave Site		5							X
Communications	ISD/ITS – Portal Ridge Microwave Site		5							X
Communications	ISD/ITS – Whitaker Middle Peak Microwave Site		5							X
Communications	Public Works – Mount Wilson Radio Antenna Tower	Mount Wilson Rd.	5							X
Communications	Public Works – Mount Wilson Radio Facility Bldg.	Mount Wilson Rd.	5							X
Maintenance/ operations	PW Flood – Rubio Yard	3200 Rubio Canyon Rd.	5							X
Dam	PW Flood – San Dimas Dam/Reservoir	3501 San Dimas Canyon Rd.	5							X
Maintenance/ operations	PW Road – Div. #559b Maintenance Yard	Mount Wilson Rd.	5							X
Communications	ISD/ITS – Johnstone Peak Microwave Site	2000 N. Sycamore Canyon Rd.	5							X
Maintenance/ operations	PW Road – Div. #558 Maint. Yard Cement Container	8505 E. Avenue T	5						500	
Sheriff station	Lancaster Station	501 W. Lancaster Blvd.	5						500	

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 33	44947 Date Avenue	5						500	
Maintenance/ operations	PW WWD #04 – North Administration Building	419 W. Avenue J	5						500	
Communications	Sheriff – Lancaster Communication s Tower	501 W. Lancaster Blvd.	5						500	
County fire station	Station 131	2629 E. Avenue S.	5					X	500	
County fire station	Station 117	44851 30th Street East	5						500	
County fire station	Station 135	1846 East Avenue K-4	5						500	
County fire station	Station 93	37941 57th Street East	5						500	
County fire station	Station 37	38318 E. 9th Street East	5						500	
Communications	ISD/ITS – Palmdale Microwave Site	38126 N. Sierra Hwy.	5						500	
Maintenance/ operations	PW Road – Div. #557 Maintenance Yard Office/Garage	38126 N. Sierra Hwy.	5						500	
Maintenance/ operations	PW Road – Palmdale Maintenance Dist. No. 5 Bldg.	38126 N. Sierra Hwy.	5						500	
Hospital	High Desert – Main Hospital Building	44900 N. W. 60th St.	5					X	500	
County fire station	Station 130	44558 40th Street West	5						500	
Sheriff substation	Sheriff – Quartz Hill Community Substation	42043 W. 50th St.	5						500	
County fire station	Station 84	5030 W. Avenue L-14	5						500	
Maintenance/ operations	PW Road – Div. #551 Maintenance Yard	4859 W. Avenue L-12	5						500	

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 112	8812 W. Avenue E-8	5						500	
County fire station	Station 73	24875 N. San Fernando Road	5						100	
Sheriff substation	Sheriff – Pyramid Lake Substation	Hungry Valley Rd.	5						100	
Maintenance/ operations	Animal Control #5 – Administration	5210 W. Avenue I	5					X		
Maintenance/ operations	Fox Airfield – ISD/ITS Maintenance Building-8	4555 W. Avenue G	5					X		
Airport/heliport	Fox Airfield – FAA Control Tower	4555 W. G Ave.	5					X		
County fire station	Station 44	1105 S. Highland Avenue	5					X		
Sheriff substation	Sheriff – Duarte Substation	1042 E. Huntington Dr.	5					X		
Maintenance/ operations	PW Eaton Yard – Maintenance Office	2811 Woodlyn Rd.	5					X		
County fire station	Station 101	606 W. Bonita Avenue	5					X		
County fire station	Station 153	1577 E. Cypress Street	5					X		
County fire station	Station 152	807 W. Cypress Street	5					X		
County fire station	Station 154	401 N. Second Avenue	5					X		
County fire station	Station 85	650 E. Gladstone Street	5					X		
Dam/debris basin	Puddingstone Res.		5					X		
Dam/debris basin	Pacoima Dam		5					X		
County fire station	Station 134	43225 North 25th Street West	5							
County fire station	Station 129	42110 6th Street West	5							
Sheriff station	Palmdale Station	750 E. Avenue Q	5							
County fire station	Station 24	1050 W. Avenue P	5							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 136	3650 Bolz Ranch Road	5							
Water tank	PW WWD #04 – M/5E Water Tank	41956 W. 5th St.	5							
Water tank	PW WWD #04 – M/62W Water Tank	6098 W. Avenue M	5							
Water tank	PW WWD #04-M8/75W Water Tank	41610 N. W. 75th St.	5							
County fire station	Station 66		5							
Dam	PW Flood – Devil's Gate Dam	1055 La Canada Verdugo Rd.	5							
County fire station	Station 19	1729 W. Foothill Blvd.	5							
County fire station	Station 5	7225 N. Rosemead Blvd.	5							
Sheriff station	Temple Station	8838 Las Tunas Dr.	5							
County fire station	Station 47	5946 N. Kauffman Avenue	5							
Maintenance/ operations	PW Road – Div. #519 Maintenance Yard	5213 N. Encinita Ave.	5							
Maintenance/ operations	Public Works Headquarters Fuel Tanks	900 S. Fremont Ave.	5							
Maintenance/ operations	Public Works Headquarters Gas Station	900 S. Fremont Ave.	5							
Sheriff substation	Sheriff – Lake Los Angeles Substation	40235 N. E. 170th St.	5							
Sheriff station	Crescenta Valley Station	4554 N. Briggs Ave.	5							
Sheriff station	Altadena Station	780 E. Altadena Dr.	5							
County fire station	Station 92	8905 E. Avenue U	5							
County fire station	Station 79	33957 Longview Road	5							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
County fire station	Station 124	25870 Hemingway Ave.	5							
County fire station	Station 12	2760 N. Lincoln Avenue	5							
County fire station	Station 11	2521 N. El Molino Avenue	5							
County fire station	Station 63	4526 Ramsdell Avenue	5							
Communications	ISD/ITS – Bald Mountain Microwave Site	46811 Ridge Route Rd.	5							
Communications	ISD/ITS – Blue Rock Microwave Tower	E. Avenue J & 170th St.	5							
Communications	ISD/ITS – Oat Mountain Microwave Site #1	Oat Mountain Mtwy.	5							
Communications	ISD/ITS – Oat Mountain Nike Microwave Site #3	Browns Canyon Rd.	5							
Communications	ISD/ITS – Tejon Peak Microwave Site	138 Edison County Rd.	5							
Maintenance/ operations	PW Fleet – Altadena Maintenance Yard Office	252 W. Mountain View St.	5							
Maintenance/ operations	PW Flood – Pickens Yard	4628 N. Briggs Ave.	5							
Maintenance / operations	PW Road – Div. #555 Yard Office/Shop	45122 E. 70th St.	5							
Maintenance/ operations	Sheriff – Altadena Maintenance Garage	780 E. Altadena Dr.	5							
County fire station	Station 151	231 W. Mountain View Avenue	5							
County fire station	Station 86	520 S. Amelia Avenue	5							

Type	Name	Address	District	Liquefaction Zone	Landslide Zone	Seismic Zone (Fault)	Tsunami	Dam Inundation Area	Flood Zone	Very High Fire Hazard Severity Zone
Dam/debris basin	Big Dalton Dam		5							
Maintenance/ operations	PW Road – Div. #518 Maintenance Yard	161 N. Valencia St.	5							
Sheriff station	San Dimas Station	270 S. Walnut Ave.	5							
County fire station	Station 64	164 S. Walnut	5							
County fire station	Station 141	1124 W. Puente Street	5							
Communications	ISD/ITS – San Dimas Microwave Site	310 Via Blanca	5							
Maintenance/ operations	PW Road – Div. #112 Maintenance Yard (Trans.)	221 S. Eucla Ave.	5							
County fire station	Station 191	850 W. La Habra Blvd.								
County fire station	Station 192	520 S. Harbor Blvd.								
County fire station	Station 193	1000 Risner Way								

Development Patterns

ELEMENT D. MITIGATION STRATEGY | D1

D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

Since the adoption of the 2005 Plan, there have been no significant alterations to the development pattern of the County in the hazard prone areas. This conclusion was reached after a thorough review of the General Plan and discussion with the Advisory Committee.

Table 4-12: Proximity of Land Use Types to Hazards

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Earthquake	Flood	Wildfire	Landslide	Windstorm	Drought	Tsunami	Land Use Types
X	X	X	X	X	X		Rural
X	X	X		X	X	X	Residential
X	X			X	X	X	Commercial/Office
X	X			X	X	X	Mixed Use
X	X			X	X	X	Industrial/Manufacturing
X	X			X	X	X	Public and Semi-Public
X	X	X	X	X	X	X	Open Space
X	X			X	X		Overlays

History of Disaster Declarations

Table 4-13: Los Angeles County State and Federal Disasters Since 1950 (updated 2011)
State of California Emergency Management Agency – Hazard Mitigation Plan

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Flood	Floods	OCD 50-01	1950	Statewide	11/21/50	Not declared	9		$32,183,000
Flood	Fire, Flood, and Erosion	DR-28	1954	Los Angeles, San Bernardino	2/5/54	2/5/54			Not available
Flood	Floods	DR-47	1955	Statewide	12/22/55	12/23/55	74		$200,000,000
Fire	Fires	DR-65	1956	Los Angeles (Malibu area), Ventura		12/29/56	1	Several hundred	$70,000,000
Fire	Fires	CDO 58-01	1958	Los Angeles	1/3/58	Not declared	1	23	Not available
Flood	Storm and Flood Damage	N/A	1958	Statewide	4/2/58	82	13		$24,000,000
Flood, Landslide	Potential Flood Damage and Landsides as a Result of Fires	CDO 59-01	1959	Los Angeles	1/8/59	Not declared			Not applicable
Fire	Major and Widespread Fires	N/A	1960	Los Angeles, San Bernardino	7/21-22/60	Not declared		12	$10,000,000
Fire	Bel Air Fires	DR-119	1961	Los Angeles		11/16/61		103	$50,000,000 – $100,000,000
Flood	Flood and Rainstorm	DR-122	1962	Los Angeles, Ventura	2/16/62 & 2/23/62	3/6/62			Not available
Flood	Baldwin Hills Dam Failure	DR-161	1963	Los Angeles	12/16/63	12/21/63			$5,233,203
Severe Storm, Flood	Abnormally Heavy and Continuous Rainfall	N/A	1963	Northern California (boundaries of San Luis Obispo, Ventura, Los Angeles, and San Bernardino counties to the Oregon state line)	2/14/64	Not declared			Not available

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Fire	Major Widespread Fires (Weldon Fire)	N/A	1964	Los Angeles	3/16/64	Not declared			$2,000,000
Flood	Storms	N/A	1964	Los Angeles	4/3/64	Not declared			1,610,300
Civil Unrest	Riots	N/A	1965	Los Angeles	8/14/65	Not declared	32	874	$44,991,000
Flood, Landslide	Flooding and Hill Slides Caused by Heavy Rains	N/A	1965	City of Burbank, Los Angeles	1/5/65	Not declared			Not available
Landslide	Slide Damage	N/A	1965	City of Los Angeles	6/21/65	Not declared			$6,488,600
Fire	Major and Widespread Fires	N/A	1967	Los Angeles, Orange, San Diego, Ventura	1/7/67	Not declared			$11,345,000
HazMat	Major Oil Spill	N/A	1969	Coastal Areas of Southern California		Not declared			Not available
Flood	1969 Storms	Unknown	1969	Los Angeles, San Luis Obispo, Fresno, Inyo, Riverside, San Bernardino, Santa Barbara, Tulare, Ventura, Amador, El Dorado, Kern, Kings, Madera, Modoc, Mono, Monterey, Orange, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Tuolumne, Mariposa, Merced, Calaveras, San Benito, Sierra, Contra Costa, Humboldt, Mendocino, Sonoma, Plumas, Tehama, Yuba, Butte, Marin, Yolo	1/23/69, 1/25,69, 1/28/69, 1/29/69, 2/8/69, 2/10/69, 2/16/69, 3/12/69	1/26/69	47	161	$300,000,000
Landslide	Slide Damage Caused by Heavy Rains and Storms	N/A	1970	City of Los Angeles	3/10/70	Not declared			$8,500,000

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Fire	Statewide Fires		1970	City of Oakland, Los Angeles, Ventura, San Diego, Kern, San Bernardino, Monterey, Riverside	9/24/70, 9/28/70, 10/1/70, 10/2/70, 10/20/70, 11/14/70	9/29/70	19		$223,611,000
Earthquake	San Fernando Earthquake	DR-299	1971	Los Angeles	2/9/71	2/9/71	58	2,000	$483,957,000
Agricultural	Exotic Newcastle Disease Epidemic	N/A	1972	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura, Santa Barbara	4/10/72, 5/22/72	Not declared			$10,000,000
Fire	Fires	N/A	1973	Los Angeles	7/16/73	Not declared			$1,300,000
Economic	Gasoline Purchasing Problems	N/A	1974	Alameda, Contra Costa, Los Angeles, Orange, Riverside, San Mateo, Solano, Santa Clara, Ventura	2/28/74, 3/4/74, 3/10/74	Not declared			
Fire	Fires	N/A	1975	Los Angeles	11/24/75	Not declared			$19,486,960
Drought	Drought	N/A	1976	Alpine, Calaveras, Colusa, Fresno, Glenn, Madera, Merced, San Diego, San Joaquin, Solano, Stanislaus, Sutter, Tuolumne, Alameda, Butte, Contra Costa, Kings, Los Angeles, Riverside, San Luis Obispo, Tulare, Yolo, Amador, Monterey, Napa, Nevada, San Benito, San Bernardino, Tehama, San Mateo, Marin	2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76	Not declared			$2,664,000,000
Fire	1978 Los Angeles Fire	EM-3067	1978	Los Angeles	10/24/78	10/29/78	1		$61,279,374
Severe Storm	Storms	Unknown	1978	Inyo, Mono, San Diego, San Luis Obispo, Kings, Monterey, Kern, Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Tulare, Ventura	3/9/78, 2/27,78, 2/13/78	2/15/78	14	21	$117,802,785

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Economic	Gasoline Shortage Emergency	N/A	1979	Alameda, Contra Costa, Los Angeles, Marin, Monterey, Orange, Riverside, San Francisco, San Diego, Santa Clara, Santa Cruz, San Mateo, Ventura, San Bernardino, Sonoma, Contra Costa, Los Angeles, Orange, Santa Clara	5/8/79 – 11/13/79	Not declared			
Fire	Fires	N/A	1979	Santa Barbara, Ventura, Los Angeles, El Dorado	9/28/79, 9/21/79, 9/20/79	Not declared			$9,970,119
Flood	1980 Winter Storms	DR-615	1980	Santa Barbara, Los Angeles, Orange, Riverside, Ventura, San Bernardino, San Diego	2/21/80, 2/7/80	2/21/80			
Fire	Southern California Fires	DR-635	1980	San Bernardino, Los Angeles, Orange, Riverside	11/18/80	11/18/80			$64,795,200
Economic	Mediterranean Fruit Fly Infestation	N/A	1981	Contra Costa, Los Angeles, San Benito, Stanislaus, Santa Cruz, San Mateo	8/8/81 – 9/25/81	Not declared			$22,000,000
Flood, Severe Storm	1982–83 Winter Storms	DR-677	1982	Contra Costa, San Joaquin, Sacramento, Marin, San Mateo, Los Angeles, San Diego, Alameda, Orange, San Benito, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Ventura, Trinity, Colusa, Lake, Mendocino, Monterey, San Luis Obispo, Solano, Yolo, Butte, Glenn, Kern, Kings, San Bernardino, Sutter, Tehama, Merced, Del Norte, Fresno, Madera, Napa, Placer, Riverside, Stanislaus, Tulare, Humboldt, Mariposa, Nevada, Yuba	1982, 1983	2/9/83	0	0	$523,617,032
Fire	Dayton Hills Fire	N/A	1982	Los Angeles, Orange, Ventura	10/10/82	Not declared	0		$19,277,102

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Flood	Winter Storms	Unknown	1982	Contra Costa, San Joaquin, Sacramento, Marin, San Mateo, Los Angeles, San Diego, Alameda, Orange, San Benito, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Ventura, Trinity, Colusa, Lake Mendocino, Monterey, San Luis Obispo, Solano, Yolo, Butte, Glenn, Kern, Kings, San Bernardino, Sutter, Tehama, Merced, Del Norte, Fresno, Madera, Napa, Placer, Riverside, Stanislaus, Tulare, Humboldt, Mariposa, Nevada, Yuba	12/8/82–3/21/83	2/9/83			$523,617,032
Economic	Mexican Fruit Fly	N/A	1983	Los Angeles	11/4/83	Not declared			
Fire	Statewide Fires	DR-739	1985	San Diego, City of Los Angeles, San Luis Obispo, Monterey, Santa Clara, Santa Cruz, Ventura	7/1/85 – 7/11/85	4/25/84	3	470	$64,845,864
Earthquake	Whittier Earthquake	DR-799	1987	Monterey Park, City of Whittier, Los Angeles, Orange	10/2/87 – 10/5/87	10/7/87	9	200	$358,052,144
Economic	Mediterranean Fruit Fly	N/A	1987	Los Angeles	8/25/87	Not declared			
Severe Storm	Coastal Storms	DR-812	1988	Los Angeles, Orange, San Diego	1/21/88	2/5/88	0		
Economic	Mediterranean Fruit Fly	N/A	1988	Los Angeles	7/21/88	Not declared			
Fire, Windstorm	Fires/High Winds	N/A	1988	Los Angeles	12/9/88	Not declared	0	2	$12,400,000
Economic	Mediterranean Fruit Fly	N/A	1989	Los Angeles	8/9/89	Not declared			
Fire	Santa Barbara Fires	DR-872	1990	Los Angeles, Santa Barbara, Riverside, San Bernardino	6/28/90, 6/29/90	6/30/90	3	89	$300,000,000

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Freeze	Freeze	DR-894	1990	Santa Cruz, Fresno, Glenn, Imperial, Kern, Mendocino, Monterey, Riverside, San Benito, San Bernardino, San Diego, San Mateo, Santa Barbara, Santa Clara, Solano, Sonoma, Tulare, Ventura, Alameda, Butte, Colusa, Los Angeles, Madera, Marin, Merced, Napa, San Joaquin, San Luis Obispo, Sutter, Yolo, Yuba, Stanislaus, Tehama	12/19/90 – 1/18/91	2/11/91			$856,329,675
Earthquake	Upland Earthquake	N/A	1990	Los Angeles, San Bernardino	3/9/90, 3/13/90	Not declared	0	38	$12,034,150
Economic	Mexican Fruit Fly	N/A	1990	Los Angeles, San Diego	5/14/90	Not declared			
Severe Storm	1992 Winter Storms	DR-935	1992	Los Angeles, Ventura, City of Los Angeles, Kern, Orange, San Bernardino	2/12/92, 2/19/92	2/25/92	5		$123,240,531
Civil Unrest	Los Angeles Civil Disorder	DR-942	1992	Los Angeles	4/29/92	5/22/92	53	2,383	$800,000,000
Flood	1992 Late Winter Storms	DR-979	1992	Alpine, Los Angeles, Humboldt, Napa, Santa Barbara, Culver City, City of Los Angeles, Contra Costa, Mendocino, Sonoma, Fresno, Imperial, Madera, Monterey, San Bernardino, Sierra, Tehama, Trinity, Tulare, Modoc, Orange, Riverside, Lassen, Siskiyou, Plumas, San Diego	1/7/93 – 2/19/93	1/15/93	20	10	$600,000,000
Fire	Southern California Firestorms	DR-1005	1993	Los Angeles, Ventura, San Diego, Orange, Riverside, San Bernardino	10/27/93, 10/28/93	10/28/93	4	162	$1,000,000,000
Earthquake	Northridge Earthquake	DR-1008	1994	Los Angeles, Ventura, Orange	1/17/94, 1/24/94	1/17/94	57	11,846	$20,000,000,000

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Severe Storm	Severe Winter Storms	DR-1044	1995	Los Angeles, Orange, Humboldt, Lake , Sonoma, Butte, Colusa, Contra Costa, Del Norte, Glenn, Kern, Lassen, Mendocino, Modoc, Monterey, Napa, Placer, Plumas, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, Tehama, Ventura, Yolo, Yuba, Alpine, Amador, Nevada, Riverside, Sacramento, San Bernardino, San Mateo, Shasta, Sutter, Trinity, San Diego, Alameda, Marin, Fresno, Kings, El Dorado, Madera, Solano, Siskiyou	1/6/95 – 3/14/95	1/13/95	11		$741,400,000
Storm, Flood	Late Winter Storms	DR-1046	1995	All counties except Del Norte		1/10/95	17		$1,100,000,000
Fire	Southern California Firestorms	EM-3120	1996	Los Angeles, Orange, San Diego	10/1/96			5	$40,000,000
Flood	El Niño		1998	Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Fresno, Glenn Humboldt, Kern, Kings, Lake, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Orange, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Yolo, Yuba			17		$550,000,000
Fire	Fire		1999	Various counties	8/26/99				
Fire	California Wildfires	DR-1498	2003	Ventura, Los Angeles, San Bernardino, Riverside, San Diego		DR1498			
Earthquake	Sierra Madre Earthquake	N/A	2003	Los Angeles	7/5/91	Not declared	1	30	$33,500,000

Hazard Type	Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	Federal Declaration	# of Deaths	# of Injuries	Cost of Damage
Fire	Southern California Wildfires	DR-1498	2003	Ventura, Los Angeles, San Bernardino, Riverside, San Diego	10/24–26/03	10/27/03			
Flood	Flash Flooding	GP 2003-04	2003	Los Angeles	11/14/03				$903,275
Fire	Pine Fire	FM-2528	2004	Los Angeles		7/14/04			$9,028,675
Fire	Foothill Fire	FM-2534	2004	Los Angeles		7/18/04			$4,319,501
Fire	Crown Fire	FM-2535	2004	Los Angeles		7/21/04			$2,604,924
Flood	2005 January Winter Storms	DR-1577, GP2005-01	2005	Los Angeles, Orange, San Bernardino, Riverside, San Diego, Santa Barbara, Ventura, Kern (HM only)	1/12/05 1/15/05	2/4/05			$291,368,772
Flood	2005 February Storms	DR-1585	2005	Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura	3/16/05	4/14/05			$76,128,144
Fire	Topanga Fire	FM-2583	2005	Los Angeles, Ventura		9/28/05			$19,787,415
Freeze	2007 Severe Freeze	DR-1689	2007	Fresno, Imperial, Kern, Los Angeles, Monterey, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, Ventura	3/13/07				
Fire	Griffith Park Brush Fire	FM-2691	2007	Los Angeles		5/8/07			
Fire	Island Fire (Catalina)	FM-2694	2007	Los Angeles		5/10/07			

Summary

Hazard mitigation strategies can reduce the impacts concentrated at large employment and industrial centers, public infrastructure, and critical facilities. Hazard mitigation for industries and employers may include developing relationships with emergency management services and their employees *before* disaster strikes, and establishing mitigation strategies together. Collaboration between the public and private sectors to create mitigation plans and actions can reduce the impacts of hazards.

Attachment 4-1: CPRI Key Code (the CPRI Key Code provides the basis for the ratings used in the Calculated Priority Risk Index analysis)

Earthquake (Magnitude/Severity Source: Southern San Andreas, Magnitude 7.8 for District 5, District 3, and Puente Hills; Magnitude 7.1 for District 1, District 2, and District 4)				
Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index	
Probability	N/A	Not affected	0	45%
	Unlikely		1	
	Possible	Dam inundation area within the district boundary	2	
	Likely		3	
	Highly likely		4	
Magnitude/ Severity	N/A		0	30%
	Negligible		1	
	Limited		2	
	Critical		3	
	Catastrophic	Dam inundation area within the district boundary	4	
Warning Time	N/A		0	15%
	Less than 6 hrs.	Dam inundation area within the district boundary	4	
	6 to 12 hrs.		3	
	12 to 24 hrs.		2	
	More than 24 hrs.		1	
Duration (Initiating Event)	N/A		0	10%
	Less than 6 hrs.	Dam inundation area within the district boundary	1	
	Less than 24 hrs.		2	
	Less than one week		3	
	More than one week		4	

Earthquake (Magnitude/Severity Source: Southern San Andreas Magnitude 7.8)				
Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index	
Probability	N /A			45%
	Unlikely		1	
	Possible		2	
	Likely	All districts	3	
	Highly likely		4	
Magnitude/ Severity	N/A			30%
	Negligible	Green: VI – Moderate shaking with objects falling	1	
	Limited	Yellow: VII – Strong shaking with nonstructural damage	2	
	Critical	Orange: VIII – Very strong shaking with moderate damage	3	
	Catastrophic	Red: IX – Violent shaking with heavy damage	4	
Warning Time	N/A			15%
	Less than 6 hrs.	All districts	4	
	6 to 12 hrs.		3	
	12 to 24 hrs.		2	
	More than 24 hrs.		1	
Duration (Initiating Event)	N/A			10%
	Less than 6 hrs.		1	
	Less than 24 hrs.	All districts	2	
	Less than one week		3	
	More than one week		4	

Flooding (Source: County of Los Angeles General Plan Done District by District)				
Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index	
Probability	N /A			45%
	Unlikely		1	
	Possible	500-year floodplain (Flood Zone X)	2	
	Likely	100-year floodplain (Flood Zone A and V)	3	
	Highly likely		4	
Magnitude/ Severity	N/A			30%
	Negligible		1	
	Limited		2	
	Critical	100- and 500-year floodplain	3	
	Catastrophic		4	
Warning Time	N/A			15%
	Less than 6 hrs.		4	
	6 to 12 hrs.	100- and 500-year floodplain	3	
	12 to 24 hrs.		2	
	More than 24 hrs.		1	
Duration (Initiating Event)	N/A			10%
	Less than 6 hrs.		1	
	Less than 24 hrs.		2	
	Less than one week	100- and 500-year floodplain	3	
	More than one week		4	

Tsunami (Source: District Level CEO-GIS Maps)				
Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index	
Probability	N /A			45%
	Unlikely		1	
	Possible	District includes tsunami inundation zone	2	
	Likely		3	
	Highly likely		4	
Magnitude/ Severity	N/A			30%
	Negligible		1	
	Limited		2	
	Critical	District includes tsunami inundation zone	3	
	Catastrophic		4	
Warning Time	N/A			15%
	Less than 6 hrs.	District includes tsunami inundation zone	4	
	6 to 12 hrs.		3	
	12 to 24 hrs.		2	
	More than 24 hrs.		1	
Duration (Initiating Event)	N/A			10%
	Less than 6 hrs.	District includes tsunami inundation zone	1	
	Less than 24 hrs.		2	
	Less than one week		3	
	More than one week		4	

Wildfire (Source: District Level Fire Hazard Severity Zone CEO-GIS Maps)				
Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index	
Probability	N /A			45%
	Unlikely	0%–24% Very High Fire Hazard Severity Zone	1	
	Possible	25%–49% Very High Fire Hazard Severity Zone	2	
	Likely	50%–74% Very High Fire Hazard Severity Zone	3	
	Highly likely	75%–100% Very High Fire Hazard Severity Zone	4	
Magnitude/ Severity	N/A			30%
	Negligible	0%–24% Very High Fire Hazard Severity Zone	1	
	Limited	25%–49% Very High Fire Hazard Severity Zone	2	
	Critical	50%–74% Very High Fire Hazard Severity Zone	3	
	Catastrophic	75%–100% Very High Fire Hazard Severity Zone	4	
Warning Time	N/A			15%
	Less than 6 hrs.	All districts	4	
	6 to 12 hrs.		3	
	12 to 24 hrs.		2	
	More than 24 hrs.		1	
Duration (Initiating Event)	N/A			10%
	Less than 6 hrs.	0%–24% Very High Fire Hazard Severity Zone	1	
	Less than 24 hrs.	25%–49% Very High Fire Hazard Severity Zone	2	
	Less than one week	50%–74% Very High Fire Hazard Severity Zone	3	
	More than one week	75%–100% Very High Fire Hazard Severity Zone	4	

Section 5:
Earthquakes

Table of Contents

Section 5: Earthquakes 1

Why Are Earthquakes a Threat to the County of Los Angeles? 1

General Situation 2

Regulatory Background 2

History of Earthquakes in Southern California 4

The Los Angeles Whittier-Narrows Earthquake of October 1, 1987 5

The Northridge Earthquake of January 17, 1994 10

Impact of Earthquakes in the County of Los Angeles 18

Earthquake Hazard Assessment 19

Other Significant Geologic Features 21

Local Conditions 23

Historic Earthquakes in Southern California 23

Earthquake-Related Hazards 24

Earthquake Probable Events 24

Faults 30

Seismic Hazard Maps 31

Earthquake Fault Zones Affecting Los Angeles County (Alquist-Priolo) 42

Causes and Characteristics of Earthquakes in Southern California 77

Fault 77

Strike-slip 77

Dip-slip 77

Thrust faults 77

Geologic Rates 78

Unknown Faults 78

Earthquake-Related Hazards *79*

Ground Shaking *79*

Fault Rupture *79*

Earthquake Shaking Potential in Southern California *79*

Rapid Instrumental Intensity Maps *80*

Earthquake-Induced Landslides *96*

Liquefaction *96*

Amplification *97*

Seismic Hazard Zone Maps *97*

Earthquake Hazard Assessment *158*

Earthquake Threats to County of Los Angeles Communities **169**

Community Earthquake Issues *169*

Vulnerability *196*

Section 5: Earthquakes

Why Are Earthquakes a Threat to the County of Los Angeles?

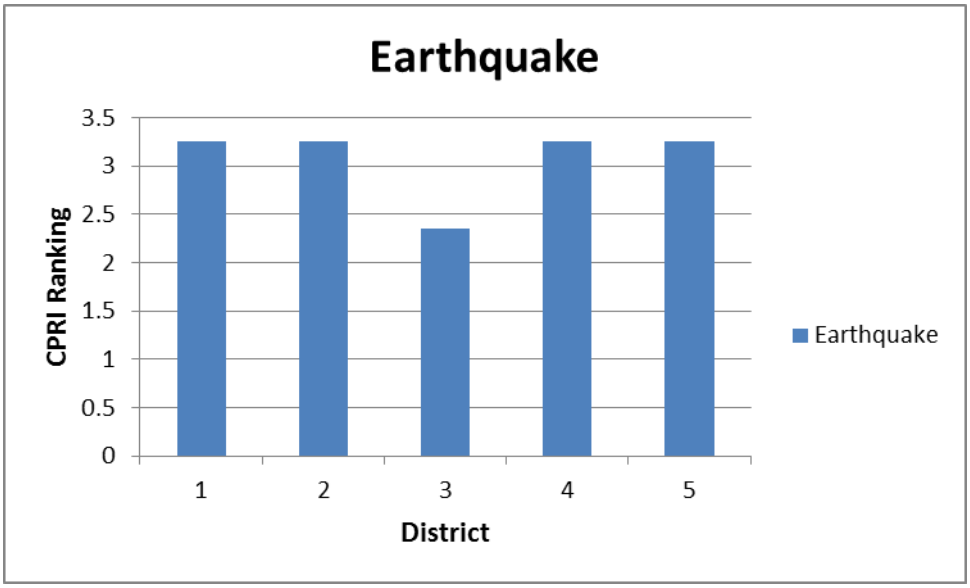
ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

Earthquake losses typically include structural damage to private and public structures, such as homes, businesses, roads, and bridges. Structural damage can cause thousands of dollars in losses for residents, business owners, and the county. The County of Los Angeles was severely affected by the 1994 Northridge earthquake. However, data is not available on the full extent or dollar value of that widespread damage.

Table 5-1: Calculated Priority Risk Index – Earthquake Risk by Board of Supervisorial District (Southern San Andreas Fault)

Board of Supervisorial District	Earthquake
Board of Supervisorial District 1	3.35
Board of Supervisorial District 2	2.75
Board of Supervisorial District 3	2.45
Board of Supervisorial District 4	3.05
Board of Supervisorial District 5	3.35

Chart 5-1: Calculated Priority Risk Index – Earthquake Risk by Board of Supervisorial District (Southern San Andreas Fault)



General Situation

Earthquakes are considered a major threat to the County of Los Angeles due to the proximity of several fault zones, notably including the San Andreas Fault, the Newport-Inglewood Fault, the Norwalk Fault, the San Jacinto Fault, and the Whittier-Elsinore Fault. A recent Southern California Earthquake Center (SCEC) report (SCEC, 1995) indicated that the probability of an earthquake of magnitude 7 or larger in Southern California before the year 2024 is 80% to 90%. A significant earthquake along one of the major faults could cause substantial casualties; extensive damage to buildings, roads, and bridges; fires; and other threats to life and property. The effects could be aggravated by aftershocks and by secondary effects such as fire, landslides, and dam failure. A major earthquake could be catastrophic in its effect on the population, and could exceed the response capability of the local communities and even the state.

Regulatory Background

The state regulates development within California to reduce or mitigate potential hazards from earthquakes or other geologic hazards. Development in potentially seismically active areas is also governed by the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act.

Chapter 16A, Division IV of the California Building Code (CBC), titled “Earthquake Design.” states that “The purpose of the earthquake provisions herein is primarily to safeguard against major structural failures or loss of life.”

The CBC and the Uniform Building Code (UBC) regulate the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The procedures and limitations for the design of structures are based on site characteristics, occupancy type, configuration, structural system, height, and seismic zonation. Seismic zones are mapped areas (figure 16A-2 of the CBC and figure 16-2 of the UBC) that are based on proximity to known active faults, the potential for future earthquakes, and the anticipated intensity of seismic shaking. Seismic zones range from 0 to 4, with areas mapped as Zone 4 being

potentially subject to the highest accelerations due to seismic shaking and the shortest recurrence intervals.

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (renamed in 1994) is "to regulate development near active faults so as to mitigate the hazard of surface fault rupture." The state geologist (chief of the Division of Mines and Geology) is required to delineate earthquake fault zones (formerly known as "Special Studies Zones") along known active faults.

As defined by the California Division of Mines and Geology (DMG), an active fault is one that has had surface displacement within Holocene time (roughly the past 11,000 years) and/or has an instrumental record of seismic activity. Potentially active faults are those that show evidence of surface displacement during Quaternary time (roughly the past 2 million years), but for which evidence of Holocene movement has not been established. The DMG evaluates faults on an individual basis to determine if a fault will be classified as an Alquist-Prioto earthquake fault zone. In general, faults must meet certain DMG criteria, including seismic activity, historic rupture, and geologic evidence to be zoned as an earthquake fault zone. Cities and counties affected by the zones must regulate certain development within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting. Typically, structures for human occupancy are not allowed within 50 feet of the trace of an active fault.

The Seismic Hazard Mapping Act was adopted in 1990 for the purpose of protecting public safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure caused by earthquakes.

The Seismic Hazard Mapping Act requires that the state geologist delineate the various seismic hazard zones. Cities, counties, or other permitting authorities are required to regulate certain development projects within the zones. They must withhold development permits for a site within a zone until the geologic conditions are investigated and appropriate mitigation measures, if any, are incorporated into the development plans. In addition, sellers (and their agents) of real property within a mapped hazard zone must disclose that the property lies within such a zone at the time of sale.

The most recent significant earthquake event affecting Southern California was the January 17, 1994, Northridge earthquake. At 4:31 a.m. on Monday, January 17, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

As a result, 57 people were killed and more than 1,500 people were seriously injured. For days afterward, thousands of homes and businesses were without electricity; tens of thousands had no gas; and nearly 50,000 had little or no water.

Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. Some 66,500 buildings were inspected. Nearly 4,000 were severely damaged, and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, but earthquake-triggered liquefaction and dozens of fires also caused additional severe damage. This extremely strong ground motion in large portions of Los Angeles County resulted in record economic losses.

However, the earthquake occurred early in the morning on a holiday. This circumstance considerably reduced the potential effects. Many collapsed buildings were unoccupied, and most businesses were not yet open. Still, the direct and indirect economic losses ran into the tens of billions of dollars.

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the sources of the earthquakes occurring in the Southern California region.

Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection of earthquakes is based on observations and felt reports, and the results are dependent on population density and distribution. Since California was sparsely populated in the 1800s, the detection of pre-instrumental earthquakes is relatively difficult. However, two very large earthquakes, the Fort Tejon in 1857 (7.9) and the Owens Valley in 1872 (7.6) are evidence of the tremendously damaging potential of earthquakes in Southern California. In more recent times, two 7.3 earthquakes have struck Southern California—in Kern County (1952) and Landers (1992). The damage from these four large earthquakes was limited because they occurred in areas that were sparsely populated at the time. The seismic risk is much more severe today than in the past because the population at risk is in the millions, rather than a few hundred or a few thousand persons.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey, and universities to share research and educational efforts with Californians.

Considerable earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake risk reduction, and they have made significant contributions in reducing the adverse impacts of earthquakes. Despite the progress, the majority of California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

In California, each earthquake is followed by revisions and improvements in the building codes. The 1933 Long Beach earthquake resulted in the Field Act, affecting school construction. The 1971 Sylmar earthquake brought another set of increased structural standards.

Similar reevaluations occurred after the 1989 Loma Prieta earthquake and the 1994 Northridge earthquake. These code changes have resulted in stronger and more earthquake-resistant structures.

History of Earthquakes in Southern California

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Southern California, most with a magnitude below 3. No community in Southern California is beyond the reach of a damaging earthquake. The table below describes the historical earthquake events that have affected Southern California.

About 30 earthquakes occur every day in Southern California. Most have a magnitude of less than 2.0. No evidence exists that earthquakes are more likely to occur in certain kinds of weather.

The best place to see any part of the immense, 800-mile-long San Andreas Fault is in Palmdale, in a road cut along the Antelope Valley Freeway (Route 14) just north of Avenue S. The last time this part of the fault was active was in 1857.

Table 5-2: Significant Regional Earthquake Events (greater than M4) (updated 2011)
(Source: www.laalmanac.com)

Date	Location	Time	Richter	Mercalli	Deaths & Property Damage
12/8/1812	L.A. Area	3:00 pm	7.0	VII	Forty deaths; Mission San Juan Capistrano moderately to severely damaged; Mission San Gabriel moderately damaged
9/24/1827	L.A. Area	4:00 am	5.5	---	No information
7/11/1855	L.A. Area	4:15 am	6.0	VIII	Bells of Mission San Gabriel fell down; 26 buildings damaged in L.A.
1/9/1857	Fort Tejon	4:24 pm	7.9	IX	Two deaths; heavy property damage and loss
10/23/1916	Tejon Pass Region	2:44 pm	5.3	---	No information
3/10/1933	Long Beach	5:54 pm	6.4	IX	120 deaths; $50 million
10/21/1941	Torrance–Gardena	10:57 pm	4.8	VII	No deaths; $100,000
11/14/1941	Torrance–Gardena	12:42 am	4.8	VIII	No deaths; $1 million
12/25/1951	San Clemente Island	4:46 pm	5.9	---	No deaths; no appreciable damage
2/9/1971	San Fernando	6:01 am	6.6	---	Sixty-five deaths; $505 million
1/1/1979	Malibu	3:15 pm	5.2	---	No deaths; minor damage
10/1/1987	Whittier Narrows	7:42 am	5.9	---	Eight deaths; $358 million
12/3/1988	Pasadena	11:38 pm	5.0	---	No deaths; no appreciable damage
1/19/1989	Malibu	10:38 pm	5.0	---	No deaths; slight damage
6/12/1989	Montebello	9:57 am	4.6	---	No deaths; no appreciable damage
6/28/1991	Sierra Madre	7:44 am	5.8	---	Two deaths; $40 million
1/17/1994	Northridge	4:31 am	6.7	---	61 deaths; est. $20 billion
9/9/2001	SE of West Hollywood	4:59 pm	4.2	---	No deaths; moderate damage
7/29/2008	Chino Hills	11:42 am	5.4		No deaths, moderate damage

The July 29, 2008, the Chino Hills earthquake, measured at a magnitude 5.4, was centered in Riverside County. It was, however, widely felt throughout Southern California, including in Los Angeles County.

The Los Angeles Whittier-Narrows Earthquake of October 1, 1987

Introduction

On October 7, 1987, the President declared California a major disaster area as a result of an earthquake that struck the eastern Los Angeles metropolitan area. Los Angeles County was declared eligible for the Individual and Public Assistance Programs. Following is a summary of the Hazard Mitigation Survey Team's recommendations to the Federal Emergency Management Agency (FEMA) regional director, the Governor's authorized representative, and interested federal, state, and local agencies.

Description of the Disaster

The relatively moderate earthquake that struck the eastern Los Angeles area at 7:42 a.m. on October 1, 1987 producing widespread damage in Southern California. The earthquake caused relatively few deaths and injuries but produced significant financial impacts, both from damage and loss of revenues.

Damage due to earthquake shaking was reported as far north as Ventura County and extended south to mid-Orange County, west to Long Beach, and east to Ontario. At least 55 cities, as well as unincorporated areas in Los Angeles, Orange, and Ventura Counties, reported some degree of damage, and total losses exceeded $350 million. The primary concentration of major damage was to the redeveloped historic central business district of Whittier. Numerous buildings occupied primarily by small businesses suffered severe damage.

Fatalities caused by the earthquake included a student at California State University, Los Angeles, killed by a concrete slab falling from a parking structure; a utility worker trapped while excavating for a power line in the Angeles National Forest; and a Maywood man who fell to his death from a second-story apartment window. Approximately 200 injuries (mostly minor) and several fatal heart attacks were also attributed to the earthquake.

FEMA and the State of California opened 10 disaster application centers. By November 13, 1987, 22,622 individuals and businesses had registered at these centers. The temporary housing program received 15,579 applications for assistance, while the Individual Family Grant Program received 4,609 applications. The Small Business Administration issued 13,877 home and personal property loan applications and 4,200 business loan applications.

Public schools generally experienced few casualties or major damage. The Los Angeles Unified School District reported that 56 schools sustained minor damage and two schools sustained major damage, with an estimated loss of $5 million. The most significant problem appeared to be emergency coordination and implementation of school disaster plans.

The earthquake damaged more than 30 hospitals, nursing homes, and medical care and outpatient facilities as far away as 30 miles from the epicenter. Businesses experienced significant financial disruption. Several large corporations reported structural and nonstructural damage, resulting in significant losses. Numerous small businesses in Whittier experienced major losses and interruptions of business that in some cases were difficult to recover from.

Geophysical Discussion

The Los Angeles Whittier-Narrows earthquake, measuring 5.9 on the Richter scale, occurred in the east Los Angeles metropolitan area at 7:42 a.m. on October 1, 1987. The earthquake's epicenter was approximately 6 miles south-southeast of Pasadena. The main shock occurred along a previously

unidentified Transverse Range thrust fault. It was followed by approximately 35 aftershocks, including one magnitude 5.3 event at 3:59 a.m. on October 4. Aftershocks continued through the end of the month.

The geophysical setting of this earthquake is described by the interaction between crustal plates that are in constant motion (5–10 cm/yr) relative to one another. The San Andreas fault system forms the boundary between the Pacific and the North American plates. This boundary intersects several of California's major metropolitan centers, making it one of the most extensively urbanized tectonic plate boundaries.

The Los Angeles metropolitan area is susceptible to earthquake damage resulting from the ongoing tectonic process that characterizes coastal California. This process is dominated by the intersection of the San Andreas and the Transverse Range fault systems. The effects of this intersection are evident in the regular occurrence of moderate-size earthquakes.

The Los Angles metropolitan area, inhabited by more than 15.4 million people (2011 estimate), is the second largest metropolitan area in the United States. It is one of the key industrial, commercial, and cultural centers of the United States. As the area's population and development continue to expand, so does its vulnerability to damaging earthquakes. The 1971 San Fernando and the Whittier-Narrows earthquakes, both moderate-sized events, demonstrate how vulnerable a complex modern urban society is to the damaging effects of earthquakes. Earthquakes of similar moderate magnitude can be expected to recur in the region on a regular basis. According to the U.S. Geological Survey, there is a strong possibility that the potential for moderate magnitude earthquakes within the Los Angeles Basin has been underestimated by seismologists and emergency planners.

Even though the losses from these and other moderate earthquakes are significant, they do not reflect the overall risk to the region, since none has been as strong as the largest credible earthquake, an 8.0+ magnitude event on the San Andreas Fault. The probability that such a large earthquake will occur sometime in the next 25 years near the Los Angeles metropolitan area is estimated to be 50% or greater. Projected losses would exceed those of any previous natural disaster in the United States.

Damage Assessment

Approximately 10,000 buildings in the region were damaged as a result of the October 1 earthquake, with additional damage occurring after the major October 4 aftershock. Structural damage affected primarily unreinforced masonry commercial buildings, wood-frame homes, apartments, mobile homes, and concrete-frame structures. Other areas of concern included nonstructural damage, transportation, and lifelines.

Unreinforced Masonry Structures

The most heavily damaged structures were older commercial buildings constructed of unreinforced masonry. The business district of Whittier experienced heavy damage to these types of structures. Following the earthquake the entire business district was closed, and a number of the damaged buildings were demolished. Typical damage consisted of failure of one or more load-bearing walls, with occasional collapse of floor or roof diaphragm elements.

The Unreinforced Masonry Building Act (SB 547)—a state law passed in 1986 to require local jurisdictions to develop hazard mitigation programs for unreinforced masonry buildings—had not yet been fully implemented at the local level. The Cities of Los Angeles and Monterey Park had enacted hazardous building ordinances, but had not yet fully implemented them. Other communities in the affected area were considering enacting this type of ordinance.

Residential Structures

A second serious type of structural damage involved single family homes, apartment buildings, and mobile homes. In some cases, homes experienced damage to unreinforced masonry walls, especially hollow clay tile walls, a construction material popular in older Southern California buildings. In most cases, however, residential damage was to wood-frame structures. Typically the failure of the supporting "cripple wall" between the concrete foundation and the floor diaphragm caused the building to slide off the foundation, destroying exterior structural components and breaking utility connections. Many homes sustained minor damage such as chimney collapse.

Unreinforced masonry apartment buildings experienced significant damage, although none actually collapsed. Wood-framed/stucco apartment buildings were less heavily affected, but some sustained major cracking of exterior walls that, in effect, made the structure uninhabitable. Some damage occurred also to the more modern apartment and condominium structures, including wall cracks, fallen ceilings, and collapse of balconies. Damage was also reported to mobile homes. Typically, this damage involved loss of support from foundation piers due to earthquake shaking.

Modern Concrete-Frame Structures

Some modern concrete-frame buildings experienced significant problems, while steel-frame buildings performed well. Concrete-frame parking structures experienced damage, in one case resulting in a fatality. Several concrete frame buildings on the campus of California State University, Los Angeles, sustained significant damage. Precast concrete buildings proved particularly vulnerable to earthquake shaking, and would probably have experienced severe damage if the duration of the earthquake shaking had been slightly longer. A 1976 precast concrete frame structure in Rosemead experienced serious structural damage, which forced the corporate occupant to relocate its work force in temporary outdoor units.

Nonstructural Damage

Widespread nonstructural damage was reported following the earthquake. Many broken glass storefront windows could have resulted in severe injuries had the earthquake occurred one hour later, when pedestrian traffic would have been present. Other nonstructural damage of serious concern included the widespread failure of elevators, the partial collapse of many ceilings and light fixtures, and the toppling of building contents.

Transportation and Lifelines

Damage to the transportation system was minimal. One exception was the Interstate 605 overpass at the intersection with Interstate 5, where damaged columns resulted in a one-day closure of both freeways at that location. Local roads and highways experienced little damage. Airports suffered enough damage to require temporary closure, but were generally back in operation within a day.

The municipally owned water system in Whittier experienced major damage. Numerous water mains in the old system were cracked or broken. The October 4 aftershock exacerbated the damage in some of the same locations.

Emergency Response

The California Office of Emergency Services (Cal OES) activated its Region I Emergency Operations Center (EOC) in Los Angeles and attempted to determine the level and location of earthquake damage. Region I staff, supplemented by staff from the state Department of Transportation, the state Department of Health Services, and the Southern California Earthquake Preparedness Project (SCEPP), also processed requests for volunteer assistance from the California Conservation Corps (CCC) and the Cal

OES engineers program. At approximately 3:45 p.m. on October 1, the California Earthquake Prediction Evaluation Council (CEPEC) convened via a conference call from the EOC to ascertain, to the extent possible, the probability that the initial earthquake would be followed within the next several days by a shock of equal or greater magnitude. The consensus of the Council was that the likelihood of such an event was less than 5%.

Two of the cities most affected by the earthquake had exercised their emergency response plan during 1987. One of these, Monterey Park, had exercised its plan just two days prior to the earthquake. Whittier, the city most seriously damaged by the earthquake, had previous initiated a comprehensive community training program and reported that citizens and city employees knew what to do.

Evacuations

Numerous evacuations from high-rise and other types of buildings occurred after the earthquake. In most cases, these evacuations were spontaneous and unplanned, resulting in some inappropriate actions. For example, in some high-rise buildings, occupants congregated on sidewalks outside the building, risking injury from falling glass in the event of an aftershock.

In other cases, residents of apartment buildings self-evacuated to nearby parks, sometimes against the advice of emergency responders. Red Cross staff reported dealing with two kinds of problems following the earthquake: residents fearful of leaving shelters and returning to their homes, and landlords locking tenants out in order to obtain new tenants at higher rents.

Mutual Aid

Once the area and extent of damage became generally known, jurisdictions in need of mutual aid were called by jurisdictions willing to provide it. Among the resources made available were the following:

- The City of Los Angeles provided numerous building inspectors to City of Whittier.
- The City of Huntington Park provided public works assistance to City of Bell.
- The County of Los Angeles provided building inspectors, aerial lift trucks, and haulage to the City of Alhambra, and building inspectors to the City of Whittier.
- The County of Orange provided fire units to the City of Monterey Park.
- The Counties of Ventura and Orange dispatched fire equipment to assist the County of Los Angeles through regular fire mutual aid channels.
- The California Conservation Corps (CCC) provided crews to the City of Alhambra and the City of Whittier to assist in demolishing chimneys destroyed by the earthquake.
- Cal OES provided handheld radios to the City of Whittier.

Communications

The telephone communications system, as expected, experienced severe overload and consequent outages. Landline communications were disrupted by the earthquake. In some cases phones did work, but most of the jurisdictions that were hardest hit reported one-way communications—with calls coming in, but none going out. Although service was restored relatively quickly, the outage restricted the ability of local government to respond quickly to the emergency.

Jurisdictions with organized radio amateurs groups reported success in using these individuals to determine the initial extent of their damage. One city used cellular car phones for two-way communications; they functioned well, although they are ultimately tied into the existing land line network.

In spite of the relatively minor incidence of injury produced by this earthquake, medical communications systems experienced an overload of the 911 system. Extra telephone dispatchers were called in to handle the greatly increased number of calls which, at one point, tied up virtually every 911 line.

It is clear from this response that a higher magnitude earthquake, with greater consequences, could completely overburden the emergency communications system.

Fires and Hazardous Materials

Fire departments around the area reported a number of calls concerning fires and hazardous materials incidents immediately following the earthquake. The Los Angeles City Fire Department reported five earthquake-caused fires, three of which were linked to natural gas leaks.

A significant hazardous materials incident occurred in the City of Santa Fe Springs, when an earthquake-ruptured tank leaked 240 gallons of chlorine into the air, causing a plume cloud formation that drifted through the industrial section of the city toward Whittier, resulting in the evacuation of some areas. Spilled chemicals resulted in a fire at a laboratory facility of California State University, Los Angeles. Pockets of encapsulated asbestos were dislodged by the earthquake shaking, releasing airborne asbestos fibers into the ventilation systems of some public schools.

The Southern California Gas Company received over 20,000 service calls following the earthquake. They found 4,065 gas leaks, of which only 1,411 proved to be directly caused by the earthquake. A total of 16,507 customers reported turning off their gas even though there was no gas leak; 81 automatic gas shutoff valves had to be reset.

Mass Care

The American Red Cross sheltered 10,359 people in 21 shelters following the earthquake, and fed disaster victims 186,635 meals. By November 18, 1987, the Red Cross had provided 20,930 “bed units” (one person per day per bed equals one bed unit). In addition, some 625 families had been placed in rental units and more than 593 individuals checked into motels. Some difficulties were reported in terms of developing coordination between volunteer organizations and local government in providing this service.

Initial Recovery

After the main shock, city and county authorities started to quickly clean up and open the damaged area to people who wanted to remove their business inventories, clean up debris, or get back to work. Vehicle traffic was kept out of the most seriously damaged areas, but access was allowed to the immediately surrounding area. This initial recovery effort failed to account for potentially damaging aftershocks. Although the Whittier-Narrows aftershock sequence was characterized by an unusually small number of aftershocks during its first 48 hours of activity, a very large aftershock, measuring 5.3 on the Richter scale, occurred on October 4. Whittier’s May Company parking garage, which was damaged but still standing after the initial earthquake, collapsed during the aftershock.

The Northridge Earthquake of January 17, 1994

The magnitude 6.7 Northridge earthquake occurred at 4:31 on the morning of January 17, 1994, a national holiday, when most Californians were at home asleep. Fifty-seven people lost their lives, nearly 9,000 were injured, and damage was in excess of $20 billion.

Responding to the losses from the Northridge earthquake, Governor Pete Wilson issued Executive Order W-78-94 instructing the Seismic Safety Commission to review the effects of the earthquake and to coordinate a study of the specific policy implications arising from the Northridge earthquake, with particular attention to seismic structural safety and land-use planning.

In carrying out the governor's mandate, the commission used over three dozen background reports (published separately in the *Compendium of Background Reports on the Northridge Earthquake*, SSC 94-08) that describe the relevant laws, codes, regulations, and current practices in the fields of land-use planning, structure and lifeline design, construction, and earth sciences. These reports were prepared by experts who reviewed the legal, social, and physical environment in which they took place. The reports were also reviewed by over 60 stakeholders, from state agencies and professional organizations to private citizens. In addition, a number of detailed case studies were conducted on over two dozen buildings following the earthquake, and published as *Northridge Buildings Case Studies*, SSC 94-06.

Effects of the Northridge Earthquake

At 4:31 a.m. on January 17, 1994, 8 miles below the surface of the northwestern end of the San Fernando Valley, the magnitude 6.7 earthquake generated intense shaking that caused widespread damage and enormous economic loss. The communities of Northridge, San Fernando, West Hollywood, Santa Clarita, Fillmore, Simi Valley, and Sherman Oaks were the hardest hit, but strong shaking (and the intrinsic vulnerability of many buildings) resulted in extensive damage as far away as central Los Angeles, Santa Monica, and Whittier.

This report is an overview of the effect of the Northridge earthquake on people, buildings, lifelines, and the local economy. It is these effects the commission seeks to reduce in future earthquakes through improved public policy.

People

Although the number of lives lost in the Northridge earthquake was remarkably low (considering the intensity of the earthquake and its location), 57 people died, nearly 9,000 were injured, and the earthquake affected the lives of more people than any previous natural disaster in the United States.

The earthquake hit California hardest at home. Over 25,000 dwelling units were permanently lost or severely damaged, and over 1,600 homes and apartment buildings were declared uninhabitable. By mid-September, Cal OES and the Federal Emergency Management Agency (FEMA) had received over 630,000 phone calls regarding disaster assistance from victims of the earthquake—more than twice the number received after the previous record holder, Hurricane Andrew. FEMA had also received over 265,000 applications for individual and family grants. The Small Business Administration had conducted over 535,000 interviews with earthquake victims and had approved over 100,000 loans totaling nearly $3.4 billion.

Low-cost housing proved the most difficult to replace. Despite extraordinary city, state, and federal government efforts, repairs have begun on less than half of the 5,607 buildings that provided 11,000 apartments in the now infamous "ghost towns". The owners of the remaining buildings either don't yet know whether they can rebuild or have decided to forfeit their equity and allow lenders to foreclose.

Local mental health agencies and community-based groups reported over 1,150,000 crisis counseling interventions, costing over $35 million. Although most victims have adjusted and returned to an appearance of normalcy, for many the trauma continues.

Buildings

With losses estimated at $20 billion, the Northridge earthquake was the most expensive earthquake in the history of this country. The greatest portion of those losses was a direct result of the damage to buildings. Over 112,000 structures were damaged in the earthquake. In the City of Los Angeles, over 934,000 buildings were damaged badly enough to require inspection, and nearly 2,000 (including 1,500 residential buildings) of those were red-tagged, forbidding entry; another 1,000 buildings were red-tagged in other affected communities. Over 8,800 buildings were yellow-tagged as safe only for limited use in Los Angeles; 5,000 more were yellow-tagged in other communities.

Most modern buildings (those built to post-1976 codes) performed significantly better than structures built to prior codes; however, three types of structures built to modern codes had a higher-than-expected frequency of damage:

1. Tilt-up concrete buildings
2. Steel moment-frame buildings
3. Aboveground reinforced concrete parking structures

The most severe damage generally occurred to buildings designed to codes used before 1976, with damages divided into three categories:

1. Buildings constructed with suspect materials and techniques, such as tilt-ups, non-ductile concrete frames, and un-retrofitted unreinforced masonry.
2. Buildings designed or constructed with irregular configurations—for example, multistory buildings with inadequately braced first stories (like most of the apartment houses that collapsed) and hillside homes.
3. Buildings with poor design, construction, or maintenance.

In spite of the good performance of most buildings, the economic losses were high. The damage to nonstructural elements—heating and air conditioning systems, lighting fixtures, suspended ceilings, partitions, and equipment—was costly. Nonstructural damage is a significant matter, as the value of these elements generally ranges from slightly over half of a single-family dwelling's cost to as much as 80% of the total cost of many large buildings. Nonstructural items make possible a building's function, and damage can disable buildings that are otherwise safe to occupy.

Some hospitals had to close—even though they had suffered only minor structural damage—because of damage to sprinkler systems, power systems, and other vital equipment.

Fires

The earthquake caused relatively few fires, although the most spectacular, the fire at a break in a natural-gas transmission line on Balboa Boulevard, was shown so often on television that it gave the perception of a more pervasive problem. Good fortune played a critical role in keeping fires from spreading; there was no wind, and the area was not experiencing a dry spell. Another major factor, which was not a matter of luck, was the high level of planning and training in local fire departments and utilities, and the earthquake risk-mitigation programs of many businesses and governments.

Nonetheless, there were several problem areas:

- A number of fires in mobile home parks were caused when mobile homes fell from their supports and severed natural-gas connections. In all, 172 mobile homes were destroyed by fire. These mobile home fires were all too predictable; they remain a constant threat throughout the state.

- Communications failures hampered the response of emergency responders.

- Damage to water delivery systems seriously limited the efforts of firefighters.

Lifelines

Lifelines—transportation systems, communications, and water, gas, and electric utilities—suffered extensive damage. The effect of individual lifeline failures and combined failures is both direct (gas fires) and indirect (interference with emergency response). The combined loss of water pressure, electrical power, emergency power, and communications, coupled with significant gas-related fires, presents a clear and unacceptable hazard with far-reaching implications for emergency response and disaster recovery. Only good fortune prevented an even greater disaster.

Transportation Systems

Despite the retrofits and improvements in design that were made between the 1971 San Fernando earthquake and this 1994 event, some freeway overpasses collapsed and other portions of the highway system failed. Most of the bridges that were severely damaged were designed prior to the changes instituted as a result of the San Fernando (1971) and Loma Prieta (1989) earthquakes. Bridges designed and built after the late 1970s performed relatively well. The direct cost to repair damaged freeway structures was over $350 million.

Communications

Communications failures during this disaster resulted in breakdowns in service, misunderstandings, lack of information for making decisions, and, in some cases, loss of lives and property. Emergency and normal communications systems were disrupted by damage, loss of electrical power, increased call volume, and call convergence into and out of the affected area. The disruption ranged from delayed dial tones to nonfunctional radio systems. Cellular phones worked well, but experienced overload. Radio communication among various police and fire agencies was hampered by too few mutual-aid channels, incompatibility of dissimilar radio systems, and the use of exclusive frequency bands.

Many hospital radios and phones did not work, requiring the Los Angeles Fire Department to send runners and fire units to determine the status of hospitals; paramedic and emergency medical services in the San Fernando Valley had communication problems; the Los Angeles County Medic Alert Center broke down; the hospital emergency administrative radio system was inoperable in the area of greatest earthquake impact; and Reddi-Net, a computerized system owned by the Hospital Council of Southern California that links 86 hospitals, failed. Equipment damage and lack of employee training took their toll.

Electricity

About two million customers in the Los Angeles area lost electric power following the earthquake. Although power to most customers was restored, those near the epicenter, including hospitals and police and fire stations, were without power. Electric utilities made significant progress in “hardening” their generating and distribution facilities as a result of lessons learned in the San Fernando, Loma Prieta, and other earthquakes, but this event presented new problems. For the first time, transmission towers were toppled at a few locations. Power was restored to most of the region within one day, and the hardest-hit areas within three days.

Gas

Damage to natural-gas transmission and distribution system caused fires—including a spectacular fire on a major thoroughfare—and interrupted service. The earthquake demonstrated that some older pipelines are vulnerable to failure in areas of ground deformation, but that newer pipelines fared well. Because gas-related fires are a major source of losses, efforts to minimize losses and control leaks are important.

Water

Damage to the area's water supply systems (which are fed from Northern California and the Colorado River), as well as to distribution lines, interrupted supplies and hampered firefighting. The earthquake damaged five major aqueducts, disrupting the supply from the north. These pipelines serve treatment facilities that prepare water for the areas of Santa Clarita, Simi Valley, and the San Fernando Valley. As was the case following the 1971 San Fernando earthquake, significant repairs were also required on local water distribution systems. Water was unavailable to some of the areas hardest hit by the earthquake for several weeks.

The Economy

The $20 billion in losses that often has been quoted as the cost of the Northridge earthquake covers, primarily, the physical damage to structures and lifelines. It does not include many of the costs related to loss of use, loss of business, loss of productivity, and relocation of businesses. Though they are significant, these losses are often overlooked. It was estimated that the loss of use of parts of the transportation system following the earthquake cost $65 billion in delays and lost productivity.

Overall productivity losses in the Los Angeles area in the days following the earthquake were estimated at $1 billion (Romero, 1994). Indirect economic effects such as loss of tax revenue, short- and long-term loss of productivity, and ripple effects such as foreclosures, abandonment of equity, and redistribution of commercial activities are extremely difficult to calculate with any degree of accuracy. Such imprecision doesn't lessen the impact, especially to the victims.

Loss of business is creating major problems in some areas, where these businesses provided both needed services and jobs. Although some businesses, trades, and professions are seeing an increase in demand for their services and products, fueled in part by government grants, low-interest loans, and other assistance, many small businesses remain closed or are struggling because the nearby residential properties that housed their normal customer base remain vacant. Nine months after the earthquake, nearly 50 percent of the small businesses in the most heavily affected area of Northridge were still not open. The commercial district in Fillmore and many commercial properties in communities from the San Fernando Valley to Santa Monica still awaited repairs.

Insured losses exceeded insurance industry expectations, illustrating the importance of reducing earthquake risk. The California Department of Insurance estimates that over 300,000 claims for earthquake damage repair had been filed as of October 1, 1994. The size of individual claims from the Northridge earthquake has been, on average, two or three times greater than claims from previous earthquakes. Insurance companies expected to pay approximately $11 billion in claims, and some have been driven to the brink of insolvency. Many insurance companies, believing their earthquake insurance risk exceeds their ability to pay future claims, have moved to limit the number of policies written for earthquake and homeowners' coverage in California. Lasting effects will be felt in terms of the availability of insurance, the amount paid for premiums, and the quality of coverage.

Geologic and Geotechnical Aspects of the Northridge Earthquake

The Northridge earthquake occurred at a depth of approximately 9 miles beneath the earth's surface on a buried, or "blind," thrust fault. It produced intense shaking and caused extensive damage that reaffirmed the potential risk from this type of fault—and the need to mitigate that risk.

The earthquake was the most recorded earthquake that has ever occurred in California. Strong-motion instrument recordings were obtained at 257 sites. Over 11,000 aftershocks have been recorded by these instruments. By maintaining and enhancing data collection programs and identifying areas that have faults capable of causing earthquakes, California can learn to better reduce its seismic risk.

The Northridge earthquake also caused secondary hazards, the most prominent of which was localized amplifications of the ground motion caused by local geologic conditions. The identification and mitigation of secondary hazards, such as landslides, liquefaction, and areas that may amplify shaking, need to be integrated into land-use planning programs, building codes, and engineering practices.

The Northridge earthquake provided many geologic, seismologic, and geotechnical data sets that are still being compiled and analyzed. A significant value of the Northridge earthquake data is their use in the development and calibration of methods for assessing seismic hazards for planning and engineering applications. For example, the Northridge event occurred on a buried fault, highlighting the need to characterize and include earthquakes on this type of fault in the analysis of the ground motion component of the overall seismic hazard. It also reaffirmed that most of the hazard associated with earthquakes typically comes from strong shaking.

Strong Ground Motion

The Northridge earthquake was a moderate earthquake that produced strong ground motions and intense shaking. The term "moderate" describes the magnitude of the earthquake, which in this case was 6.7. Moderate earthquakes (less than magnitude 7.0) generally produce localized shaking of intensity (that is, amplitude of motion and frequency content) on stiff structures similar to that of major earthquakes (magnitudes of 7.0 and above). However, a more extensive area experiences intense shaking in a higher-magnitude earthquake, and the duration of the shaking—the length of time the strong motion lasts—generally increases with increases in magnitude. Since a higher-magnitude earthquake affects a larger area and lasts longer, it can be expected to cause greater damage.

A number of factors affect the amount of damage to structures in an earthquake, but the intensity of shaking is of paramount importance. Shaking intensity is affected by the magnitude of the earthquake, its style of faulting, local geologic conditions, proximity to the fault rupture, and the rupture geometry along the fault. The Northridge earthquake's strong-motion records reveal extensive information about the nature of the shaking, including acceleration, velocity, displacement, duration, and frequency; the consensus of earth scientists and geotechnical engineers is that the earthquake's motions were not unusual for a thrust-fault earthquake of this magnitude.

However, this earthquake clearly points out the importance of near-source effects and local geologic conditions on shaking intensity, and the need to incorporate these phenomena in seismic design and construction.

Accelerations

Peak accelerations, which are not necessarily the best measurement for correlating ground motion with the forces in structures, typically ranged from 0.4g to 0.8g in the regions that suffered significant damage. Recorded peak horizontal accelerations typically ranged between 0.1g and 0.5g at distances between 12 and 30 miles from the rupture zone, although some higher accelerations were recorded due to local

geologic or topographic conditions. Horizontal accelerations exceeding 0.9g were recorded in the San Fernando Valley and in Santa Monica, nearly 14 miles away from the epicenter. The highest recorded free-field accelerations, 1.82g horizontal and 1.18g vertical, were at the Cedar Hill Nursery in Tarzana, 3 miles south and west of the epicenter. Instruments near an abutment to the Pacoima Dam recorded peak accelerations of 2.3g horizontal and 1.5g vertical, although the free-field accelerations on alluvial materials near the base of the dam were less than 0.5g.

There was initial speculation that much of the damage in the Northridge earthquake was caused by abnormally high vertical accelerations. Although vertical accelerations were high in some locations, so was the horizontal acceleration. The ratio of vertical to horizontal acceleration was consistent with previously recorded data. Modern building codes are based on assumptions that the maximum vertical accelerations will be two-thirds of the peak horizontal acceleration. An analysis of Northridge records indicates that, although this ratio was exceeded at a number of locations, on average, it held true (Shakal et al., 1994). The commission has not received evidence that vertical accelerations played an unusual role in the damage caused by the Northridge earthquake.

Velocity and Displacement

The intensity of shaking is typically described by acceleration recordings. The Northridge earthquake also produced high velocities and displacements not described in acceleration data. A velocity of 56 inches per second was recorded in a parking lot at the Sylmar County Hospital, and a velocity of 72 inches per second was recorded at the Rinaldi receiving station. Peak velocity is important because it is a good indicator of an earthquake's demand potential (or energy) on multistory structures.

Ground displacement also is a significant factor in the design of structures, especially for seismically isolated structures. Ground displacement of 31 inches was measured at the Sylmar County Hospital parking lot. Base-isolated structures are normally separated from the surrounding soil to allow room for movement. Although seismically isolated structures are isolated from high-frequency shaking during an earthquake, they may collide with building foundation stops or barriers if actual displacements exceed the anticipated or design displacements. Such collisions would result in high impact forces that can cause significant damage and even collapse.

Near-Source Effects

The near-source region of an earthquake can be defined as the region within several miles of where the projection of the fault rupture plane meets the ground surface. Within this region, the ground motion may be characterized by pulses of high velocity that are potentially damaging to certain types of structures. The near-source area in a strike-slip earthquake would have a different shape (generally longer and narrower, extending on both sides of the fault rupture for the length of the rupture), and the nature of the near-source strong motion would also vary, depending on other non-source effects such as local geologic conditions.

Although seismologists have known of the influence of near-source effects on seismic shaking for some time, near-source effects first gained the interest of California engineers following the 1971 San Fernando earthquake. Failure of the Olive View Hospital in 1971 was attributed, in part, to a large, long-period near-source "seismic pulse." Near-source effects have been considered in the design of some critical facilities for a number of years. However, the implications of near-source effects have only recently been studied for use in the design of conventional structures because previous earthquakes have not struck well-instrumented urbanized areas and, therefore, produced few recorded motions from areas close to the source. At present, near-source effects are not explicitly considered in the building codes except for seismically isolated structures.

Near-source effects of engineering interest are related to the direction and mechanics of the fault rupture. The numerous localized, relatively rapid failures of "patches" of the fault surface causes significant high-frequency motion and allows permanent coseismal displacement of the fault and surrounding area. Known as source-effect phenomena, these factors affect the amplitude and frequency content of shaking.

Of critical importance to the design of engineered structures is that near-source effects, combined with local geologic effects, can adversely alter the seismic performance of a wide range of structures, including high-rise and base-isolated buildings. Data recorded during the Northridge earthquake clearly indicate the need to incorporate measures to mitigate this hazard in building codes. High-velocity pulses in the near-source area are believed by some to be a cause of much of the damage. These pulses were the largest in the northern San Fernando Valley and Santa Susana Mountains. They were also significant in the southern San Fernando Valley.

Duration of Strong Motion

The longer ground shaking lasts, the greater the damage to structures, natural slopes, and fills. When strong shaking ceases, there is a reasonable possibility that the damage will not continue. However, if the shaking continues after damage has been initiated, structures will continue to degrade and may eventually collapse. Damage caused by seismic consolidation and liquefaction also increases as duration increases. The duration of intense shaking during the Northridge earthquake was relatively short, on the order of nine seconds or less. Had the earthquake's magnitude been larger, there is little doubt that the strong shaking would have lasted longer and the damage would have been greater. Strong shaking has lasted minutes in some other events.

The duration of intense shaking, like near-source effects, is not explicitly considered in our building codes. Because an urbanized area of California has not yet been exposed to long-duration near-source effects, the effect of durations on various types of structures is not fully understood.

Response Spectra

Response spectra are graphs that display the response of structures to ground motion associated with earthquakes. A spectrum graphically depicts the variation of spectral accelerations (velocities or displacements) experienced by simple structures with different stiffness or periods of vibrations (expressed in seconds). Although some recorded accelerations in this earthquake were especially high, most spectra generally agreed with those recommended by site-specific geotechnical studies as the basis for the design of special structures. Similar response spectra have been calculated from data from numerous earthquakes since the 1971 San Fernando event, and should be expected in future events.

Engineers use design spectra to determine the design parameters to use when designing stuffier. The values of design spectra are not the same as those of response spectra computed from measured ground motion. Design spectra are modified from response spectra to reflect safety factors and the performance of materials and structural systems observed in past earthquakes.

Because of the damage from this earthquake, questions have been raised concerning the adequacy of the building code's definition of the forces that earthquakes can impose on buildings. Code writers and designers know that code spectral values will likely be exceeded in large earthquakes, and that this was anticipated when the code was written.

The recorded data from the Northridge earthquake are still being evaluated, and are subject to different interpretations. Strong-motion instruments also were not located in many of the areas that suffered the most severe damage. Generally speaking, the motions recorded near the Northridge epicenter were compatible with those used as the basis for the code, but the motions exceeded those assumed in the code in some cases. At some locations, particularly in the near-source areas and in areas with unique

local geology, shaking exceeded the assumptions underlying design values in the short- to mid-period range. This shaking appears to have affected low- and mid-rise buildings and caused response in higher modes of vibration for tall buildings. Velocity- and displacement-sensitive structures also may have been affected by the velocity pulses described earlier. Near-source and local geological effects must be considered in the design of structures. There is no compelling evidence that changes to the code's assumed force levels are necessary. However, changes are necessary regarding the treatment of effects of near-source and local geologic conditions.

Strong-Motion Instrumentation

The timely release of strong-motion data, especially during the days immediately following an earthquake, is invaluable to building owners, emergency responders, and those who will revise codes and design practices. Much of the evidence of an earthquake's effects disappears quickly as demolition, repair, and reconstruction take place. The opportunity to compare building performance and earthquake effects with actual motion data helps practicing engineers and researchers understand their observations, which in turn helps strengthen building codes and reduce future earthquake damage.

The Strong Motion Instrumentation Program (SMIP) proved its worth during this earthquake and its aftermath. Within a day of the main shock, SMIP had issued a "Quick Report" containing copies of strong-motion records obtained by 4 of its stations; copies of records for 9 additional stations were released the following day. By the third day, copies of records for 28 stations had been made available, and by January 25, five quick reports had been released, providing peak acceleration data for 68 stations. In mid-February, SMIP issued a report containing pertinent station information, known geologic site conditions, peak acceleration data, and traces of recordings from 193 stations. SMIP also processed significant records rapidly and released processed data from 5 stations during the first week of February; additional releases followed at three- to four-week intervals. Processed data for more than 70 stations were released by December 1994. The timeliness and quality of these data made them extremely valuable.

The U.S. Geological Survey (USGS), utilities, dam owners, and researchers funded by the National Science Foundation (NSF) operate networks of hundreds of free-field and structural strong-motion instruments scattered throughout California. A considerable public investment has been made in developing and maintaining USGS- and NSF-funded strong-motion networks. For example, the USGS strong-motion network in Southern California consists of nearly 100 stations, while the University of Southern California network originally consisted of 80 free-field stations. Many of these instruments are old analog-type devices; the data they collect require considerable processing before they can be used. Because these arrays complement the SMIP instruments and record motion in different areas, data from these networks are vital to understanding the distribution and severity of shaking resulting from the earthquake. The USGS released photocopies of records obtained from 150 individual accelographs in February 1994. However, data from the USGS- and NSF-funded networks were not processed in a timely manner following the Northridge earthquake.

USGS data were released to the scientific and engineering community in December 1994, but NSF-funded data were not released as of that date. This situation is unacceptable; a mechanism is urgently needed to correct this problem.

Reference Stations

Most free-field strong-motion stations were installed in locations near active faults to collect data for use in understanding the physics of earthquakes to be better able to estimate ground motion in future earthquakes. Such studies are vital to an understanding of the earthquake processes, and such instrument deployments need to continue. However, there is also an urgent need for free-field strong-motion data as references to establish the levels of ground shaking experienced by buildings and other

structures. Without such data, engineers cannot assess whether buildings performed as intended, and determine the changes needed in codes and design practices to improve performance. For example, there were few free-field instruments in the immediate vicinity of damaged steel-frame buildings, so the levels and character of shaking experienced by these buildings were not well understood. The lack of reliable ground-motion data makes it extremely difficult to understand the causes of these failures and find acceptable solutions. None of the existing programs is directed toward obtaining the reference ground-motion data that are needed.

Impact of Earthquakes in the County of Los Angeles

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Based on the risk assessment, it is evident that earthquakes will continue to have potentially devastating economic impacts to certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Severity

A major earthquake occurring in or near the County of Los Angeles could cause many deaths and injuries, extensive property damage, fires, hazardous material spills, and other dangers. Aftershocks and the secondary effects of fire, hazardous material/chemical accidents, and possible failure of dams and waterways could aggravate the situation.

The time of day and season of the year would have a profound impact on the number of dead and injured and the amount of property damage. Such an earthquake could exceed the response capabilities of the individual cities, the Los Angeles County Operational Area, and the State of California Emergency Management Agency. Support of damage control and disaster relief could be required from other local governments and private organizations, as well as the state and federal governments.

Extensive search and rescue operations could be required to assist trapped persons. Mass evacuation could be essential to save lives, particularly in areas downwind from hazardous material releases. Emergency medical care, food, and temporary shelter could be required by injured or displaced persons.

Many families could be separated, particularly if the earthquake occurs during working hours. A personal inquiry or locator system could be essential to maintain morale. Emergency operations could be seriously hampered by a loss of communications, damage to transportation routes, and/or disruption of public utilities and services.

The economic impact on the county would be catastrophic in terms of lost employment and lost tax base. A major earthquake could disrupt, damage, or destroy computer facilities, which could curtail the operations of banks, insurance companies, and other elements of the financial community for several days or weeks. This could affect the ability of local government, business, and residents to make payments and purchases. (Source: California Division of Mines and Geology, Special Publication 60, *Earthquake Planning Scenario for a Magnitude 8.3 Earthquake on the San Andreas Fault in Southern California*, 1982.)

Earthquake Hazard Assessment

Hazard Identification

The 2007 Working Group on California Earthquake Probabilities (WGCEP 2007), a multidisciplinary collaboration of scientists and engineers, has released the Uniform California Earthquake Rupture Forecast (UCERF), the first comprehensive framework for comparing earthquake possibilities throughout California. In developing the UCERF, the 2007 working group revised earlier forecasts for Southern California (WGCEP 1995) and the San Francisco Bay Area (WGCEP 2003) by incorporating new data on active faults and an improved scientific understanding of how faults rupture to produce large earthquakes. It extended the forecast across the entire state using a uniform methodology, allowing, for the first time, meaningful comparisons of earthquake probabilities in urbanized areas such as Los Angeles and the San Francisco Bay Area, as well as comparisons among the large faults in different parts of the state. The study was organized by the Southern California Earthquake Center, the U.S. Geological Survey, and the California Geological Survey, and it received major support from the California Earthquake Authority, which is responsible for setting earthquake insurance rates statewide. According to the new forecast, California has a 99.7% chance of having a magnitude 6.7 or larger earthquake during the next 30 years. The likelihood of an even more powerful quake of magnitude 7.5 or greater in the next 30 years is 46%.

Map 5-2: California Area Earthquake Probabilities illustrates the probability that an earthquake of various magnitudes will occur in California within 30 years. Such a quake is more likely to occur in the southern half of the state, a 37% chance in 30 years, than in the northern half, with a 15% chance in 30 years.

The probability of a magnitude 6.7 or larger earthquake over the next 30 years striking the greater Los Angeles area is 67%. For the entire California region, the fault with the highest probability of generating at least one magnitude 6.7 quake or larger is the southern San Andreas, 59% in the next 30 years.

Map 5-3: California Faults illustrates the probability that a rupture of a major fault will occur within California that will result in an earthquake of a magnitude 6.7 or greater within 30 years (Source: Southern California Earthquake Data Center).

Several major active faults exist in Los Angeles County, including the San Andreas, Newport-Inglewood, Elsinore, San Joaquin Hills Fault, Whittier, and Norwalk. The County of Los Angeles is situated between multiple major, active fault zones; the San Andreas Fault, the Newport-Inglewood Fault, the Norwalk Fault, the San Jacinto Fault, and the Whittier-Elsinore Fault (Map 5-4: Southern California Earthquake Fault Map).

Map 5-4: Southern California Earthquake Fault Map plots the various major faults in Southern California. In California, many agencies are focused on seismic safety issues: the state's Seismic Safety Commission, the Applied Technology Council, the California Emergency Management Agency, the United States Geological Survey, Cal Tech, the California Geological Survey, and a number of universities and private foundations.

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake-induced landslides. Seismic hazard maps have been published and are available for many communities in California through the state Division of Mines and Geology.

Vulnerability Assessment

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of the Southern California region would probably be felt throughout the region. However, the degree to which the earthquakes are felt, and the damages associated with them, may vary. At risk from earthquake damage are large stocks of old buildings and bridges: many high-tech and hazardous materials facilities: extensive sewer, water, and natural gas pipelines; earthen dams; petroleum pipelines; and other critical facilities and private property located in the county. The relative or secondary earthquake hazards, which are liquefaction, ground shaking, amplification, and earthquake-induced landslides, are just as devastating as the earthquake.

Risk Analysis

Risk analysis is the third phase of a hazard assessment. Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time. Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the region due to an earthquake event in a specific location. FEMA's software program, HAZUS, uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, and other information to estimate losses from a potential earthquake. The HAZUS software is available from FEMA at no cost.

HAZUS Data Sources

Geographical information systems (GIS) street centerline data—and city boundary and location mapping data for police and fire stations, schools, and hospitals—was provided by the County of Los Angeles GIS

Department, in Environmental Systems Research Institute (ESRI) geodatabase and shapefile format. GIS data is referenced to the California State Plane Coordinate System Zone 5 (US Feet), NAD83 datum.

Earthquake scenario shake maps were provided by the USGS. Land topography information was derived from digital elevation models (DEMs) provided by the USGS.

For the greater Southern California area there are multiple worst-case scenarios, depending on which fault might rupture and which communities are in proximity to the fault. Damage will not necessarily be limited to immediately adjoining communities. Depending on the hypocenter of the earthquake, seismic waves may be transmitted through the ground to unwary communities. In the 1994 Northridge earthquake, Santa Monica suffered extensive damage, even though there was a range of mountains between it and the origin of the earthquake.

Damages from a large earthquake almost anywhere in Southern California are likely to run into the billions of dollars. Although building codes are some of the most stringent in the world, tens of thousands of older buildings were built under less rigid codes. California has laws affecting unreinforced masonry buildings (URMs), and although many building owners have retrofitted their buildings, hundreds of pre-1933 buildings have not been brought up to current standards.

Nonstructural bracing of equipment and contents is often the most cost-effective type of seismic mitigation. Inexpensive bracing and anchoring may be the most cost-effective way to protect expensive equipment. Nonstructural bracing of equipment and furnishings also reduces the chance of injury for the occupants of a building.

Significant Geologic Features

The major faults that have the potential to affect the greater County of Los Angeles region are the following:

- ✓ San Andreas Fault (runs through the northern half of the County of Los Angeles)
- ✓ Newport-Inglewood Fault (runs through the southern part of the County of Los Angeles)
- ✓ Palos Verde Fault (runs through the southern part of the County of Los Angeles)
- ✓ San Jacinto Fault (runs east of the County of Los Angeles)
- ✓ Whittier-Elsinore Fault Zone (runs just southeast of the County of Los Angeles)
- ✓ Norwalk Fault (runs just southeast of the County of Los Angeles)

Southern California has a history of powerful and relatively frequent earthquakes, dating back to the powerful magnitude 8.0+ 1857 San Andreas earthquake, which did substantial damage to the relatively few buildings that existed at the time.

Paleoseismological research indicates that large-magnitude (8.0+) earthquakes occur on the San Andreas Fault at intervals between 45 and 332 years, with an average interval of 140 years. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the 1933 Long Beach earthquake, the 1971 San Fernando earthquake, the 1987 Whittier earthquake, and the 1994 Northridge earthquake.

In addition, many areas in Southern California have sandy soils that are subject to liquefaction. The County of Los Angeles has potential landslide and liquefaction zones located throughout the county.

Following major earthquakes, extensive search and rescue operations may be required to assist trapped or injured persons. Emergency medical care, food, and temporary shelter would be required for injured or displaced persons. In the event of a truly catastrophic earthquake, identification and burial of the dead would pose difficult problems. Mass evacuation may be essential to save lives, particularly in areas below dams. Many families could be separated, particularly if the earthquake should occur during working hours, and a personal inquiry or locator system would be essential to maintain morale.

Emergency operations could be seriously hampered by the loss of communications and damage to transportation routes within, and to and from, the disaster area, and by the disruption of public utilities and services.

Extensive federal assistance could be required, and the need could continue for an extended period. Efforts would be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population, including temporary housing for displaced persons.

In general, the population is less at risk during non-work hours (if at home), as wood-frame structures are relatively less vulnerable to major structural damage than are typical commercial and industrial buildings. Transportation problems are intensified if an earthquake occurs during work hours, as significant numbers of employees would be stranded throughout the county. An earthquake occurring during work hours would clearly create major transportation problems for those displaced workers.

In addition to the loss of production capabilities, the economic impact on the county from a major earthquake would be considerable in terms of loss of employment and loss of tax base. Also, a major earthquake could cause serious damage and outages to computer facilities. The loss of such facilities could curtail or seriously disrupt the operations of banks, insurance companies, and other elements of the financial community. In turn, this could affect the ability of local government, business, and the population to make payments and purchases.

The San Andreas is only one of dozens of known earthquake faults that crisscross Southern California. Some of the better known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, Puente Hills, and Palos Verdes Faults. Beyond the known faults, there are a potentially large number of “blind” faults that underlie the surface of Southern California. One such blind fault was involved in the October 1987 Whittier-Narrows earthquake.

Although the most famous of the faults, the San Andreas, is capable of producing an earthquake with a moment magnitude of greater than 8, some of the “lesser” faults have the potential to inflict greater damage on the urban core of Southern California.

Table 5-3: Principal Active Faults in Los Angeles County

Fault	Maximum Moment Magnitude Earthquake
Elsinore-Whittier	6.8
Elsinore-Glen Ivy	6.8
Chino-Central Avenue	6.7
Newport-Inglewood (L.A. Basin)	6.9

Fault	Maximum Moment Magnitude Earthquake
Newport-Inglewood (offshore)	6.9
Palos Verdes	7.1
Raymond	6.5
Verdugo	6.7
Clamshell-Sawpit	6.5
Hollywood	6.5
San Jacinto–San Bernardino	6.7
San Jacinto–San Jacinto Valley	6.9
Santa Monica	6.6
San Andreas–Southern	7.4
Malibu Coast	6.7
San Andreas–1857 Rupture	7.8
Cleghorn	6.5
Sierra Madre (San Fernando)	6.7
San Gabriel	7.0
North Frontal Fault Zone (West)	7.0

Local Conditions

Major active fault zones are located throughout the county. According to the 1997 UBC, and the 1998 CBC, the County of Los Angeles is within Seismic Zone 4.

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending roughly northwest. Major fault systems include the active San Andreas, San Jacinto, Whittier-Elsinore, and Newport-Inglewood Fault Zones.

These major fault systems form a regional tectonic framework consisting primarily of right-lateral, strike-slip movement.

Historic Earthquakes in Southern California

Historically, the County of Los Angeles has generally been spared a major destructive earthquake. However, based on a search of earthquake databases of the United States Geological Survey (USGS) - National Earthquake Information Center (NEIC), several major earthquakes (magnitude 6.0 or more) have been recorded within approximately 100 kilometers of the project area since 1769. Table 5-4: Historical Earthquakes near Los Angeles County summarizes the approximate magnitude of these seismic events.

Table 5-4: Historical Earthquakes near Los Angeles County
(Source: http://earthquake.usgs.gov/regional/sca/ca_eqs.php)

Date	Location	Maximum Magnitude (M)*
7/28/1769	Los Angeles Basin	6.0
11/22/1800	San Diego Region	6.5
12/8/1812	Wrightwood	7.0
7/11/1855	Los Angeles Region	6.0
12/16/1858	San Bernardino Region	6.0
7/30/1894	Lytle Creek Region	6.0
4/21/l918	San Jacinto	6.9
7/23/1923	San Bernardino Region	6.0
3/11/1933	Long Beach	6.3
2/9/1971	San Fernando	6.5
10/1/1987	Whittier Narrows	5.8
1/17/1994	Northridge	6.7

** Magnitudes listed are "summary magnitudes". Prior to 1898, these are adjusted-intensity magnitudes; after 1898, they are surface wave magnitudes (www.pasadena.wr.usgs.gov).*

Earthquake-Related Hazards

Earthquake-Induced Landslide Potential

Generally, these types of failures consist of rock falls, disrupted soil slides, rock slides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides generally occur in areas of previous landslide movement, or where local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements.

Areas considered for earthquake-induced landslides are shown on various maps below labeled "Seismic Hazard Zones." The landslide potential zones were compiled from the State of California. Mapped earthquake-induced landslide potential zones are intended to prompt more detailed, site-specific geotechnical studies, as required by the Seismic Hazard Mapping Act.

Earthquake-Induced Landslides

Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond to and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

Earthquake Probable Events

Following is a list of regional faults and associated data. (Source: Southern California Earthquake Data Center)

Elsinore Fault Zone

TYPE OF FAULTING: right-lateral strike-slip
LENGTH: about 180 km (not including the Whittier, Chino, and Laguna Salada Faults)
NEARBY COMMUNITIES: Temecula, Lake Elsinore, Julian
LAST MAJOR RUPTURE: May 15, 1910; Magnitude 6 – no surface rupture found
SLIP RATE: roughly 4.0 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: roughly 250 years
PROBABLE MAGNITUDES: M6.5 – 7.5
MOST RECENT SURFACE RUPTURE: 18th century A.D.(?)

Newport-Inglewood Fault Zone

TYPE OF FAULTING: right-lateral; local reverse slip associated with fault steps
LENGTH: 75 km
NEAREST COMMUNITIES: Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa
MOST RECENT MAJOR RUPTURE: March 10, 1933, MW6.4 (but no surface rupture)
SLIP RATE: 0.6 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M6.0 – 7.4
OTHER NOTES: Surface trace is discontinuous in the Los Angeles Basin, but the fault zone can easily be noted there by the existence of a chain of low hills extending from Culver City to Signal Hill. South of Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and becomes the Newport-Inglewood - Rose Canyon Fault Zone.

Palos Verdes Fault Zone

TYPE OF FAULT: right-reverse (?)
LENGTH: roughly 80 km
NEARBY COMMUNITIES: San Pedro, Palos Verdes Estates, Torrance, Redondo Beach
MOST RECENT SURFACE RUPTURE: Holocene, offshore; Late Quaternary, onshore
SLIP RATE: between 0.1 and 3.0 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M6.0 – 7.0 (or greater?); fault geometries may allow only partial rupture at any one time
OTHER NOTES: Has two main branches (see below). Continues southward as the Palos Verdes – Coronado Bank Fault Zone.

San Andreas Fault Zone

TYPE OF FAULT: right-lateral strike-slip
LENGTH: 1,200 km: 550 km south from Parkfield, 650 km northward
NEARBY COMMUNITY: Parkfield, Frazier Park, Palmdale, Wrightwood, San Bernardino, Banning, Indio
LAST MAJOR RUPTURE: January 9, 1857 (Mojave segment); April 18, 1906 (Northern segment)
SLIP RATE: about 20 to 35 mm per year
INTERVAL BETWEEN MAJOR RUPTURES: average of about 140 years on the Mojave segment; recurrence interval varies greatly—from under 20 years (at Parkfield only) to over 300 years
PROBABLE MAGNITUDES: M6.8 – 8.0

San Fernando Fault Zone

TYPE OF FAULTING: thrust
LENGTH: 17 km
NEAREST COMMUNITIES: San Fernando, Sunland
LAST MAJOR RUPTURE: February 9, 1971, M6.6
SLIP RATE: 5 mm/yr (?)
INTERVAL BETWEEN MAJOR RUPTURES: roughly 200 years
PROBABLE MAGNITUDES: M6.0 – 6.8
OTHER NOTES: Dip is to the north. The slip rate is not well known, but trenching studies indicate recurrence interval as between 100 and 300 years.

San Jacinto Fault Zone

TYPE OF FAULTING : right-lateral strike-slip; minor right-reverse
LENGTH: 210 km, including Coyote Creek Fault
NEARBY COMMUNITIES: Lytle Creek, San Bernardino, Loma Linda, San Jacinto, Hemet, Anza, Borrego Springs, Ocotillo Wells
MOST RECENT SURFACE RUPTURE: within the past few centuries; April 9, 1968, M6.5 on Coyote Creek segment
SLIP RATE: typically between 7 and 17 mm/yr
INTERVAL BETWEEN SURFACE RUPTURES: between 100 and 300 years, per segment
PROBABLE MAGNITUDES: M6.5 – 7.5

Sierra Madre Fault System

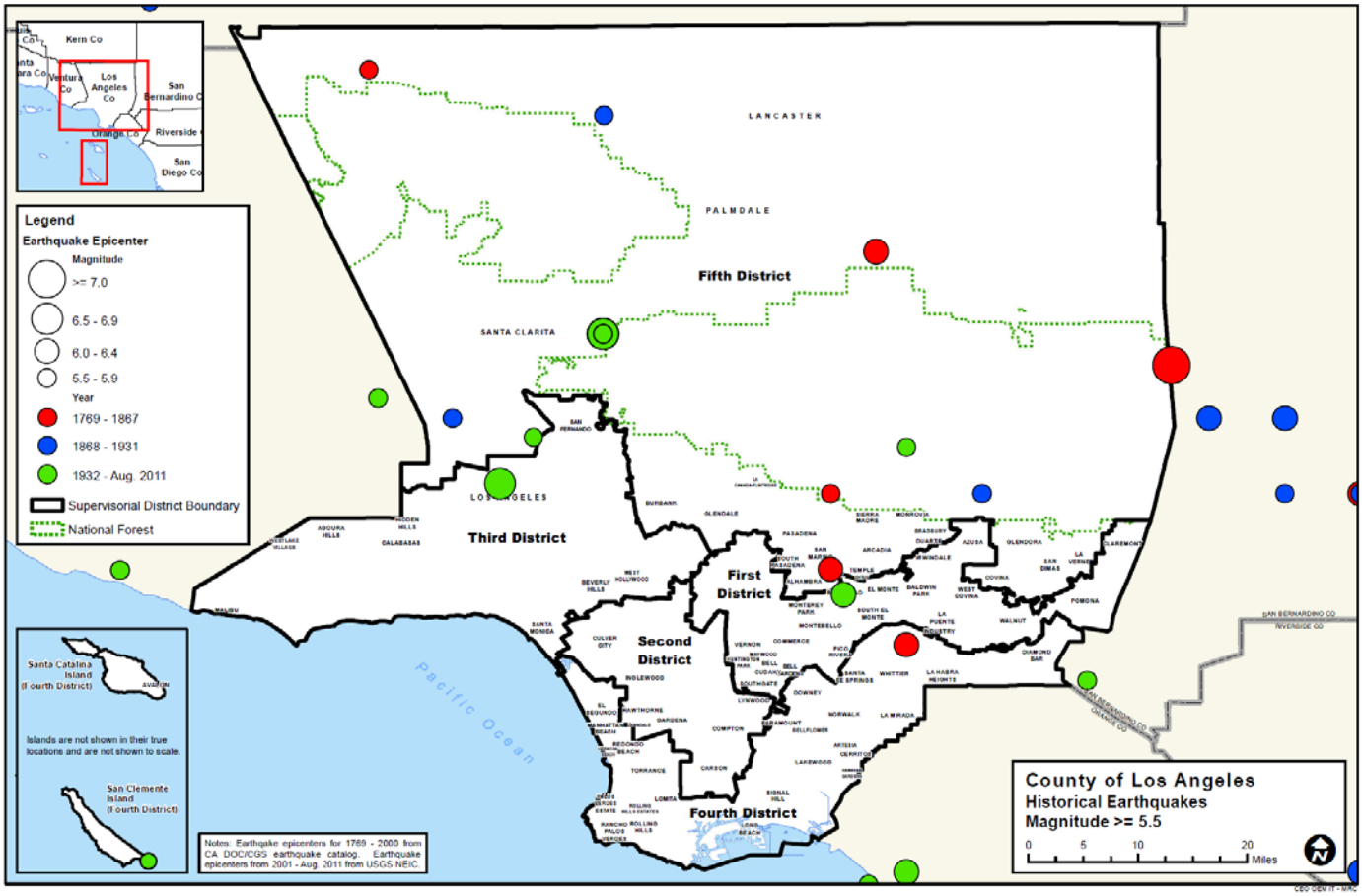
TYPE OF FAULTING: reverse
LENGTH: the zone is about 55 km long; total length of main fault segments is about 75 km, with each segment measuring roughly 15 km long
NEARBY COMMUNITIES: Sunland, Altadena, Sierra Madre, Monrovia, Duarte, Glendora
MOST RECENT SURFACE RUPTURE: Holocene
SLIP RATE: between 0.36 and 4 mm/yr
INTERVAL BETWEEN SURFACE RUPTURES: several thousand years (?)
PROBABLE MAGNITUDES: M6.0 – 7.0 (?)
OTHER NOTES: This fault zone dips to the north. It was not the fault responsible for the 1991 Sierra Madre earthquake.

Whittier Fault

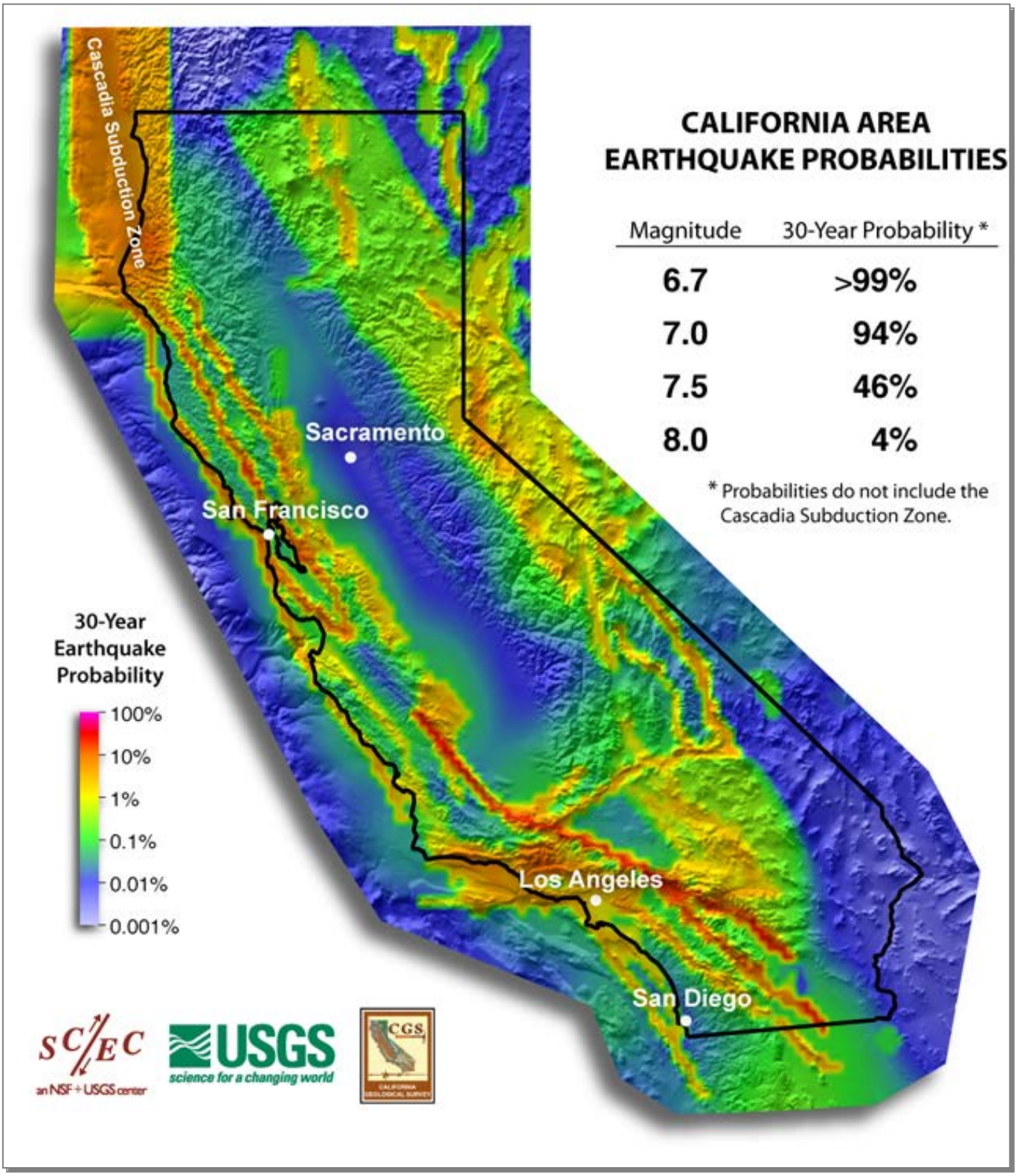
TYPE OF FAULTING: right-lateral strike-slip with some reverse slip
LENGTH: about 40 km
NEARBY COMMUNITIES: Yorba Linda, Hacienda Heights, Whittier
MOST RECENT SURFACE RUPTURE: Holocene
SLIP RATE: between 2.5 and 3.0 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M6.0 – 7.2
OTHER NOTES: The Whittier Fault dips toward the northeast.

Map 5-1: Historic Earthquake Epicenters

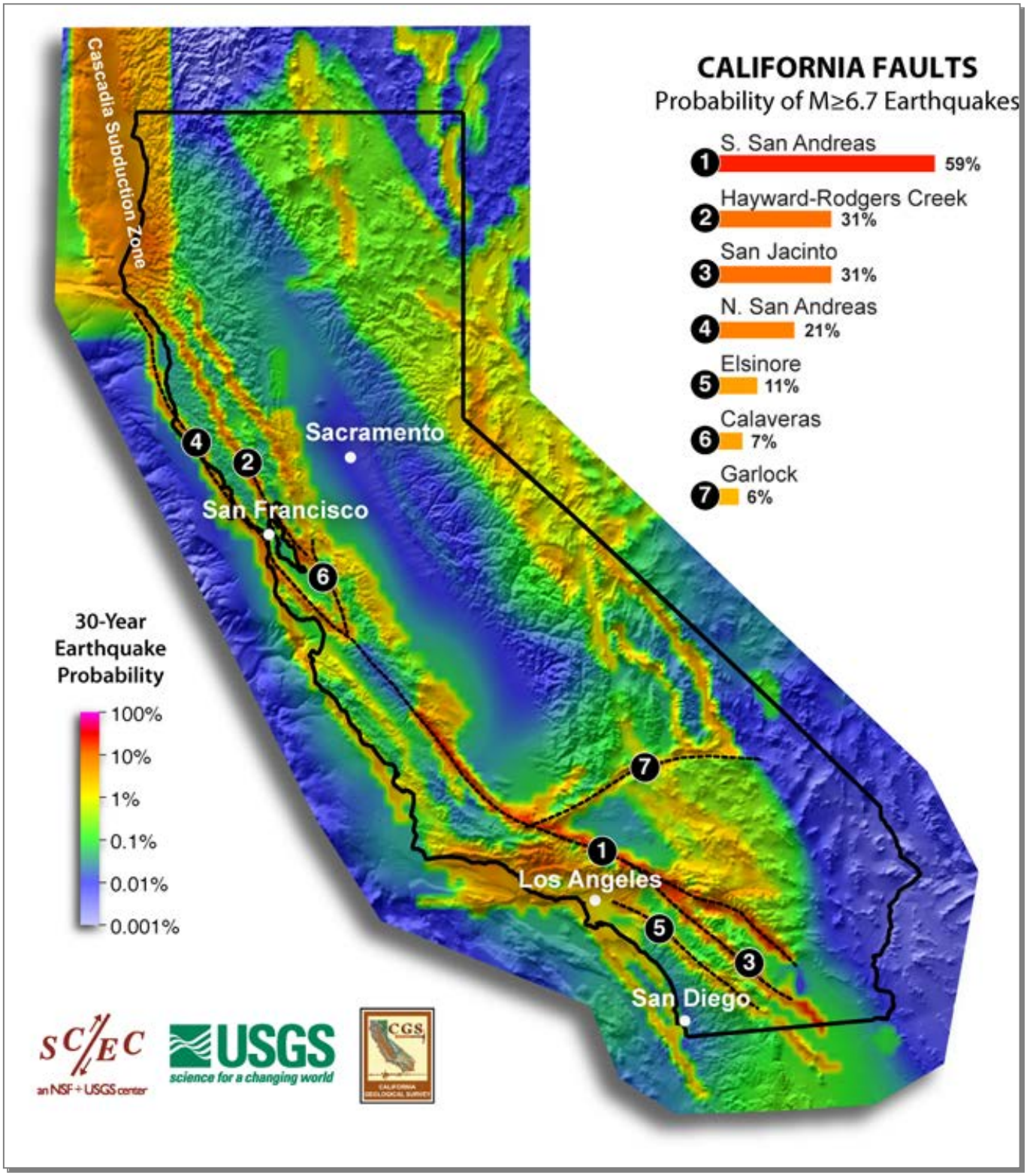
(Source: County of Los Angeles CEO ITS GIS Department)



Map 5-2: California Area Earthquake Probabilities
(Source: Southern California Earthquake Center, www.scec.org/ucerf)



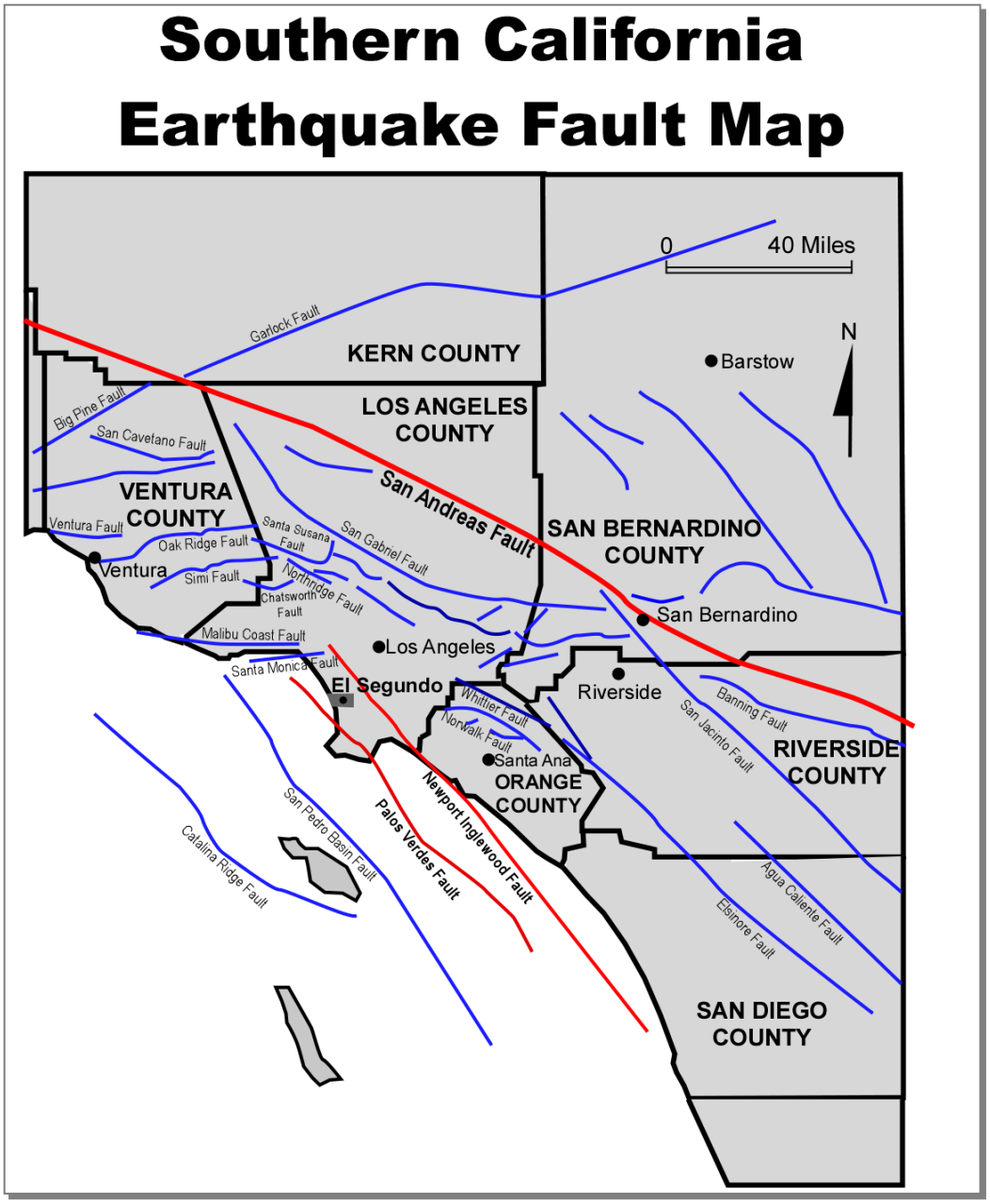
Map 5-3: California Faults
(Source: Southern California Earthquake Center, www.scec.org/ucerf)



Faults

Historical and geological records show that California has a long history of seismic events. Southern California is probably best known for the San Andreas Fault, a 400–mile-long fault running from the Mexican border to a point offshore, west of San Francisco. "Geologic studies show that over the past 1,400 to 1,500 years large earthquakes have occurred at about 130-year intervals on the southern San Andreas Fault. As the last large earthquake on the southern San Andreas occurred in 1857, that section of the fault is considered a likely location for an earthquake within the next few decades."

Map 5-4: Southern California Earthquake Fault Map



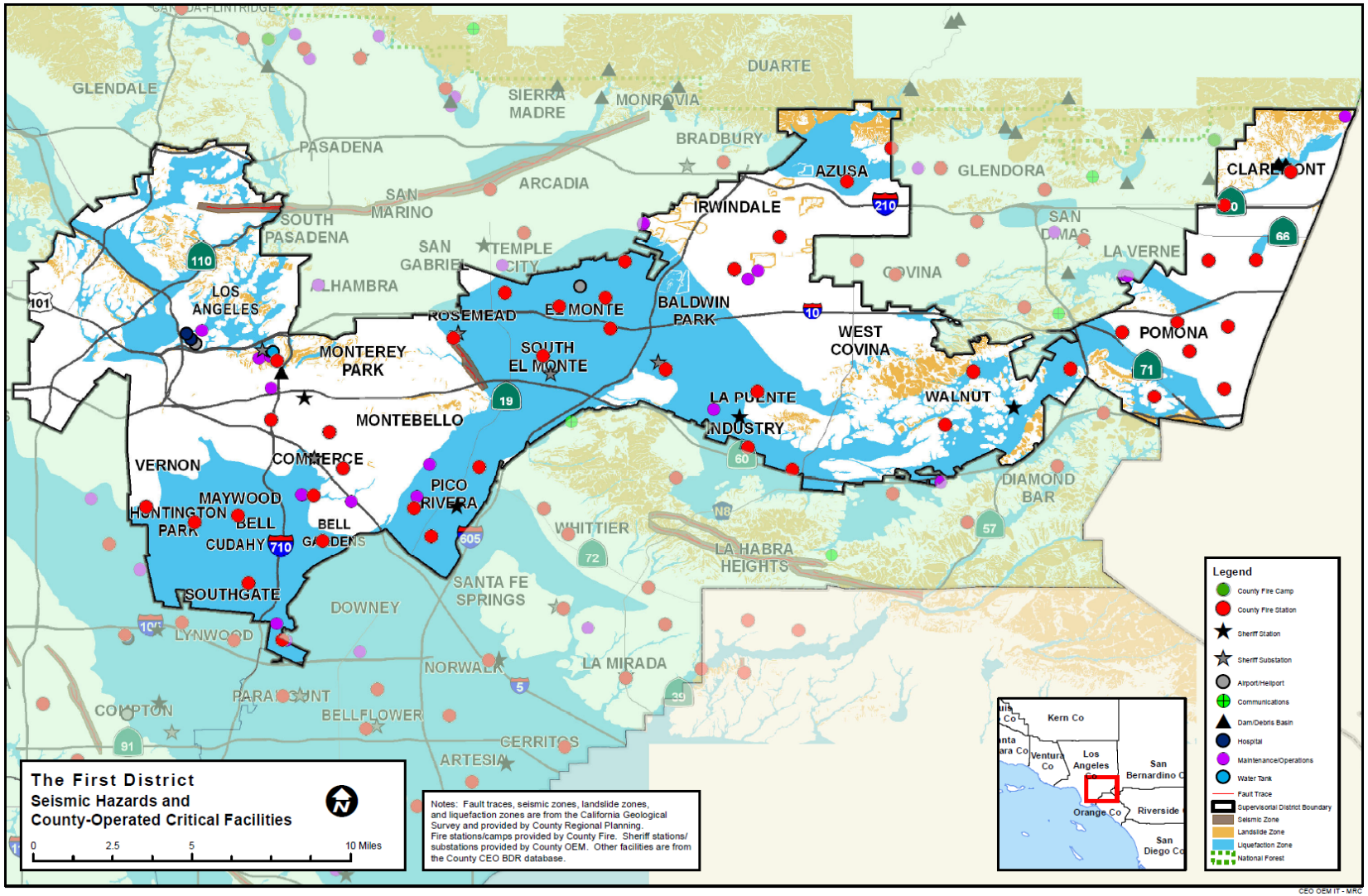
But the San Andreas is only one of dozens of known earthquake faults that crisscross Southern California. Some of the better known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, and Palos Verdes Faults. Beyond the known faults, there are a potentially large number of "blind" faults that underlie the surface of Southern California. One such blind fault was involved in the Whittier Narrows earthquake in October 1987.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey and universities to share research and educational efforts with Californians. Substantial earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake risk reduction, and have made significant contributions in reducing the adverse impacts of earthquakes. Despite the progress, the majority of California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

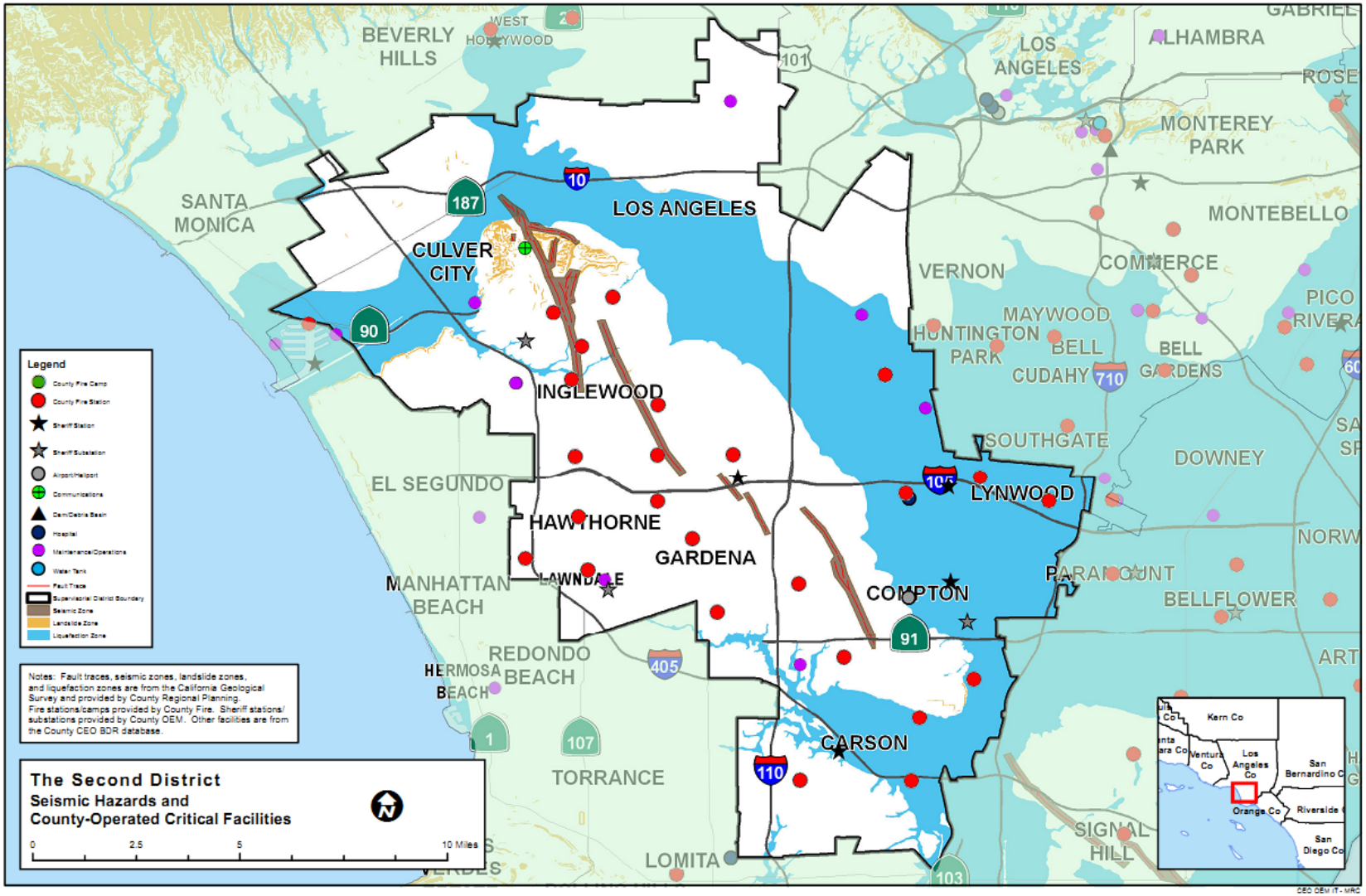
Seismic Hazard Maps

The State of California produces seismic hazard maps that indicate the location of earthquake-induced landslide areas, liquefaction-prone areas, and seismic zones (requiring special construction standards). The data from the seismic hazard maps were combined with locational data about county-owned critical facilities using FEMA HAZUS software. District-level "Seismic Hazard and County-Operated Critical Facilities" maps were completed by the County of Los Angeles Chief Executive Office – GIS Department.

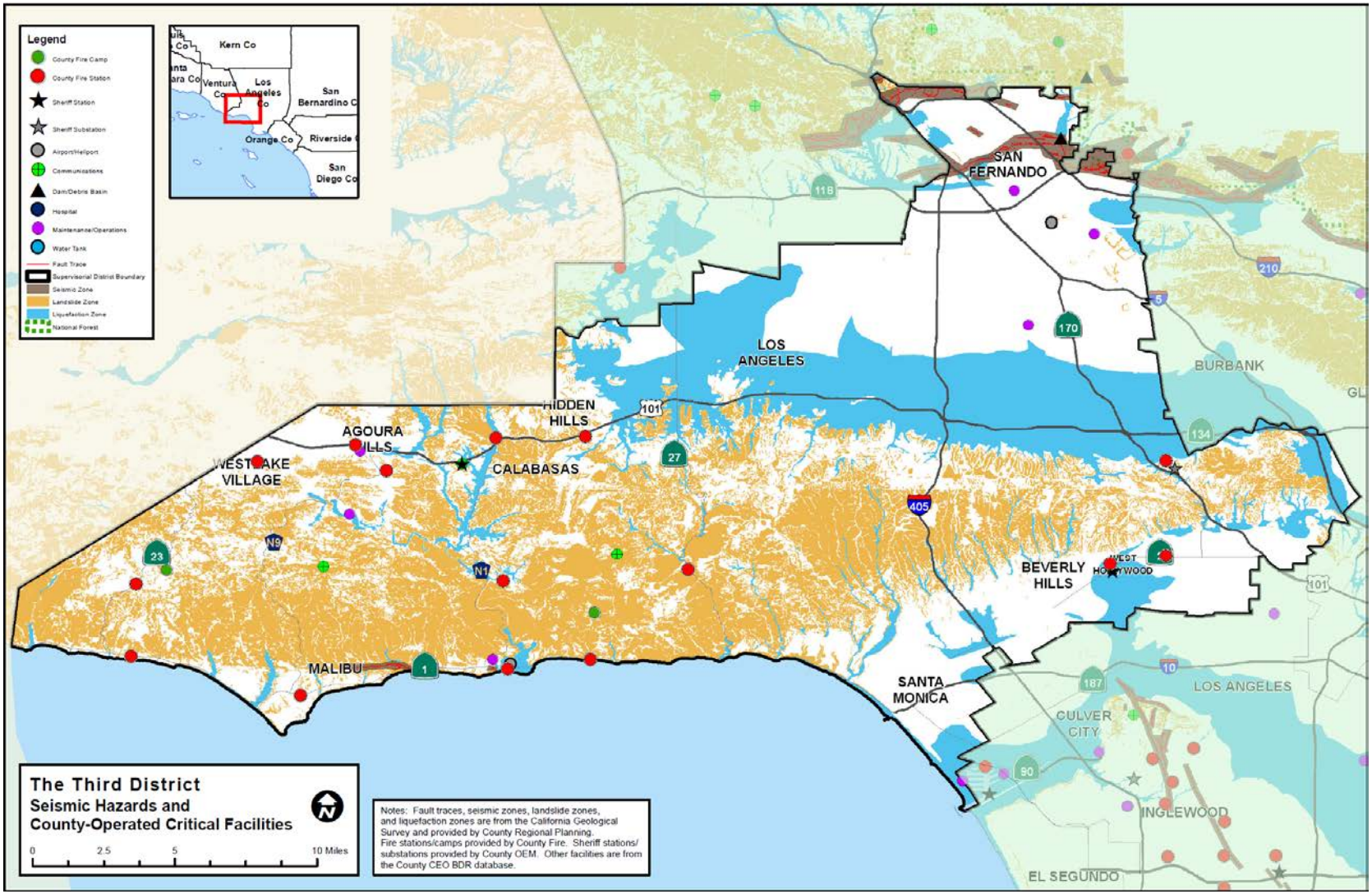
Map 5-5: Seismic Hazards and County-Operated Critical Facilities (Board of Supervisorial District 1)
(Source: County of Los Angeles CEO - ITS GIS)



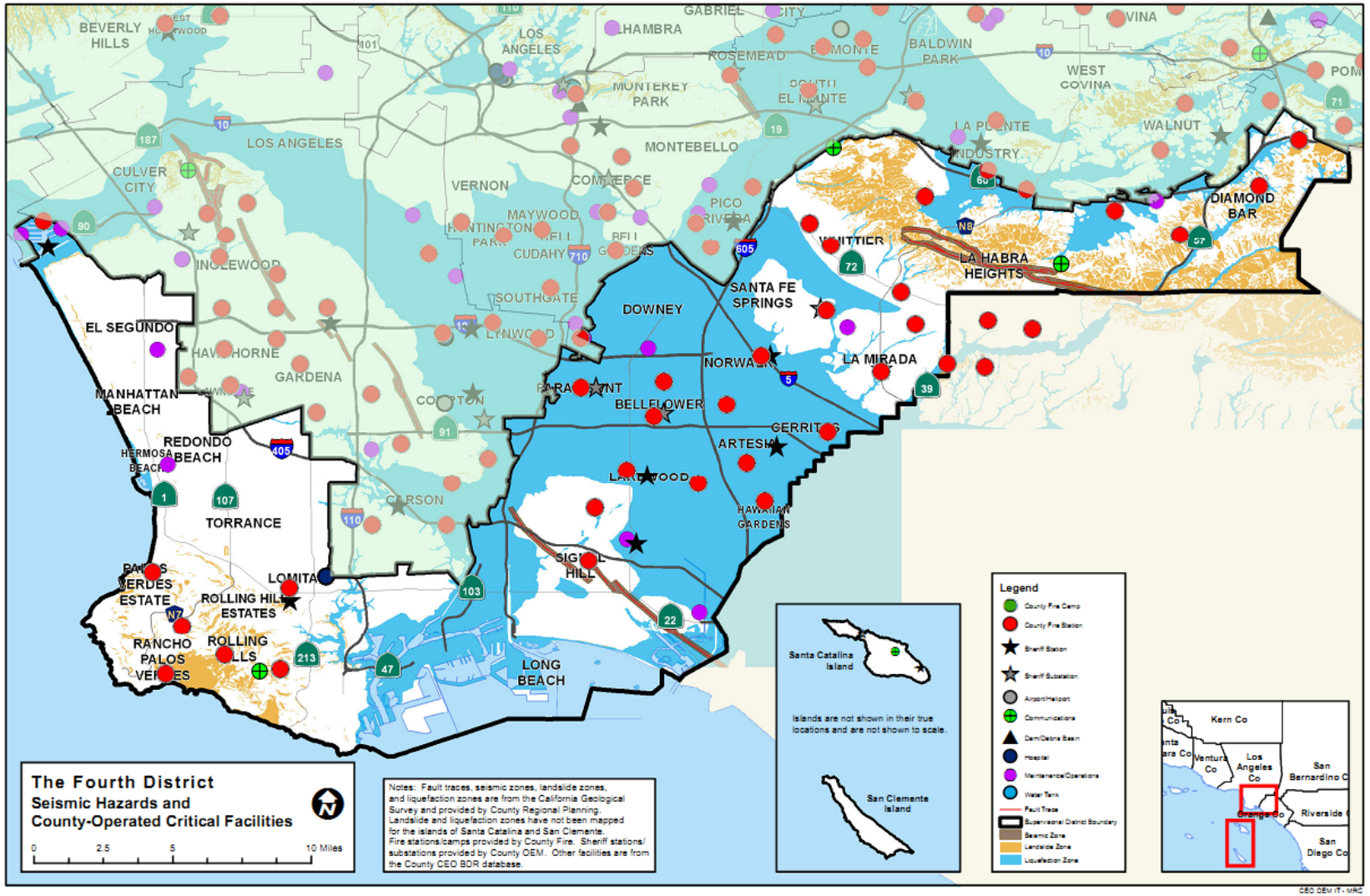
Map 5-6: Seismic Hazards and County-Operated Critical Facilities (Board of Supervisorial District 2)
(Source: County of Los Angeles CEO - ITS GIS)



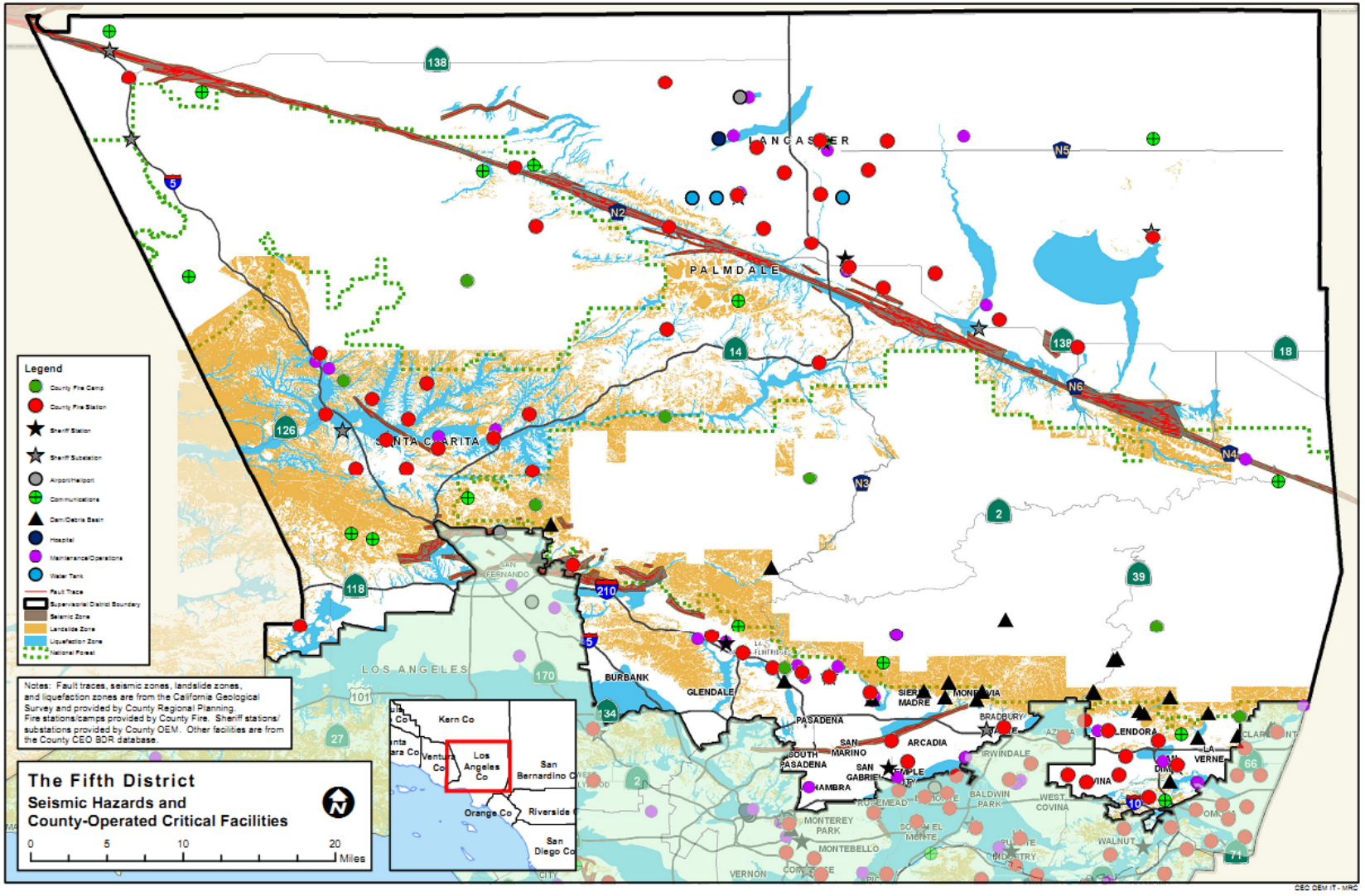
Map 5-7: Seismic Hazards and County-Operated Critical Facilities (Board of Supervisorial District 3)
(Source: County of Los Angeles CEO - ITS GIS)



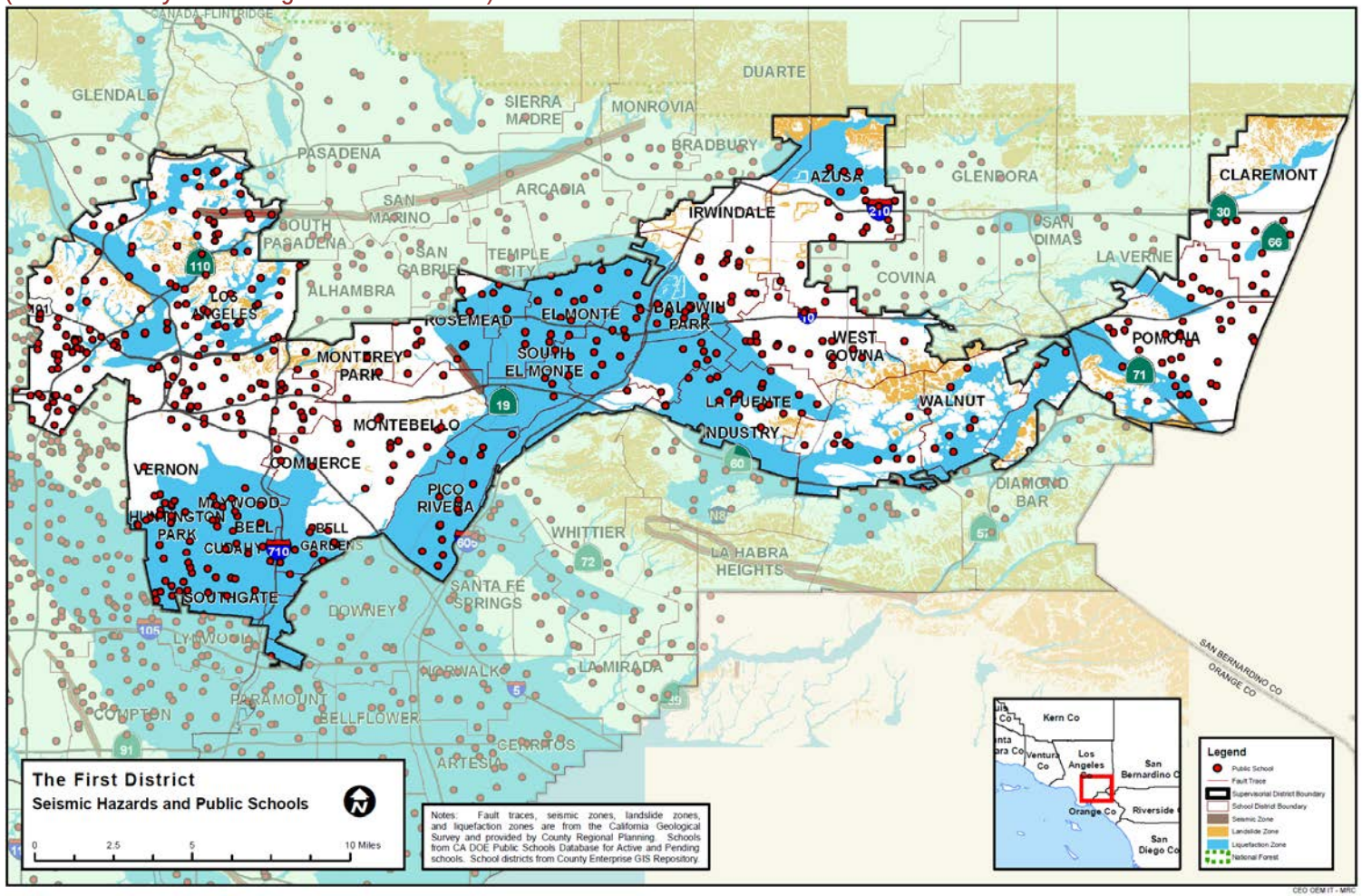
Map 5-8: Seismic Hazards and County-Operated Critical Facilities (Board of Supervisorial District 4)
(Source: County of Los Angeles CEO - ITS GIS)



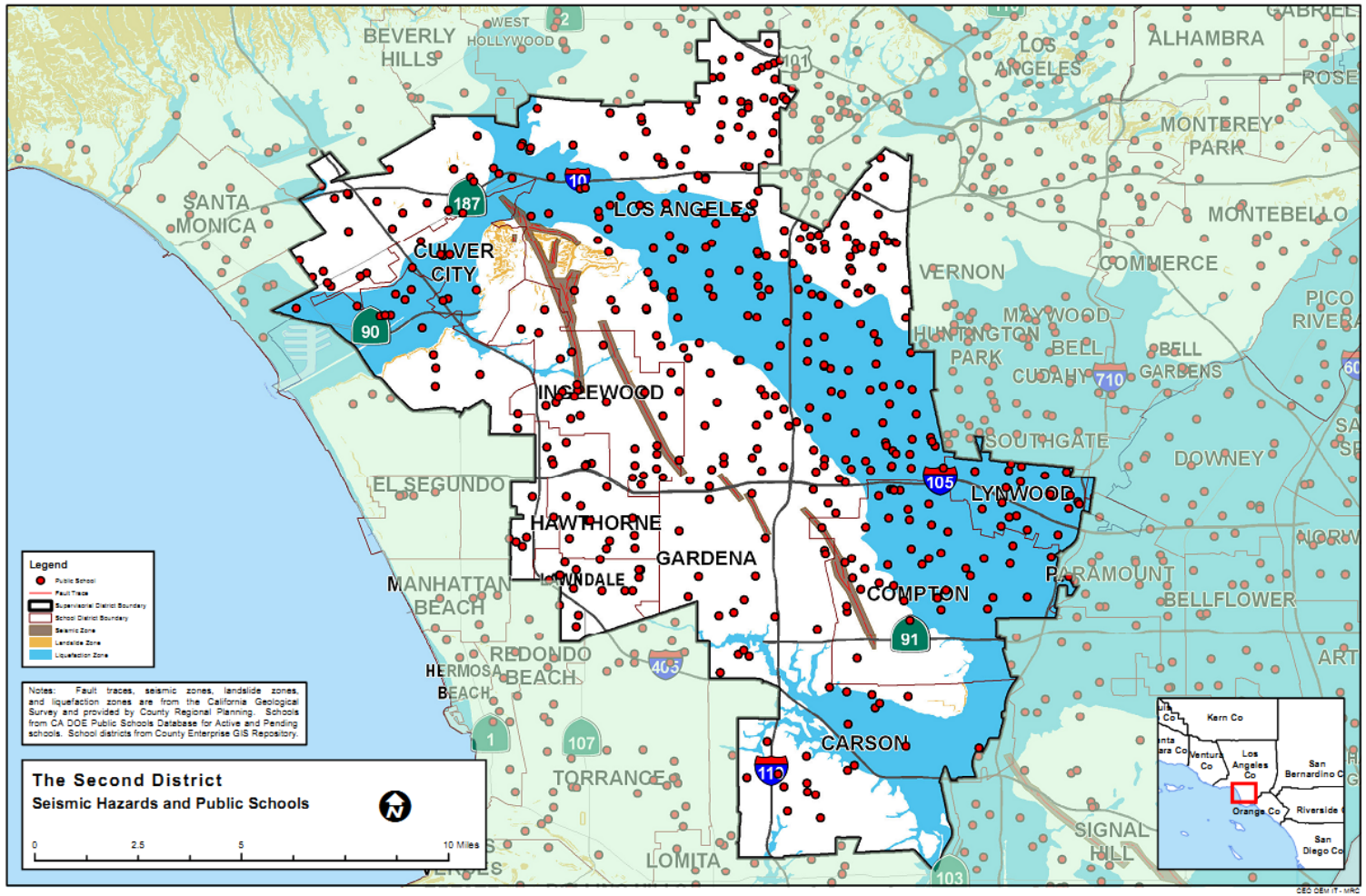
Map 5-9: Seismic Hazards and County-Operated Critical Facilities (Board of Supervisorial District 5)
(Source: County of Los Angeles CEO - ITS GIS)



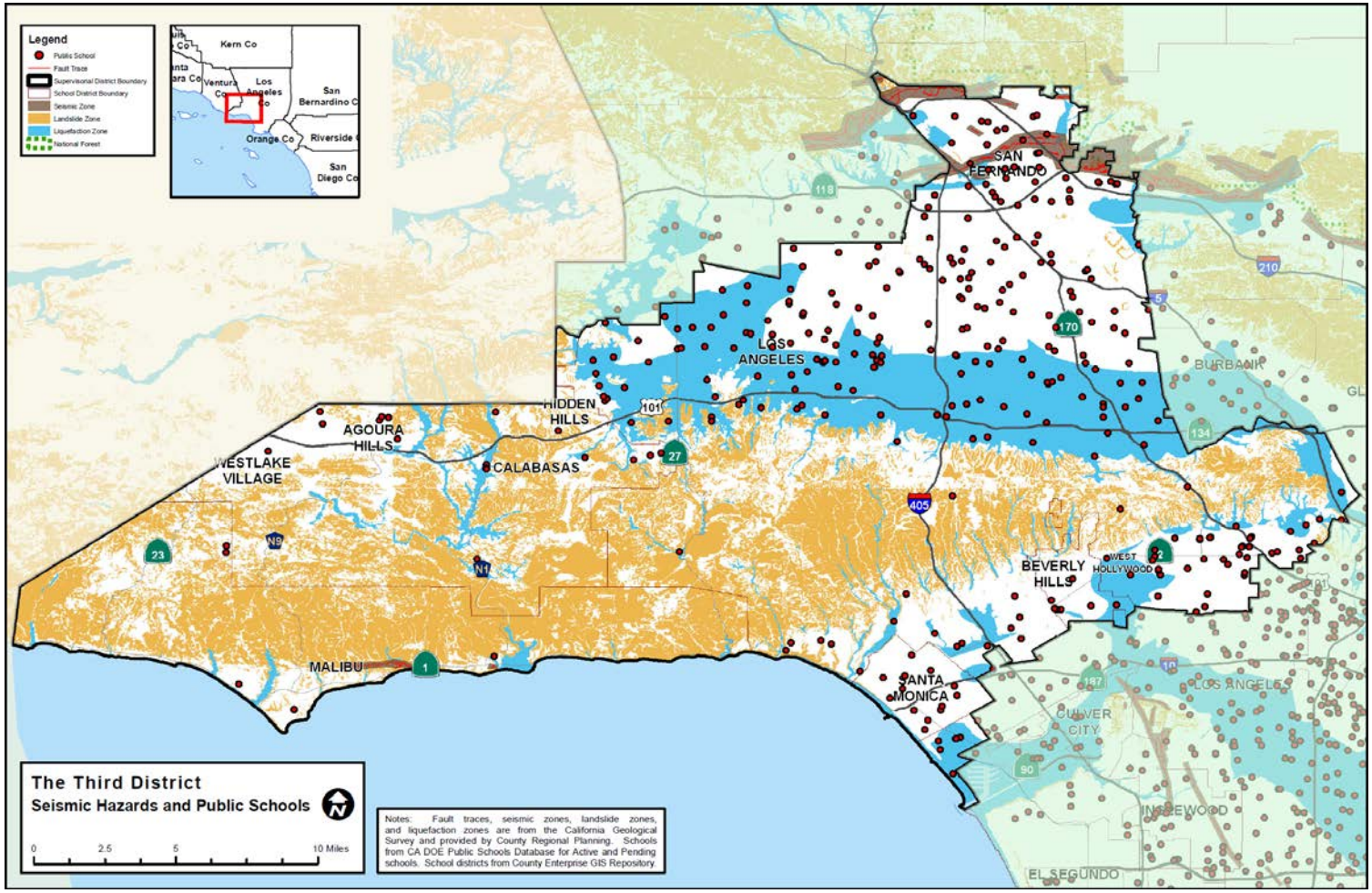
Map 5-10: Seismic Hazards and Public Schools (Board of Supervisorial District 1)
(Source: County of Los Angeles CEO - ITS GIS)



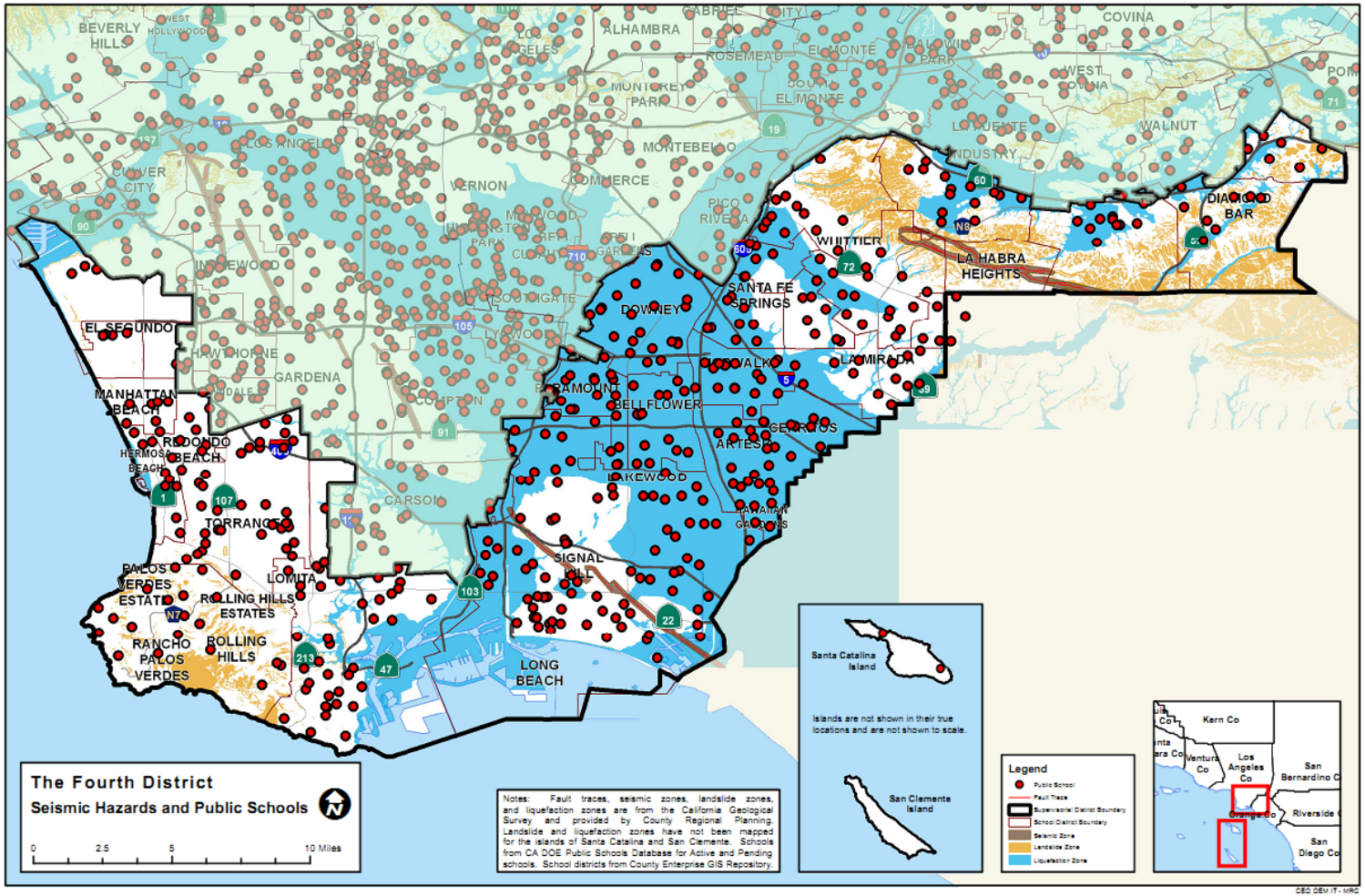
Map 5-11: Seismic Hazards and Public Schools (Board of Supervisorial District 2)
(Source: County of Los Angeles CEO - ITS GIS)



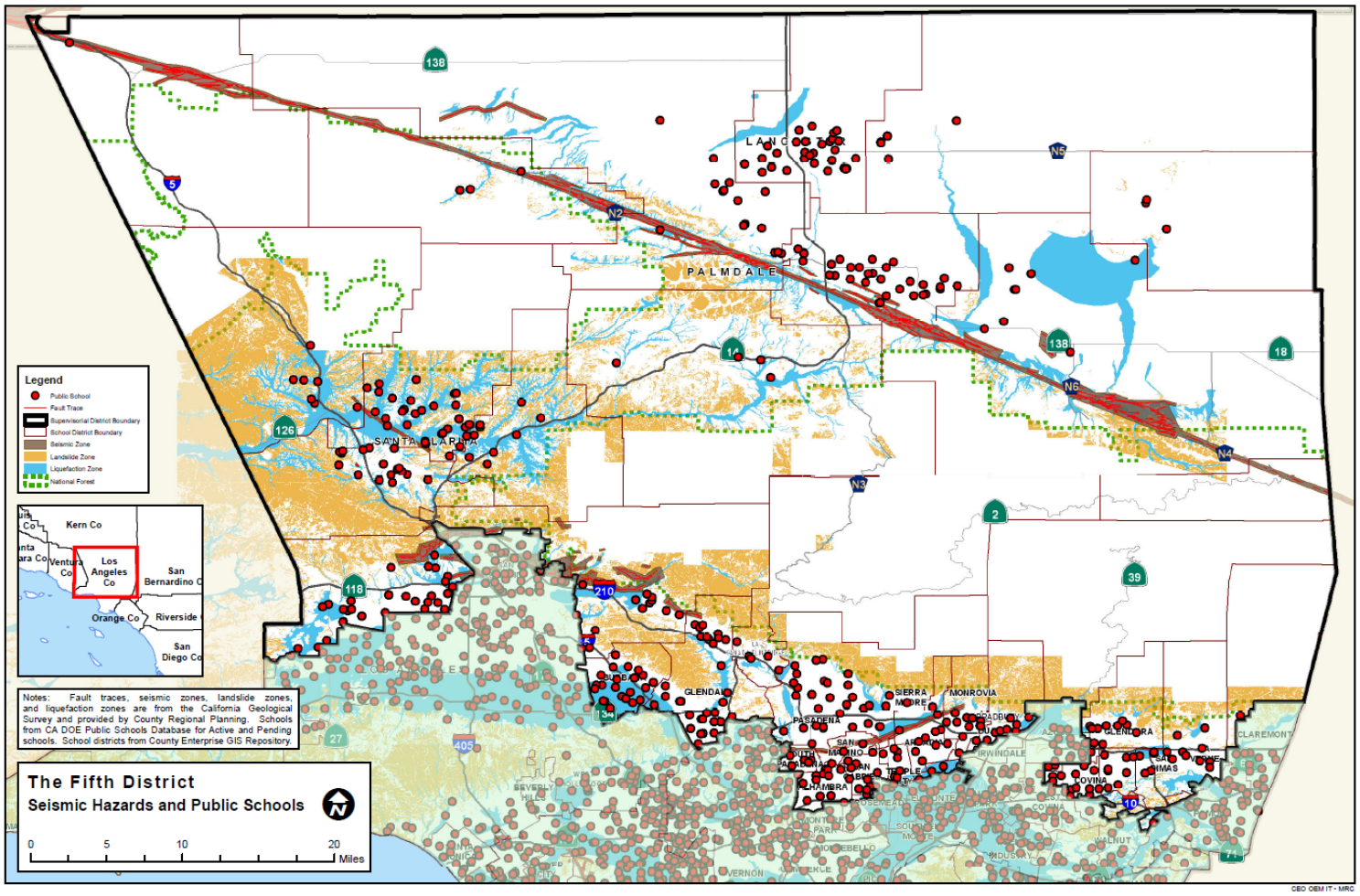
Map 5-12: Seismic Hazards and Public Schools (Board of Supervisorial District 3)
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-13: Seismic Hazards and Public Schools (Board of Supervisorial District 4)
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-14: Seismic Hazards and Public Schools (Board of Supervisorial District 5)
(Source: County of Los Angeles CEO - ITS GIS)

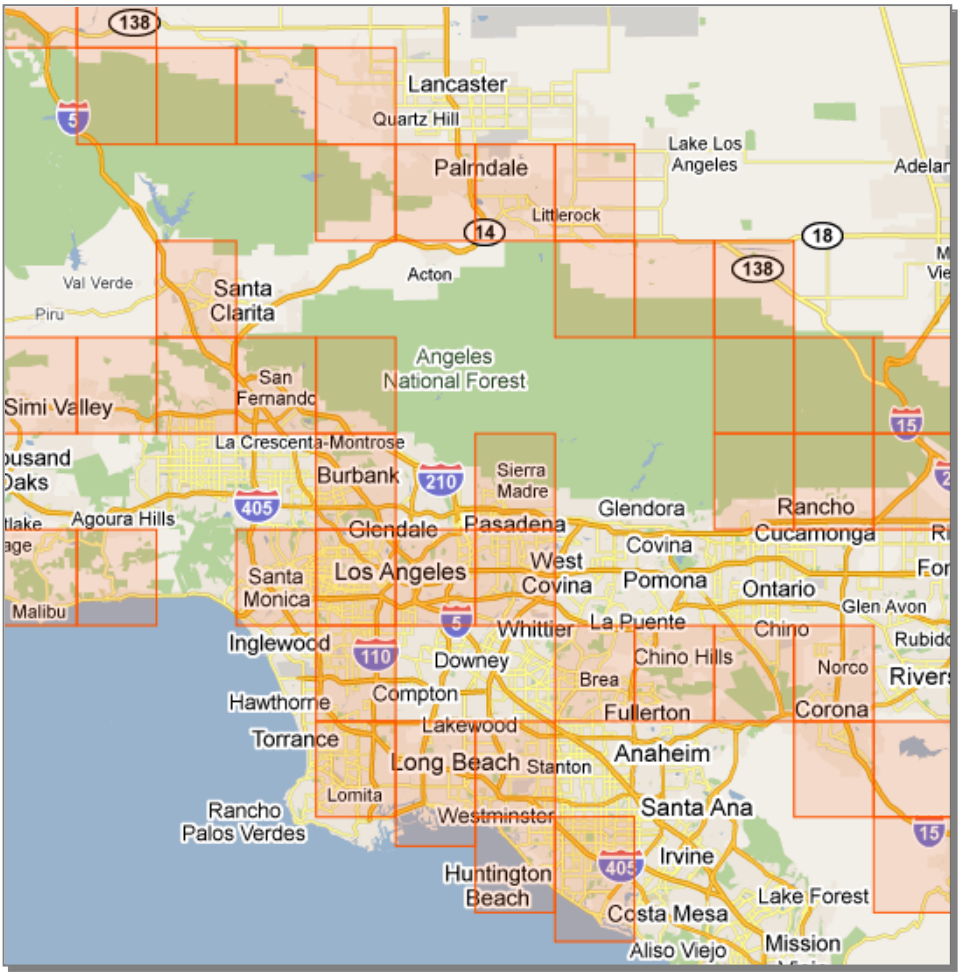


Earthquake Fault Zones Affecting Los Angeles County (Alquist-Priolo)

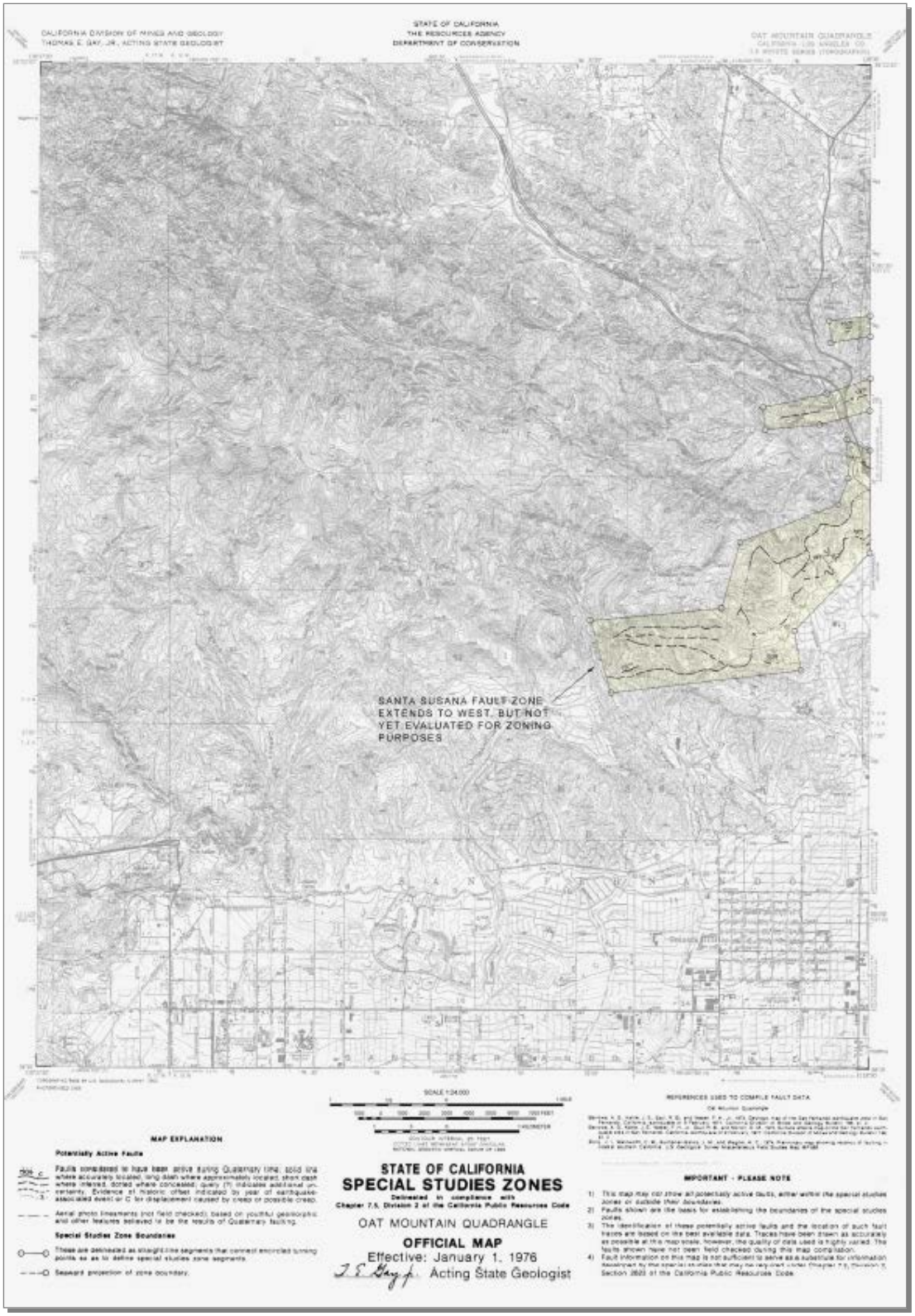
The Alquist-Priolo Earthquake Fault Zoning (AP) Act was passed in 1972 as a result of the destructive 1971 San Fernando earthquake. The AP Act addresses the seismic hazard of surface fault rupture by prohibiting the placement of most structures for human occupancy across traces of active faults. The AP Act addresses the seismic hazard of surface fault rupture by prohibiting the placement of most structures for human occupancy across traces of active faults. The act also requires sellers and real estate agents to inform buyers whether real property being sold is within a state-designated earthquake fault zone. The Department of Conservation, Division of Mines and Geology, has issued 544 regulatory maps at a scale of 1:24,000. These maps, designated as earthquake fault zone maps, are issued in order to assist cities and counties in avoiding the hazard of surface fault rupture.

This index shows all official maps of earthquake fault zones (EFZ) affecting Los Angeles County as of December 2010.

Map 5-15: Earthquake Fault Zones Index Map (as of December 2010)
(Source: http://www.quake.ca.gov/gmaps/ap/ap_maps.htm)



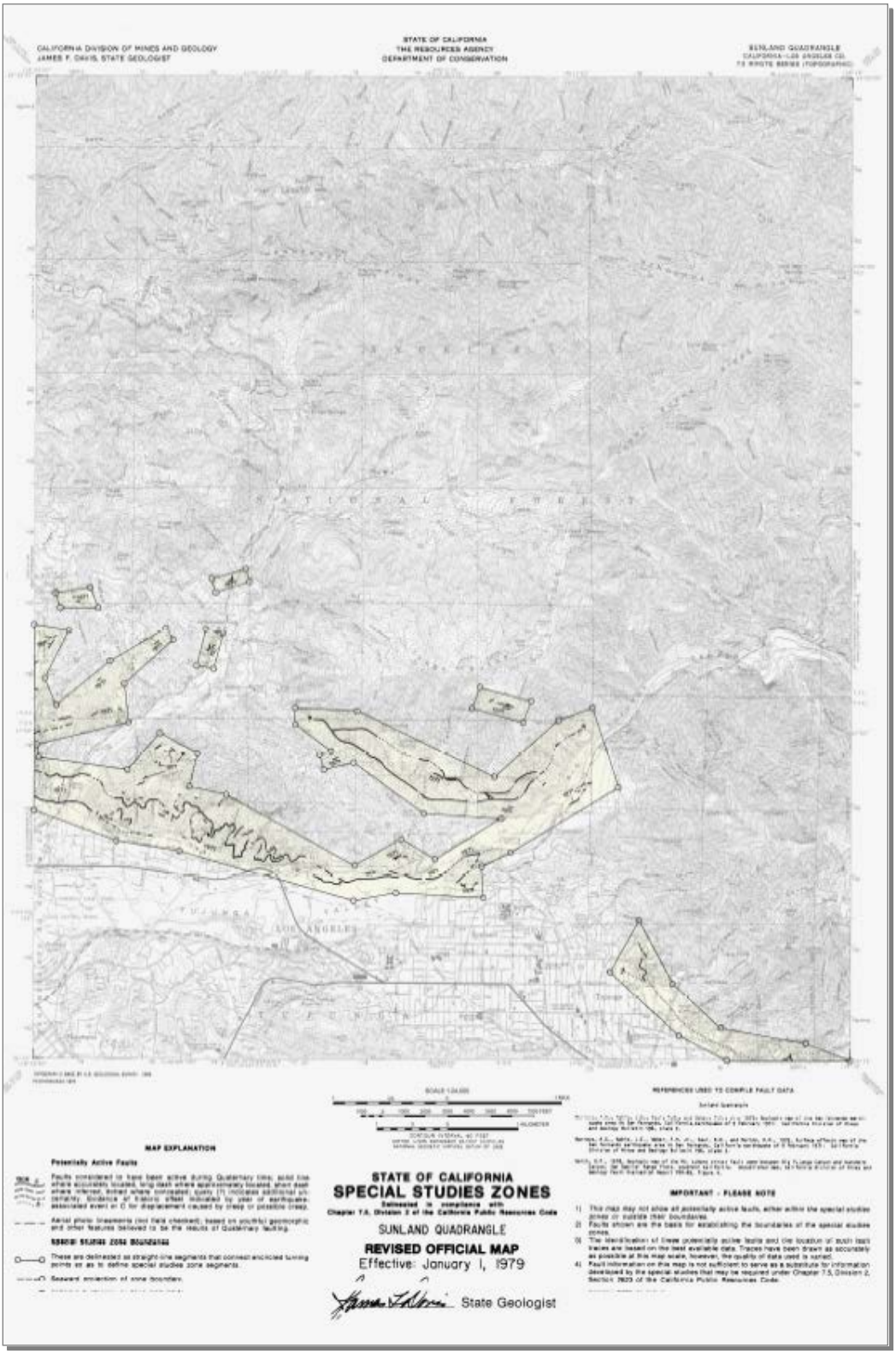
Oat Mountain Quadrangle



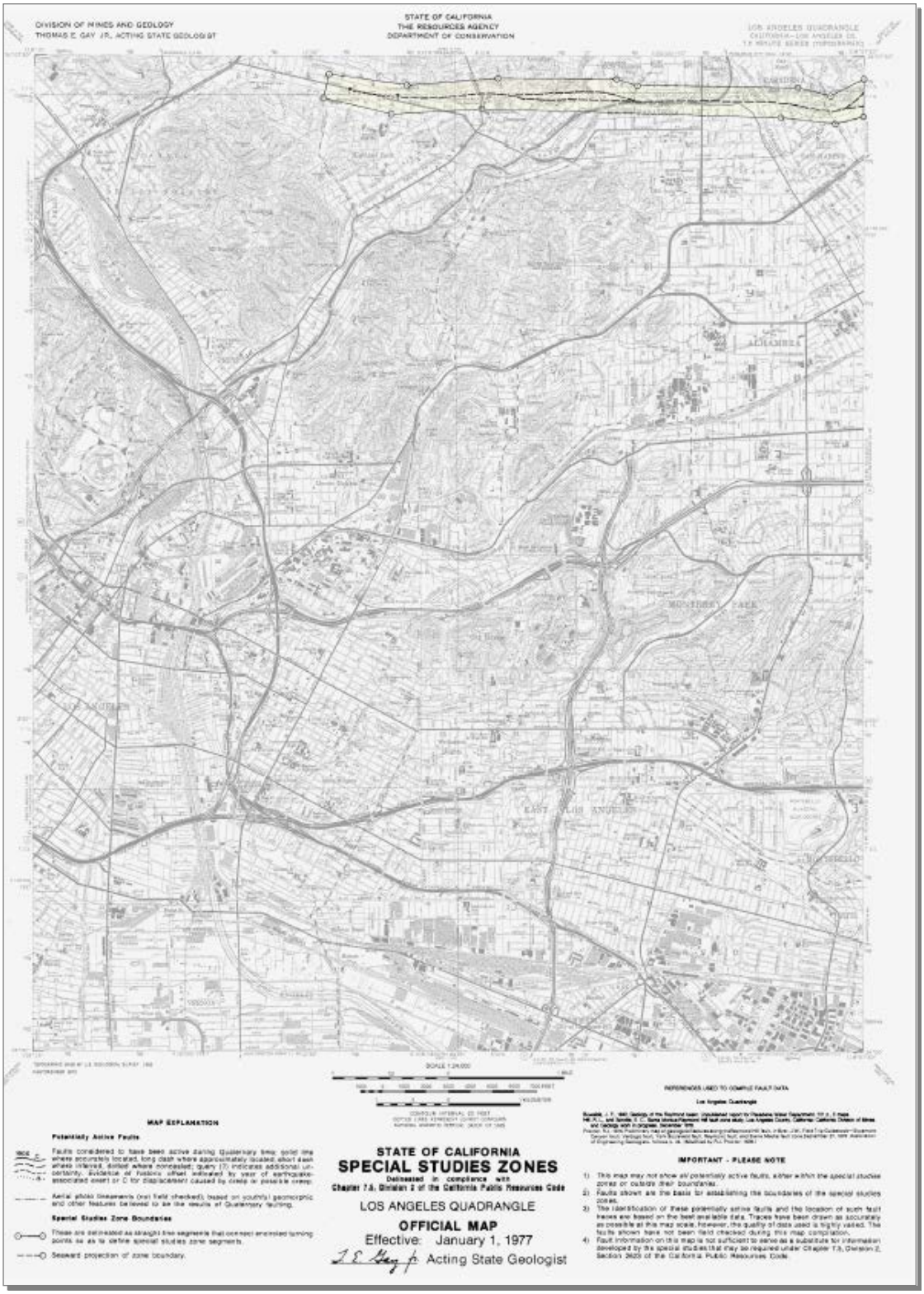
San Fernando Quadrangle



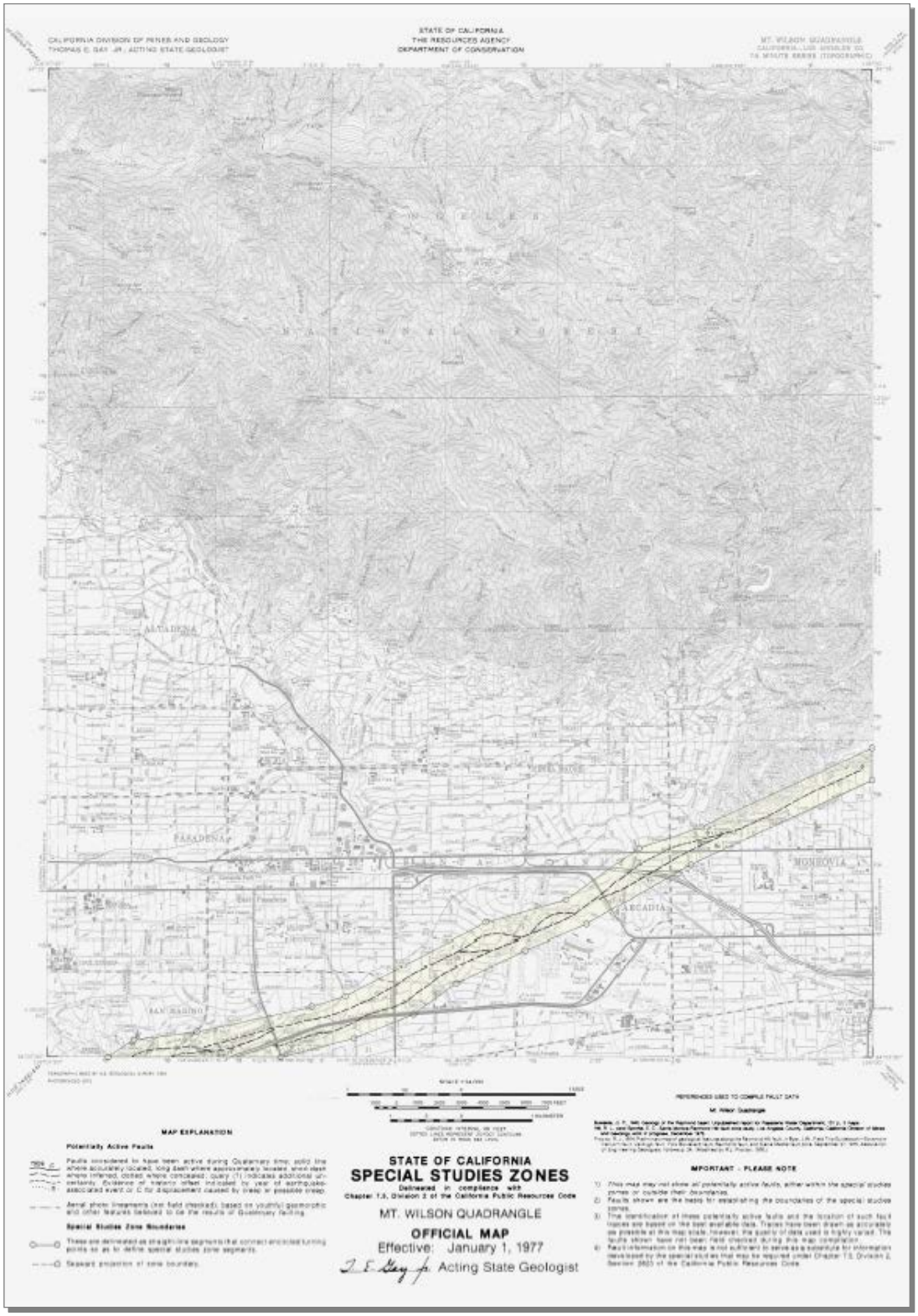
Sunland Quadrangle



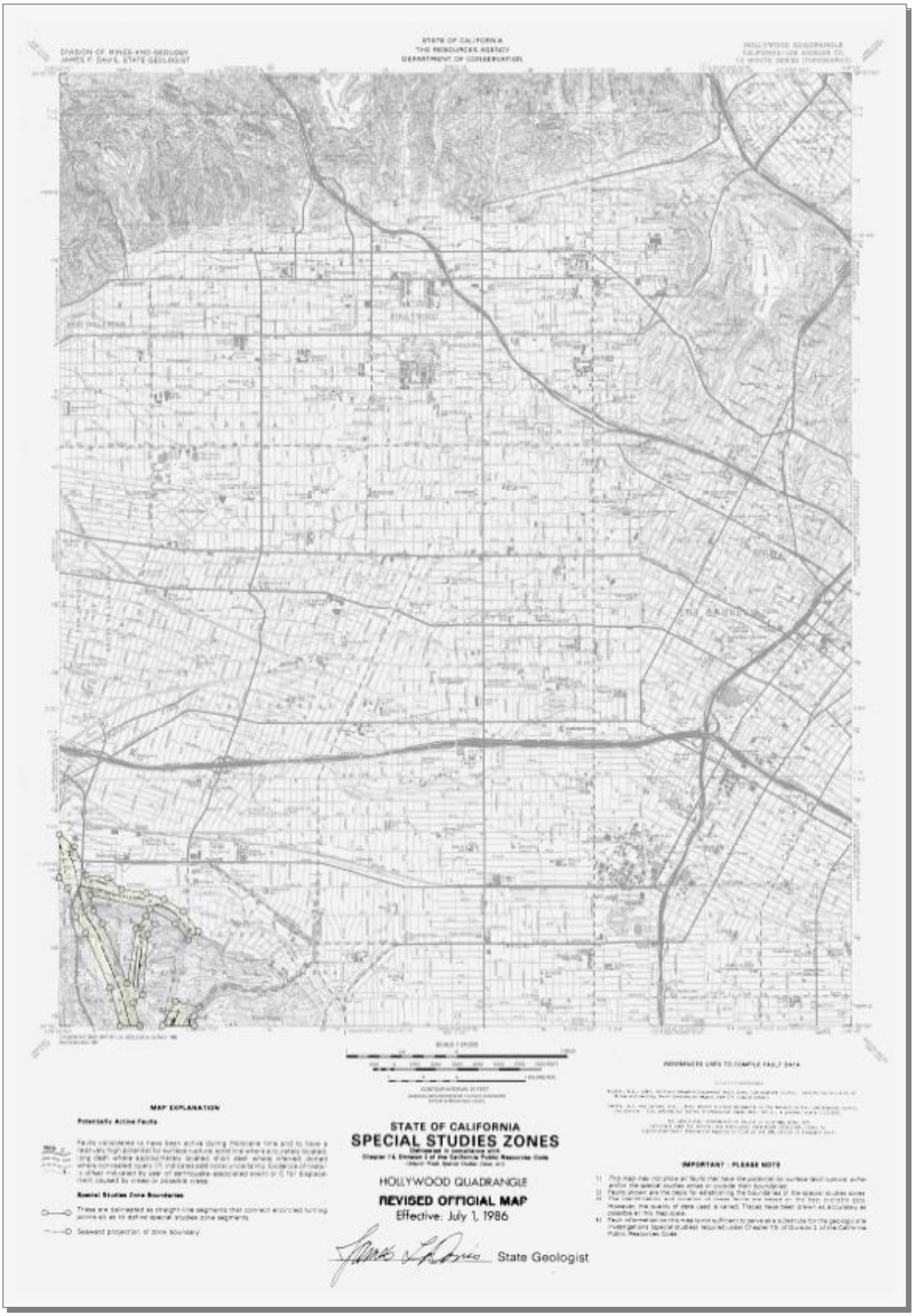
Los Angeles Quadrangle



Mt. Wilson Quadrangle



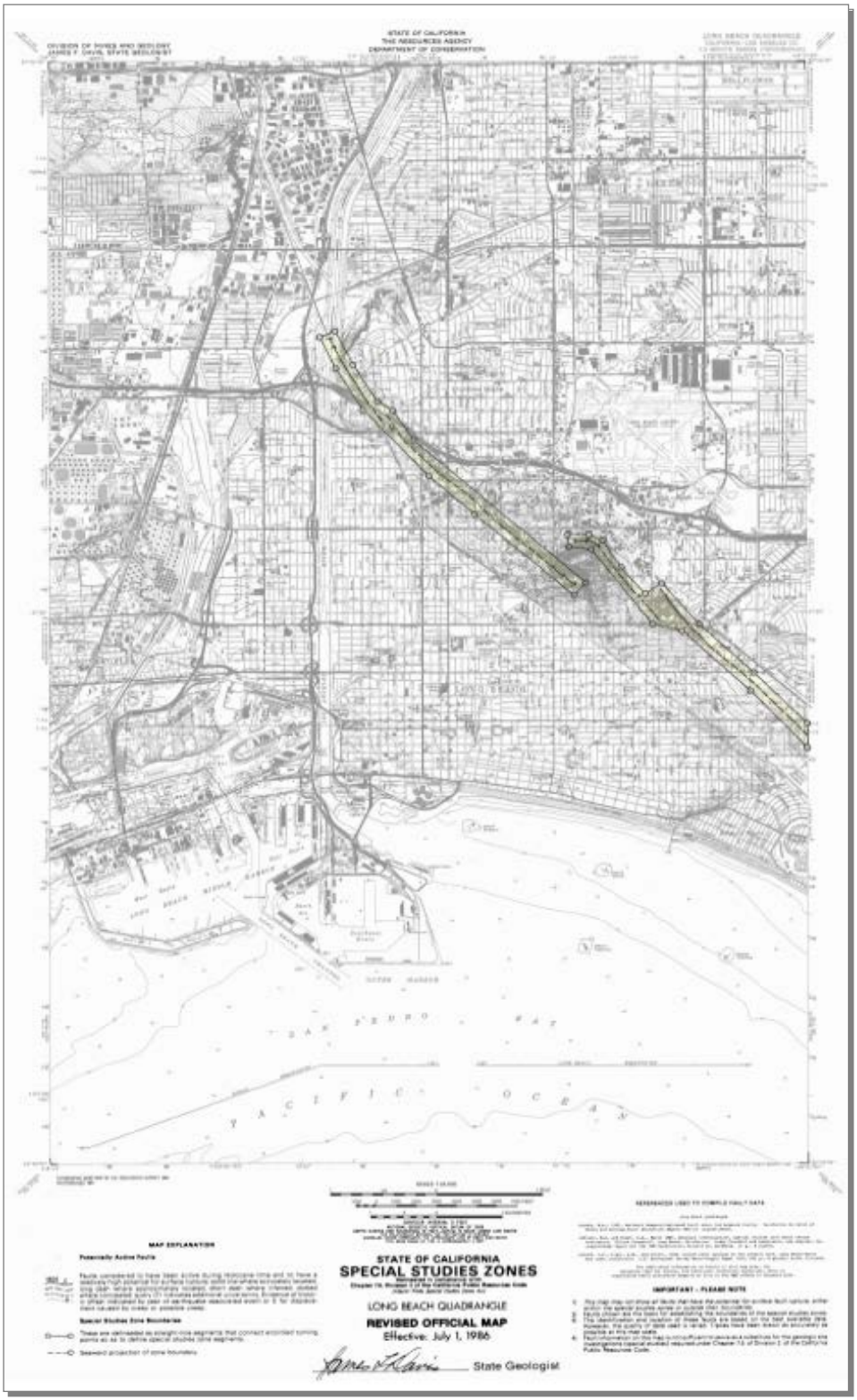
Hollywood Quadrangle



Inglewood Quadrangle



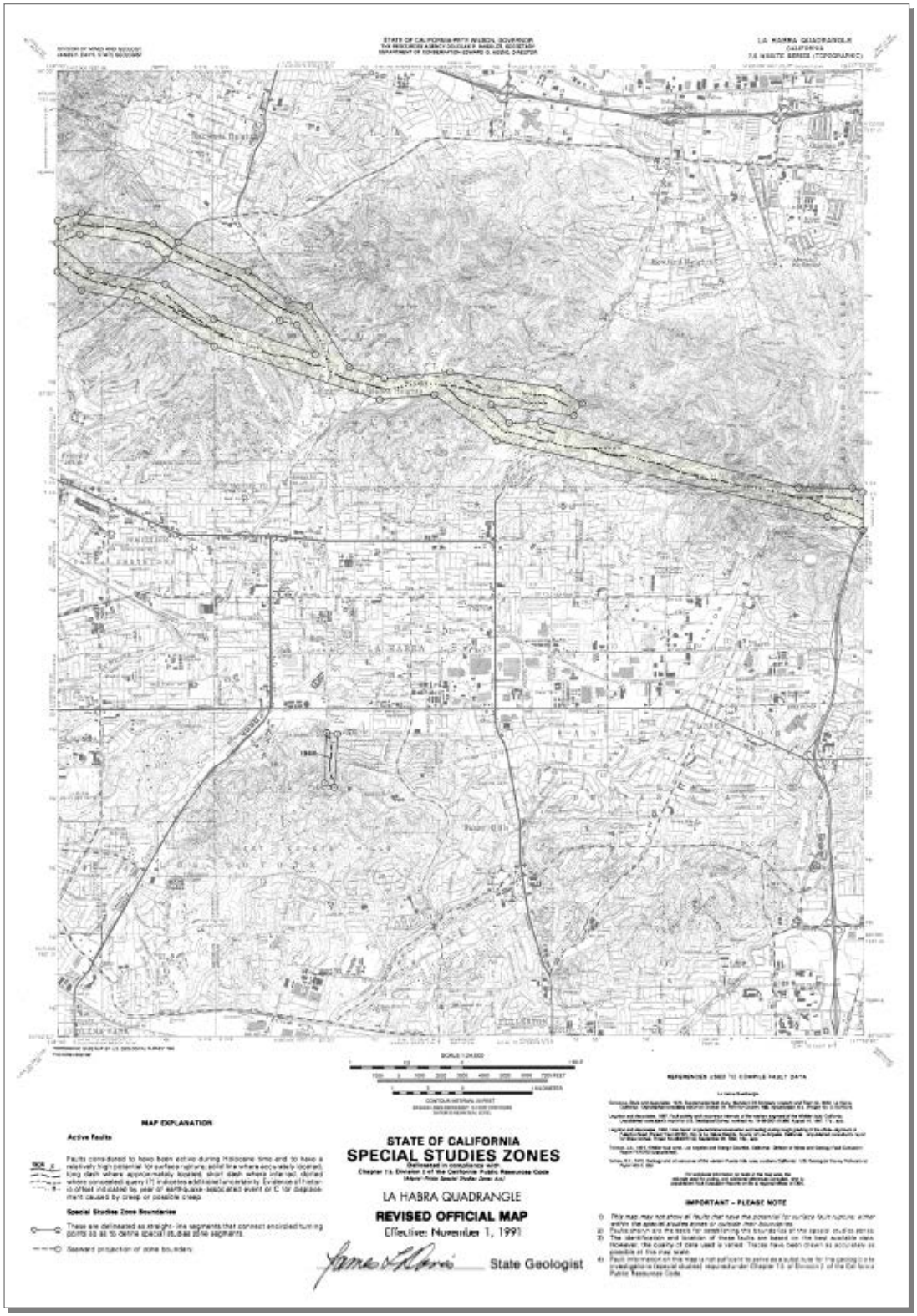
Long Beach Quadrangle



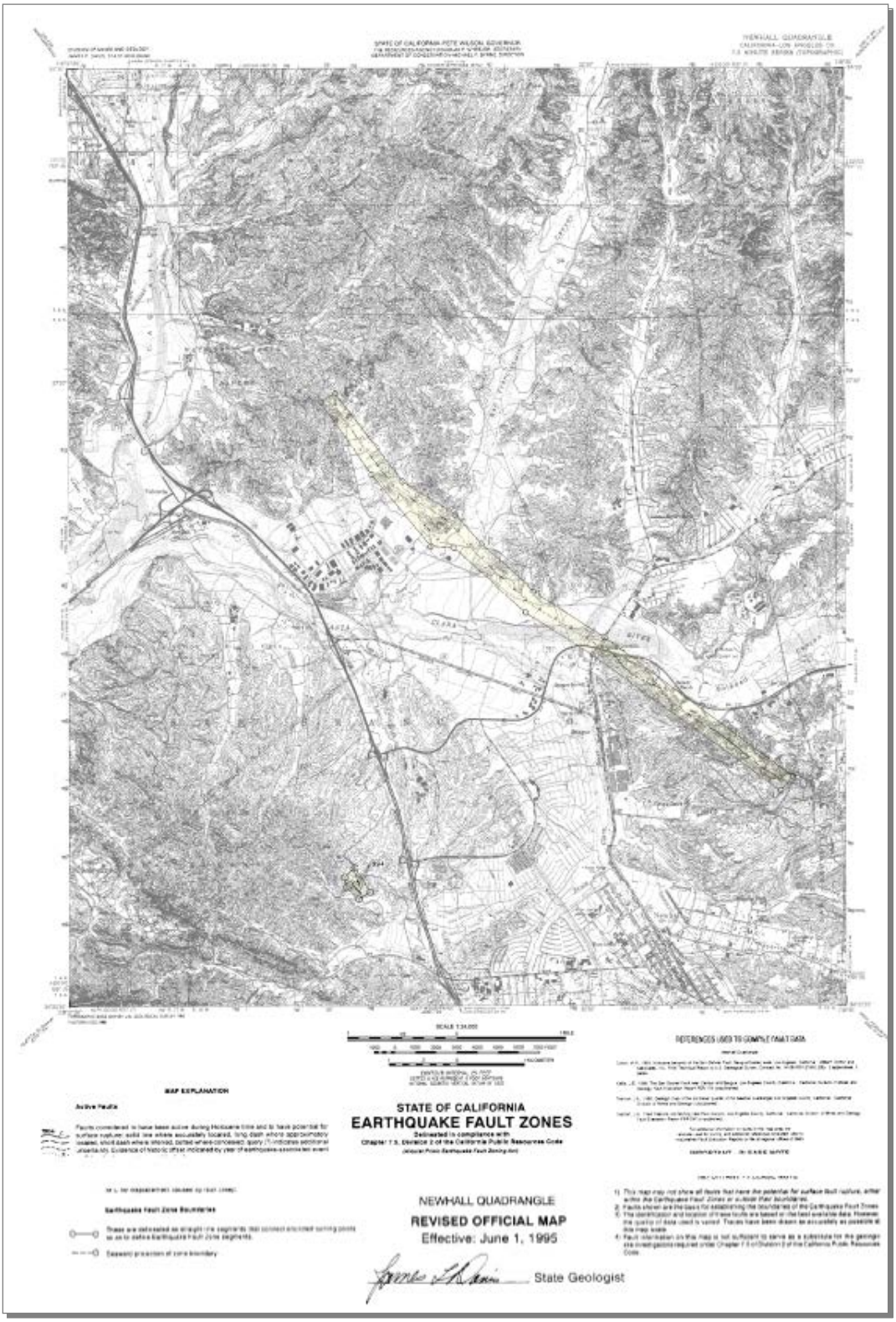
Los Alamitos Quadrangle



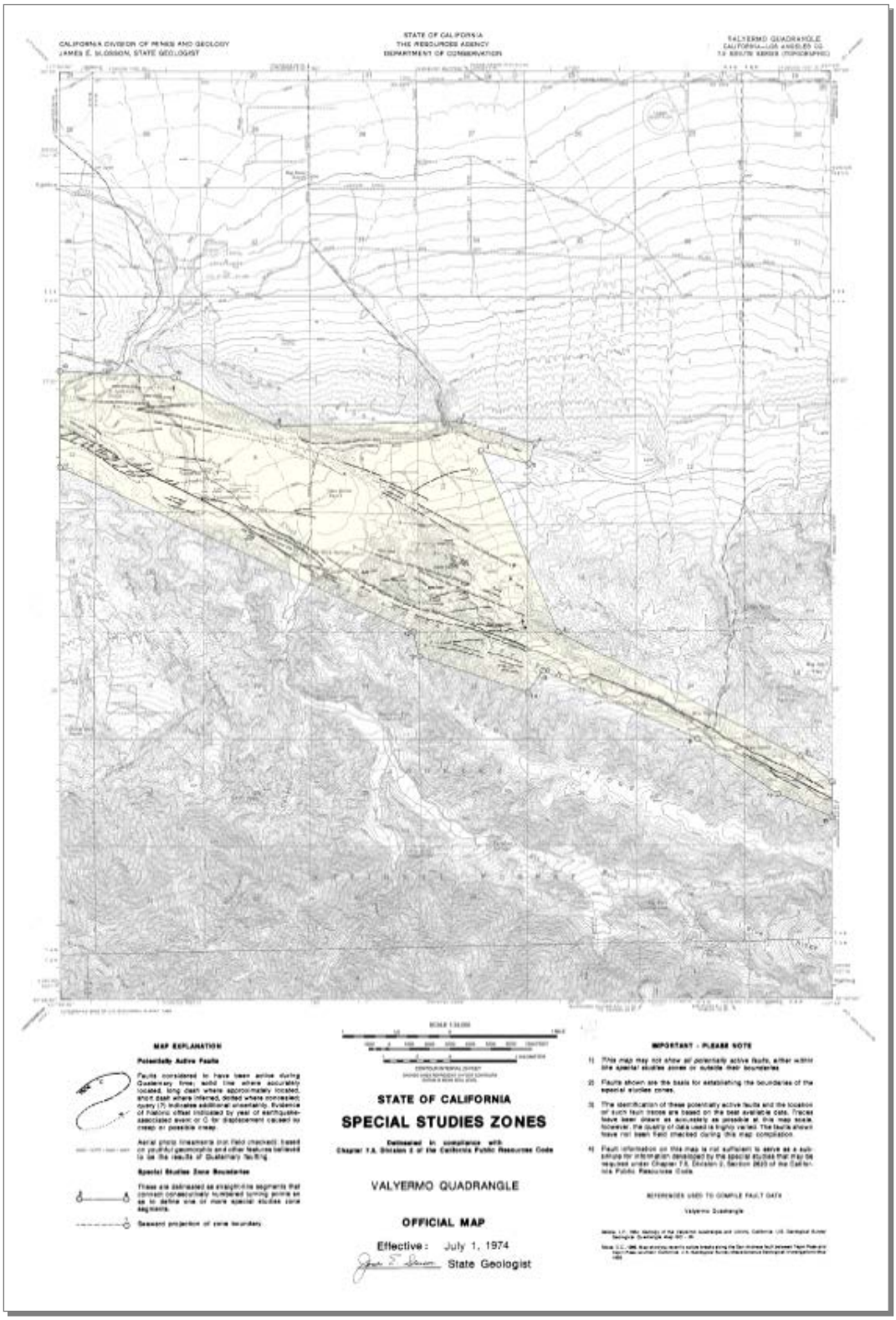
La Habra Quadrangle



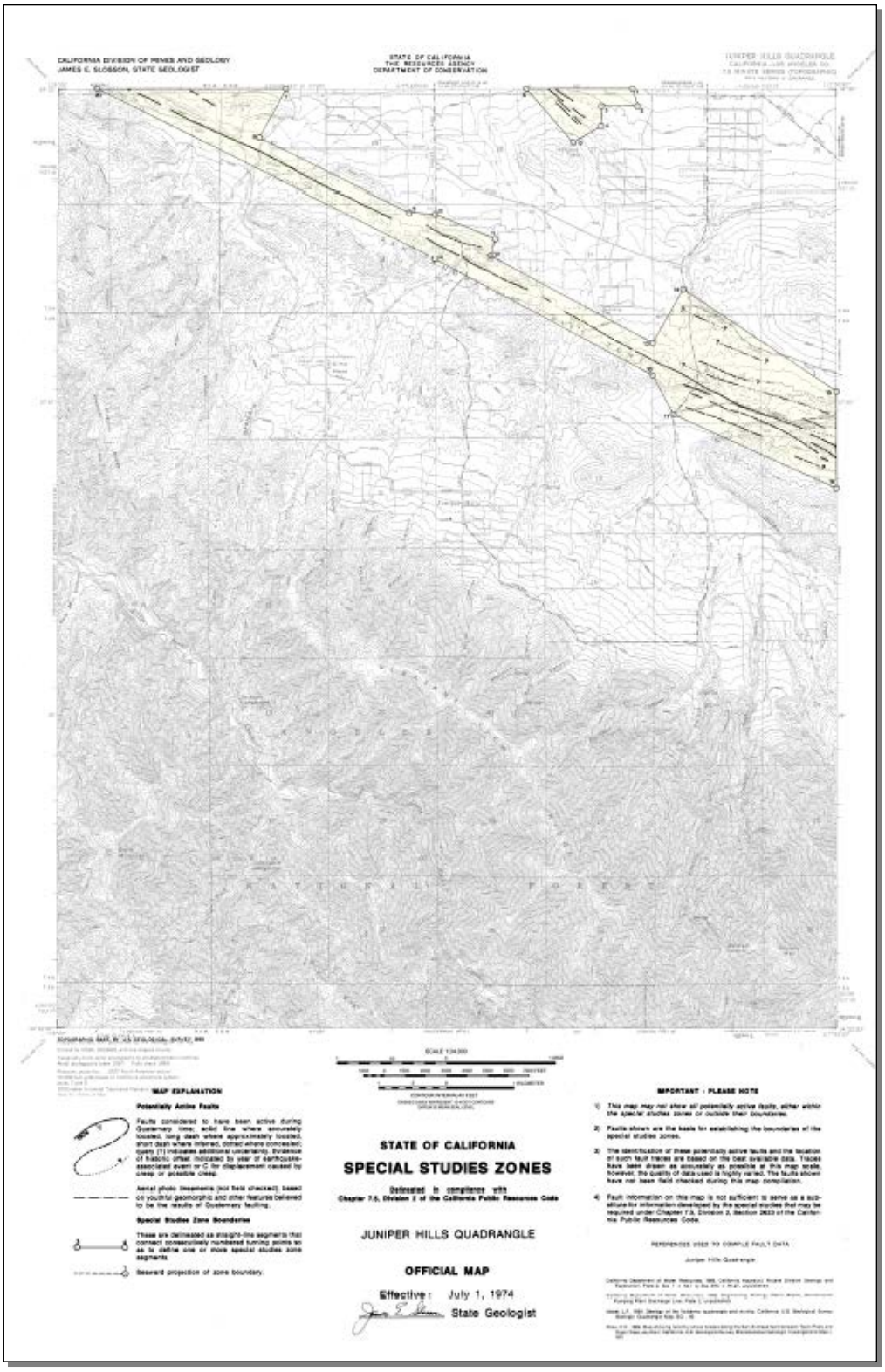
Newhall Quadrangle



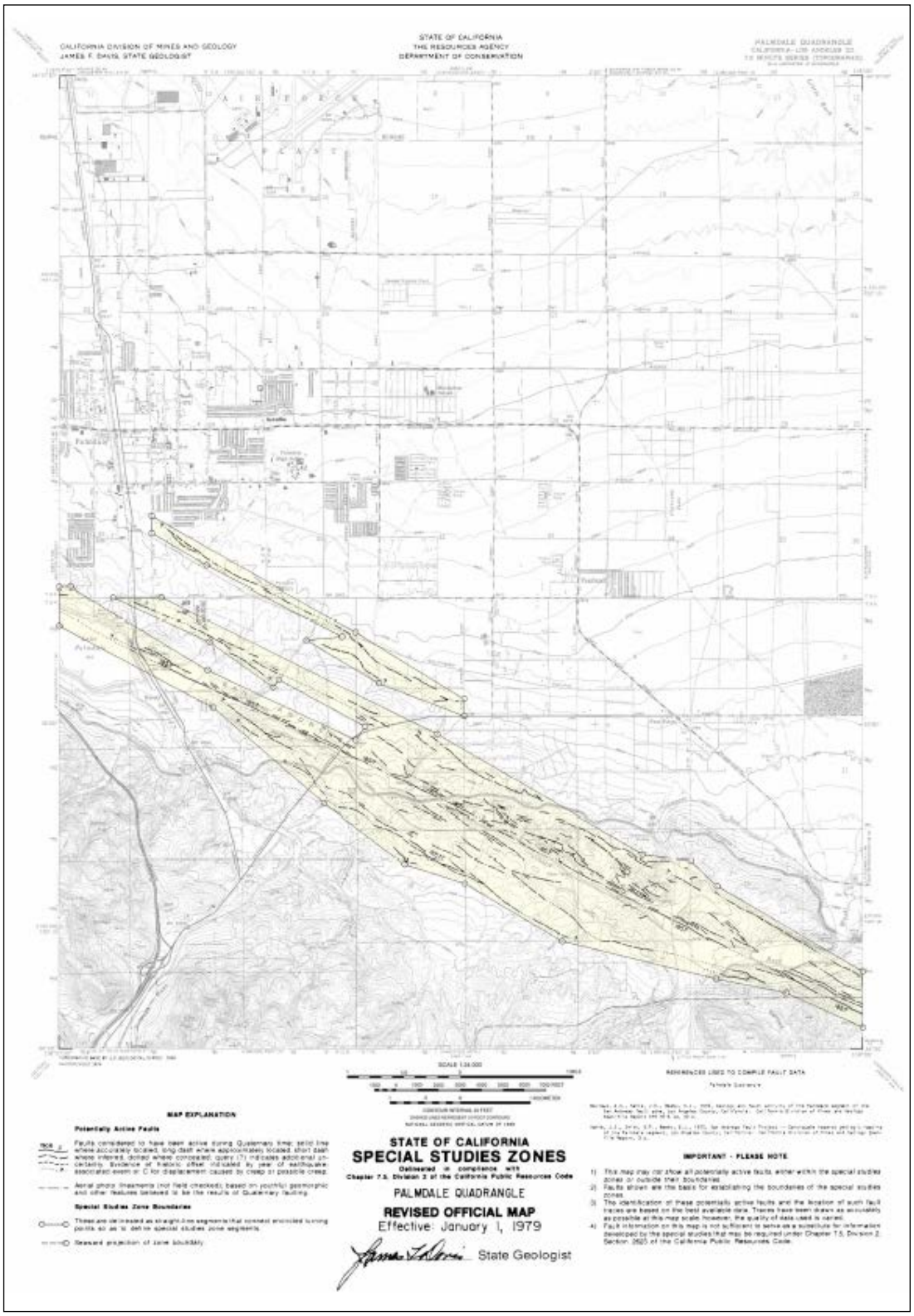
Valyermo Quadrangle



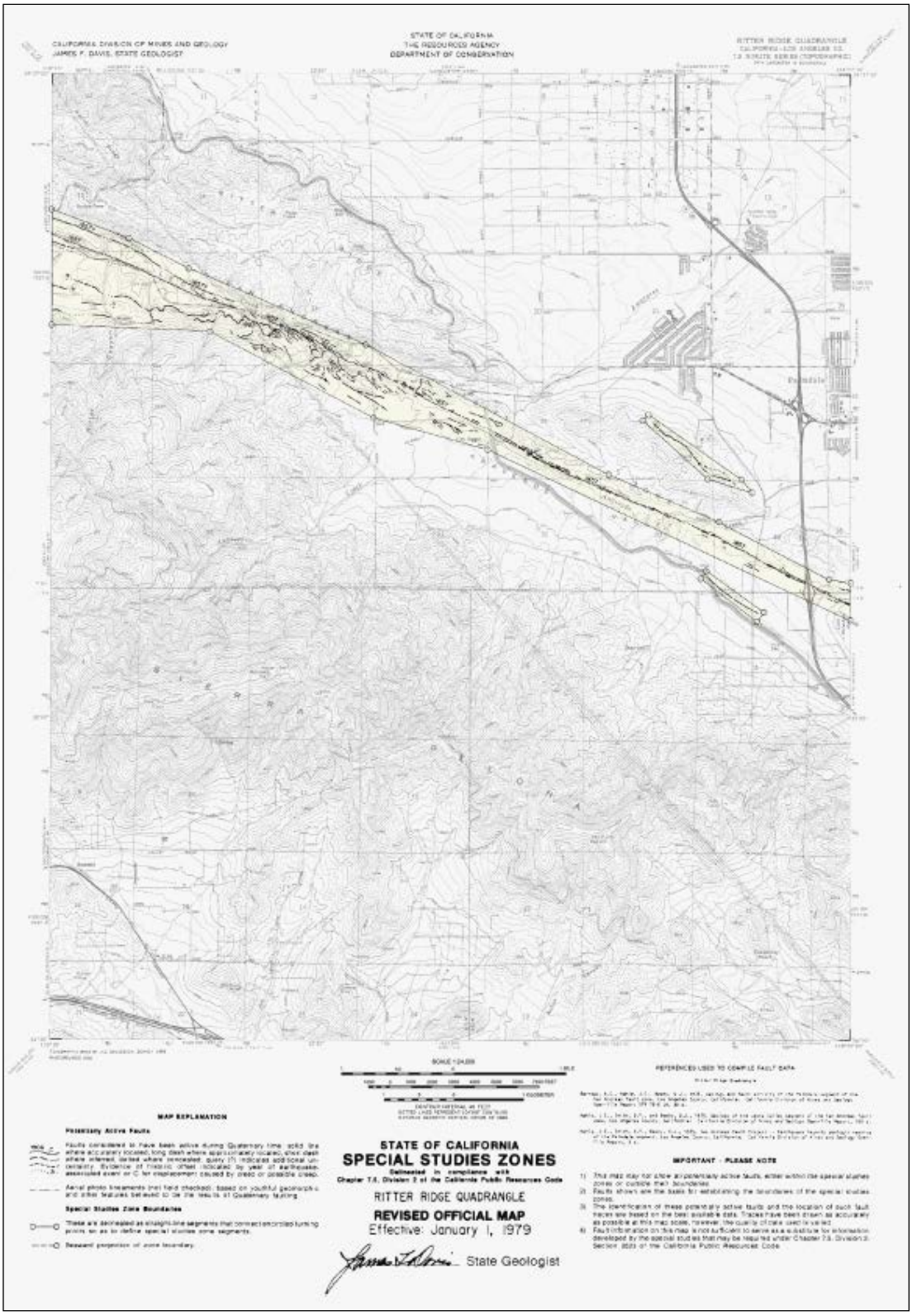
Juniper Hills Quadrangle



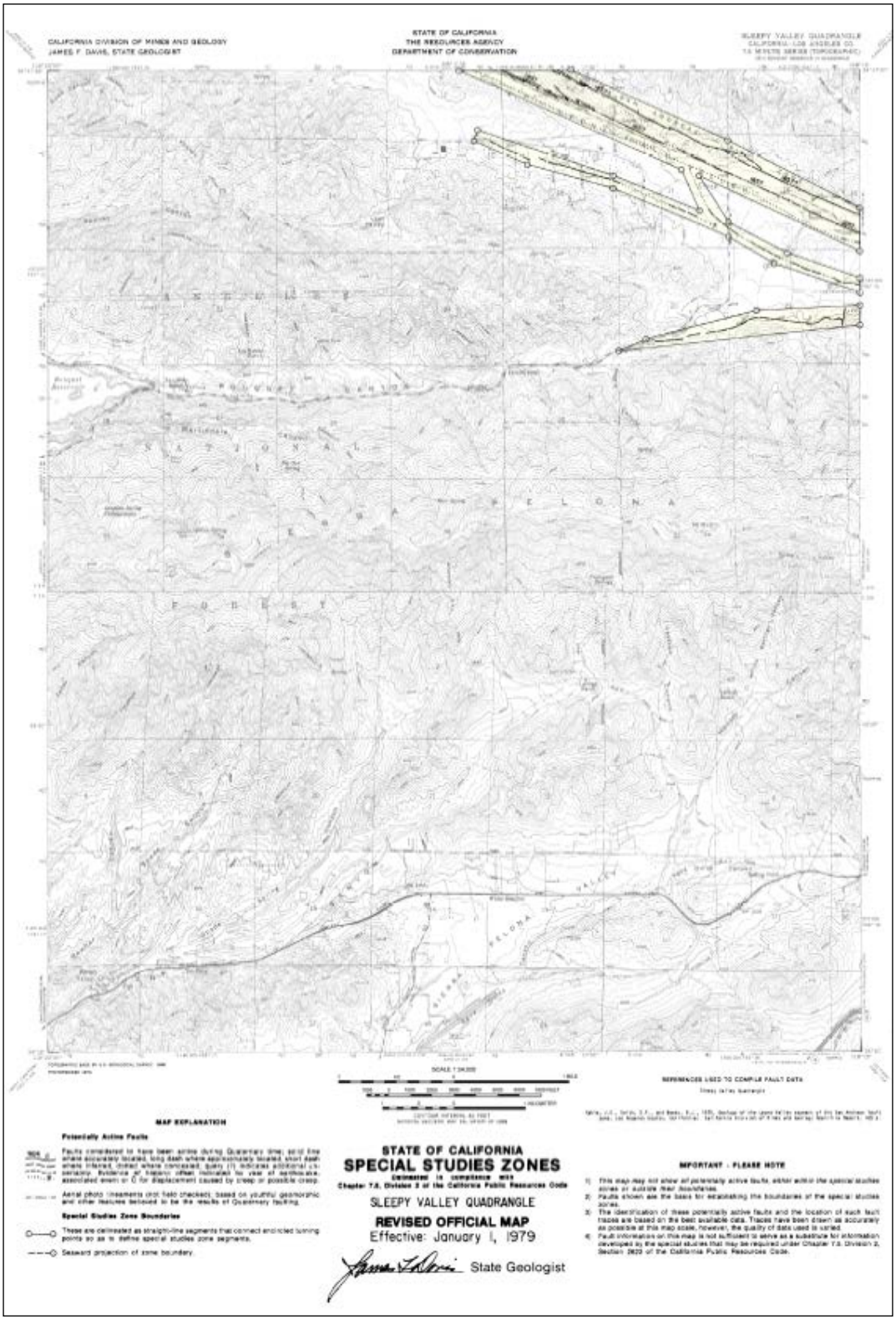
Palmdale Quadrangle



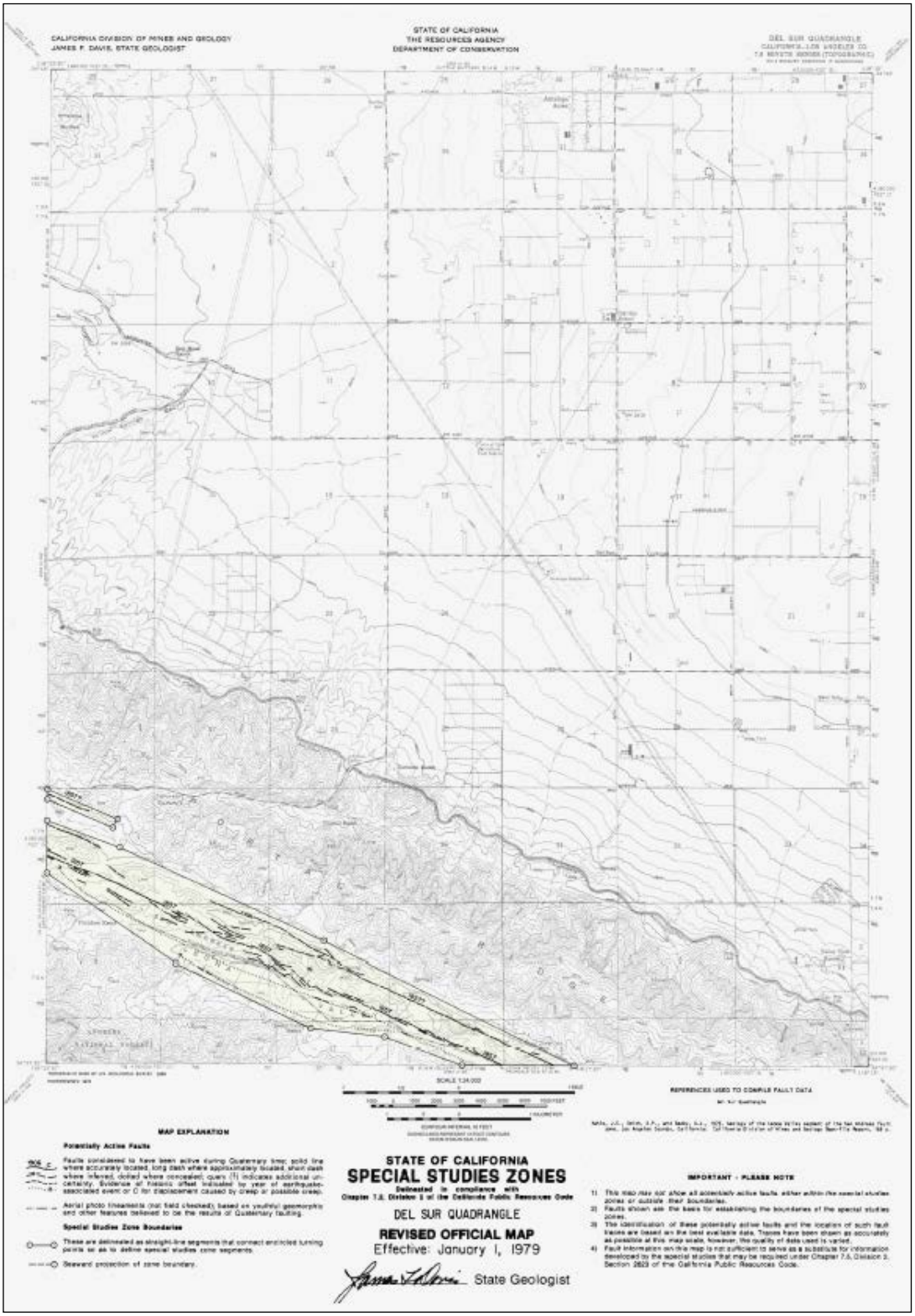
Ritter Ridge Quadrangle



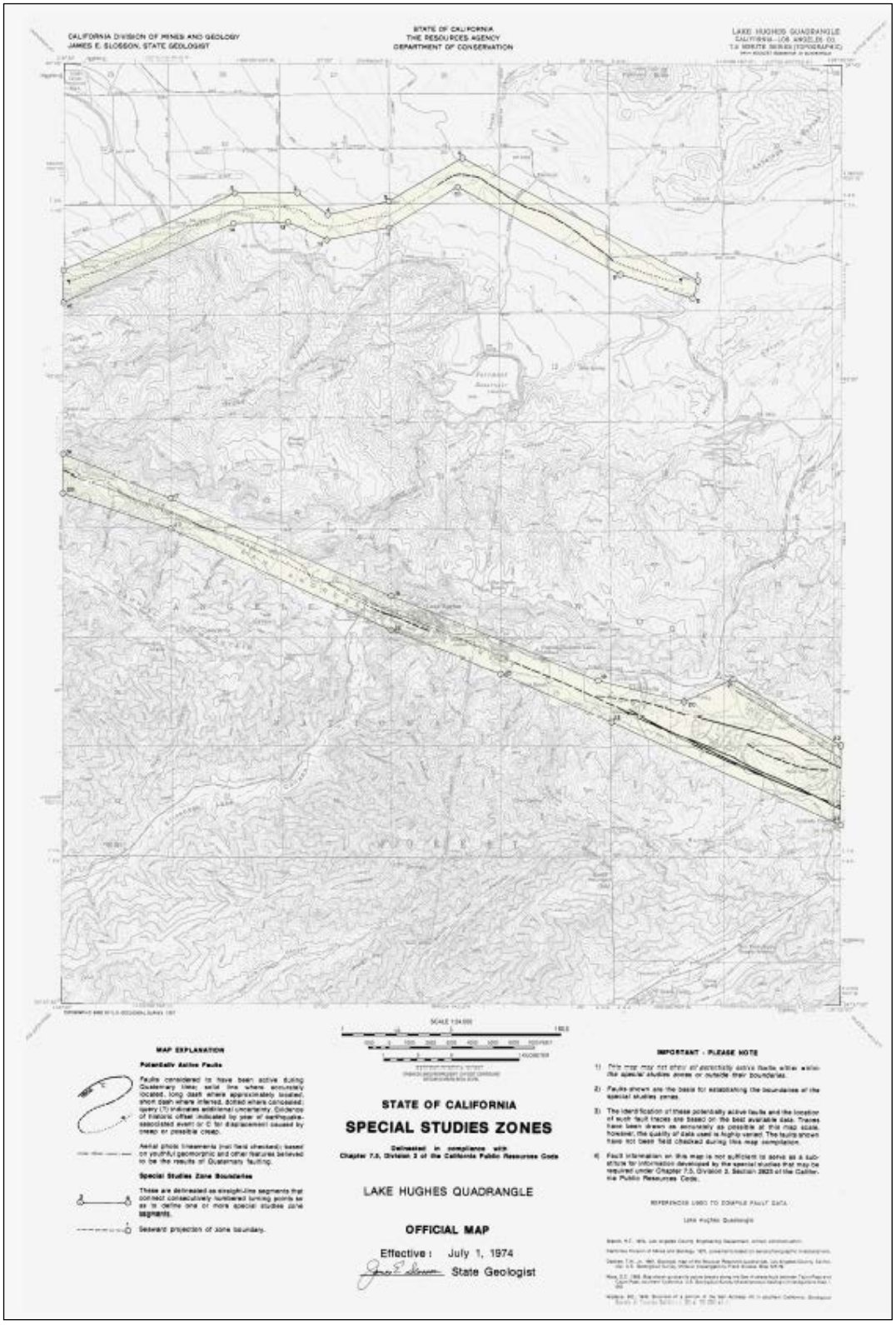
Sleepy Valley Quadrangle



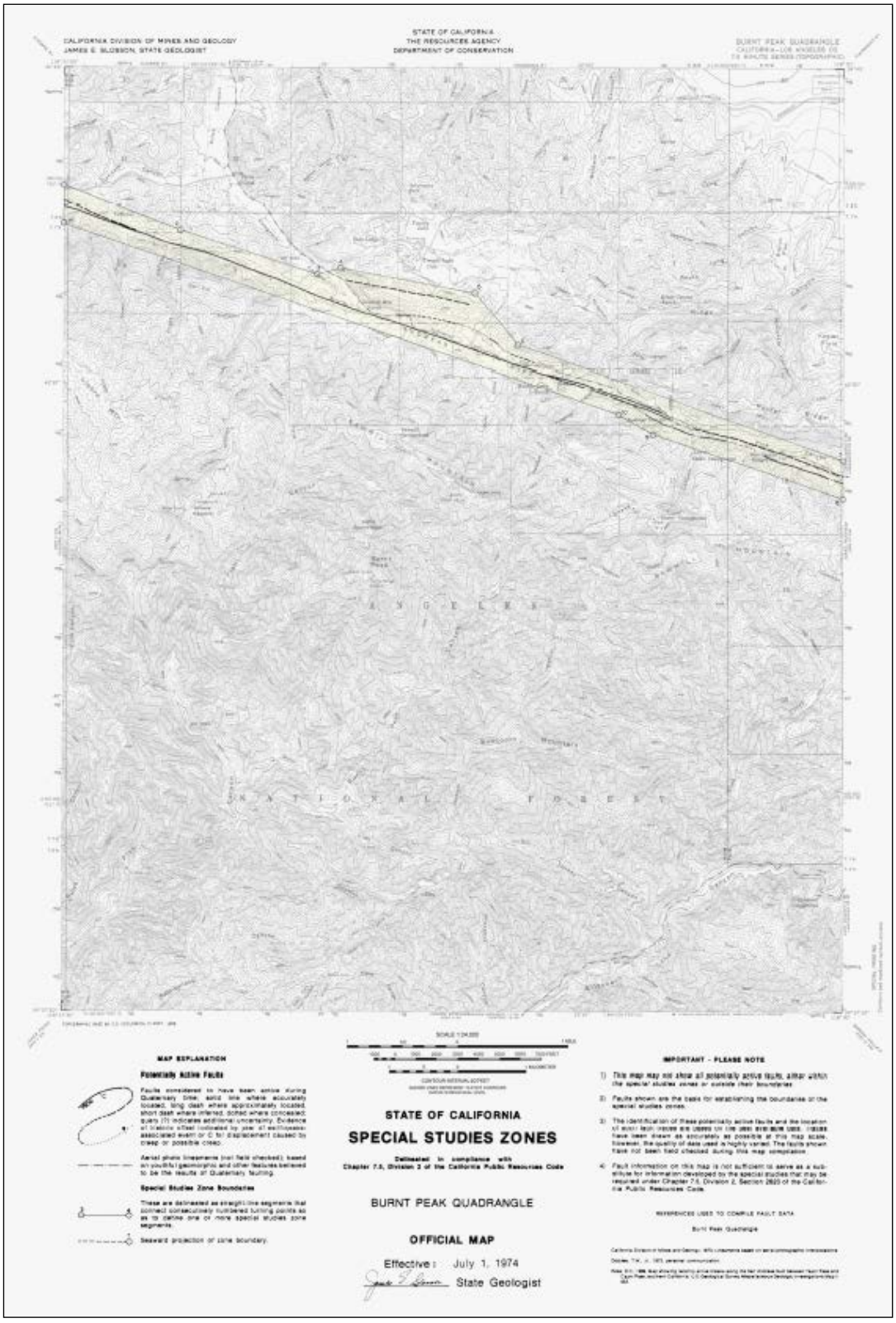
Del Sur Quadrangle



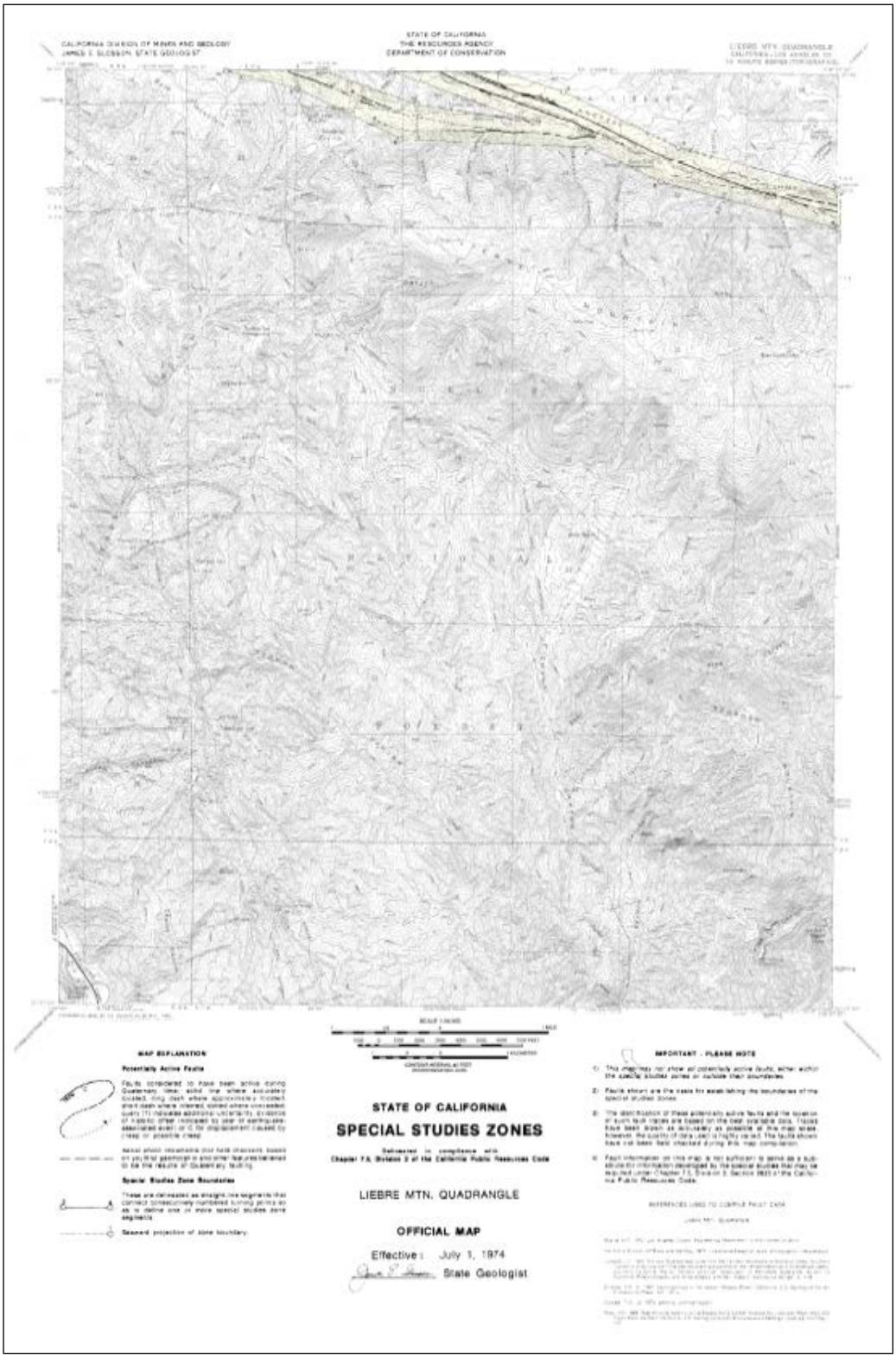
Lake Hughes Quadrangle



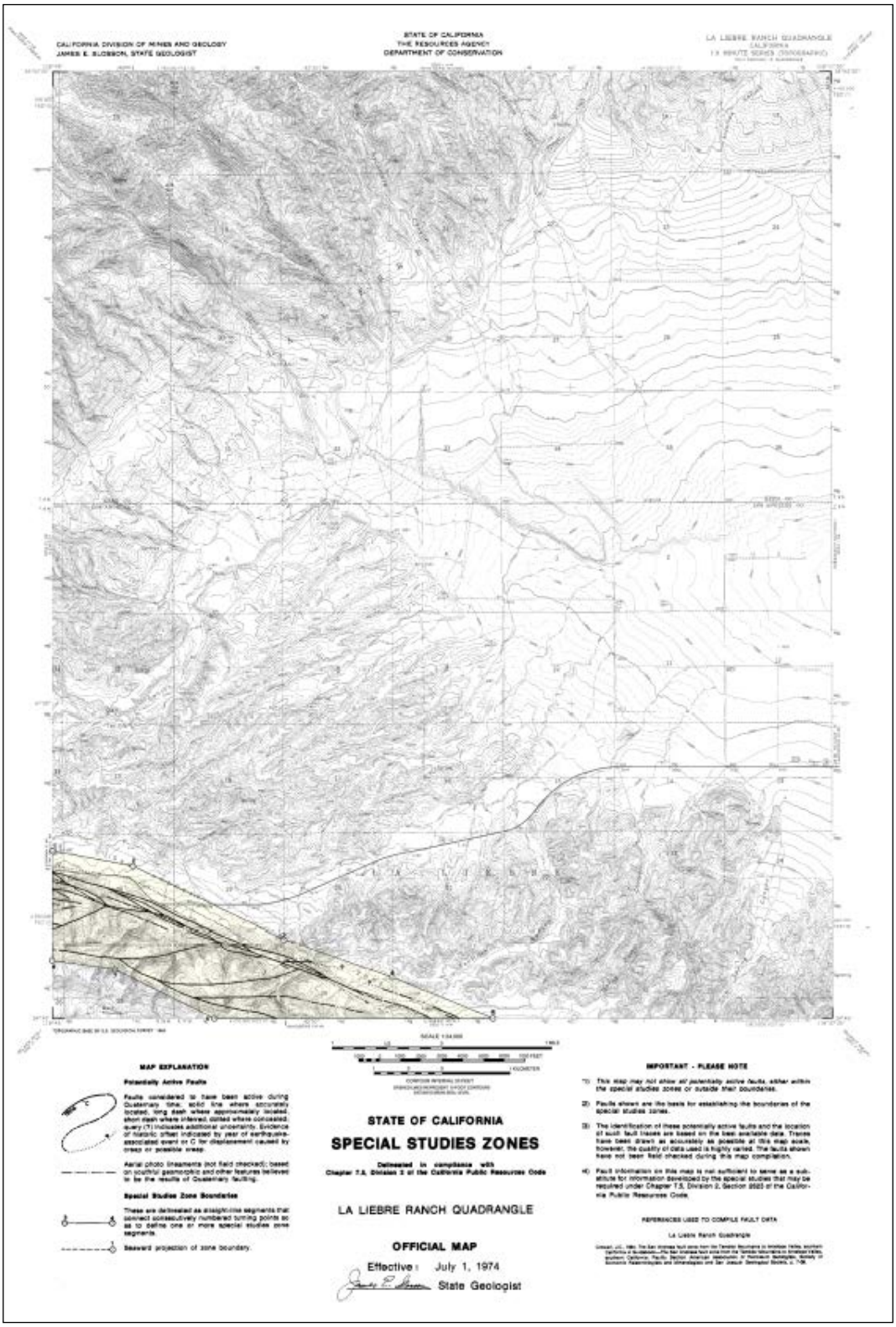
Burnt Peak Quadrangle



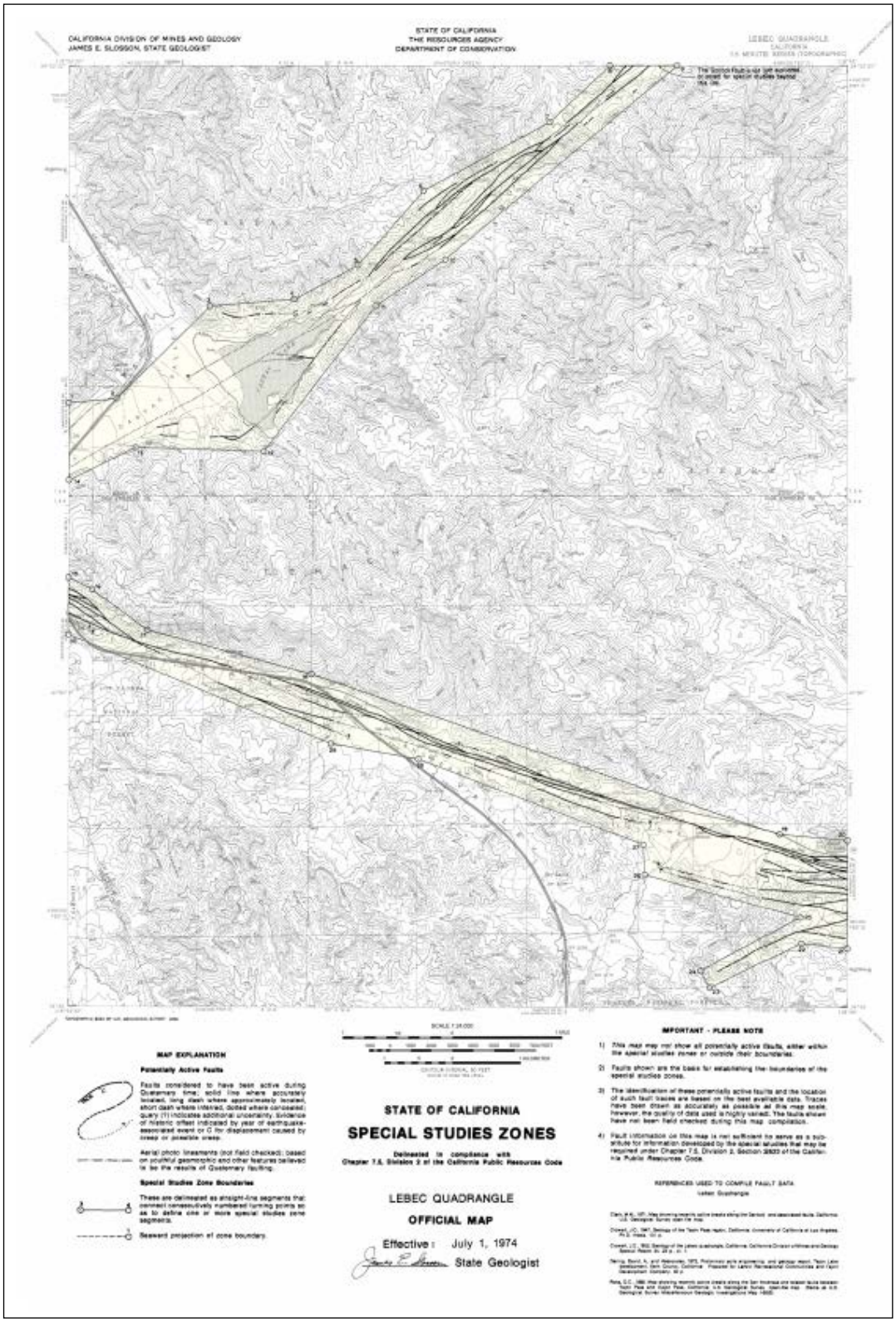
Liebre Mountain Quadrangle



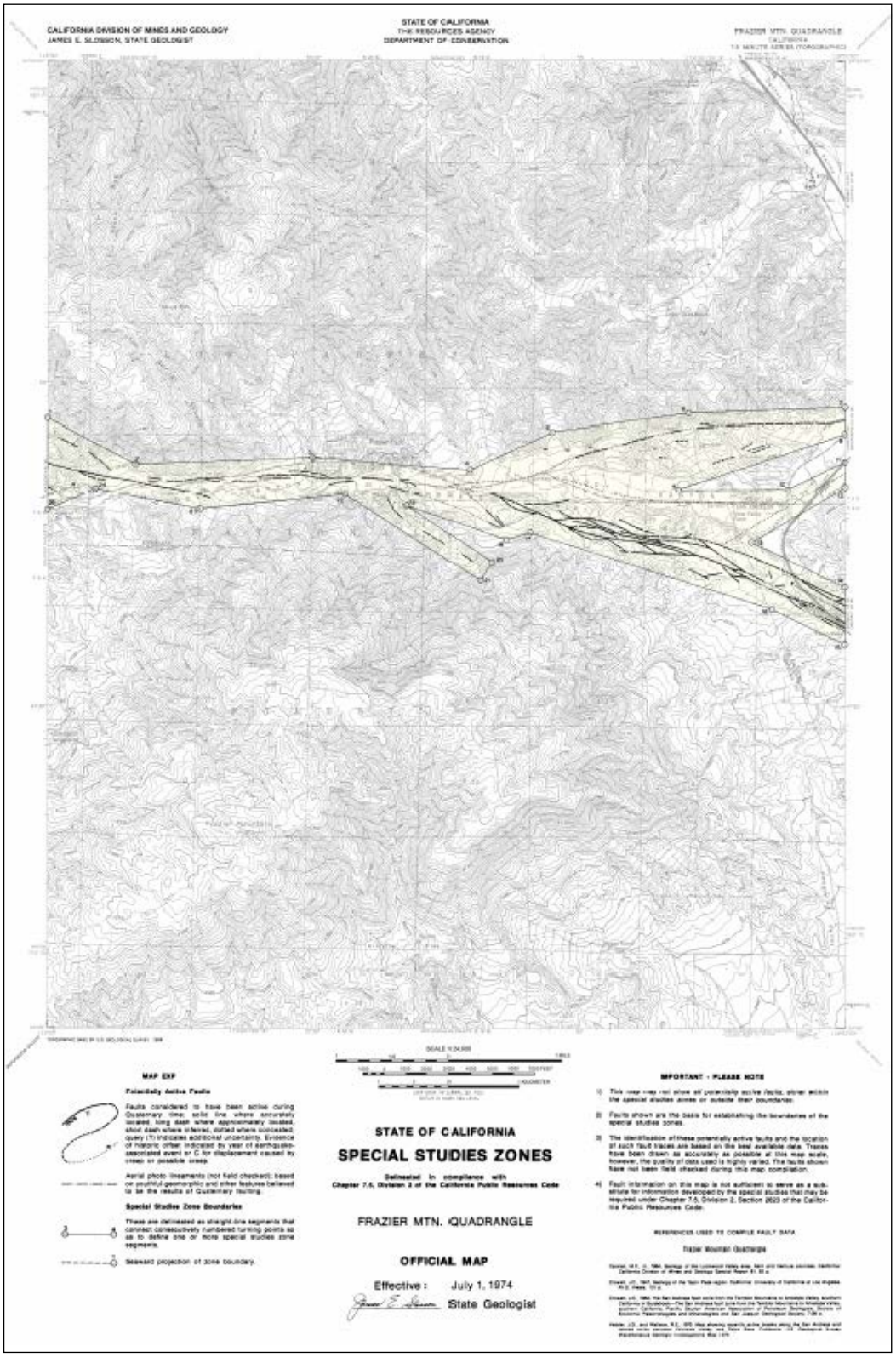
La Liebre Ranch Quadrangle



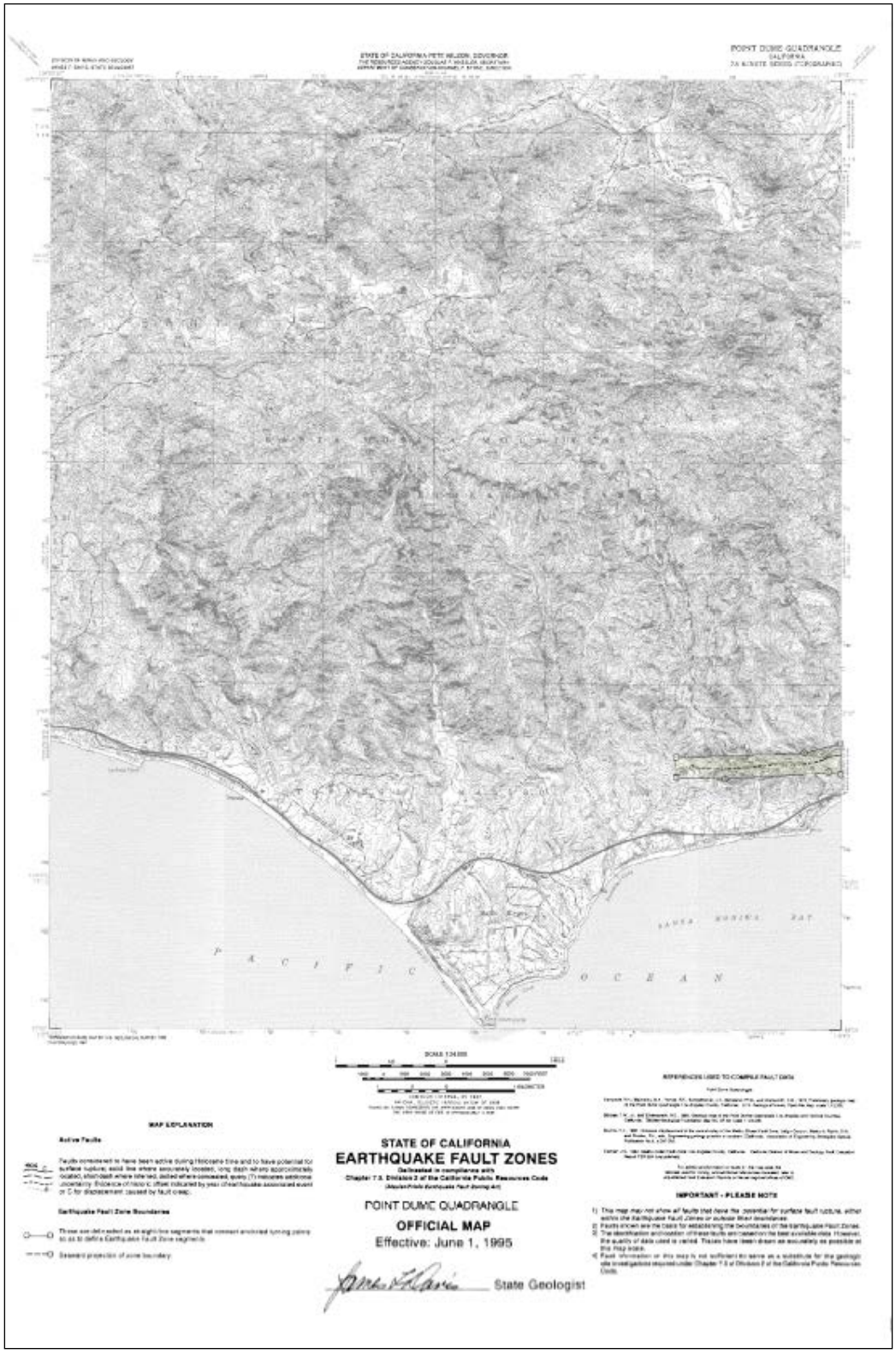
Lebec Quadrangle



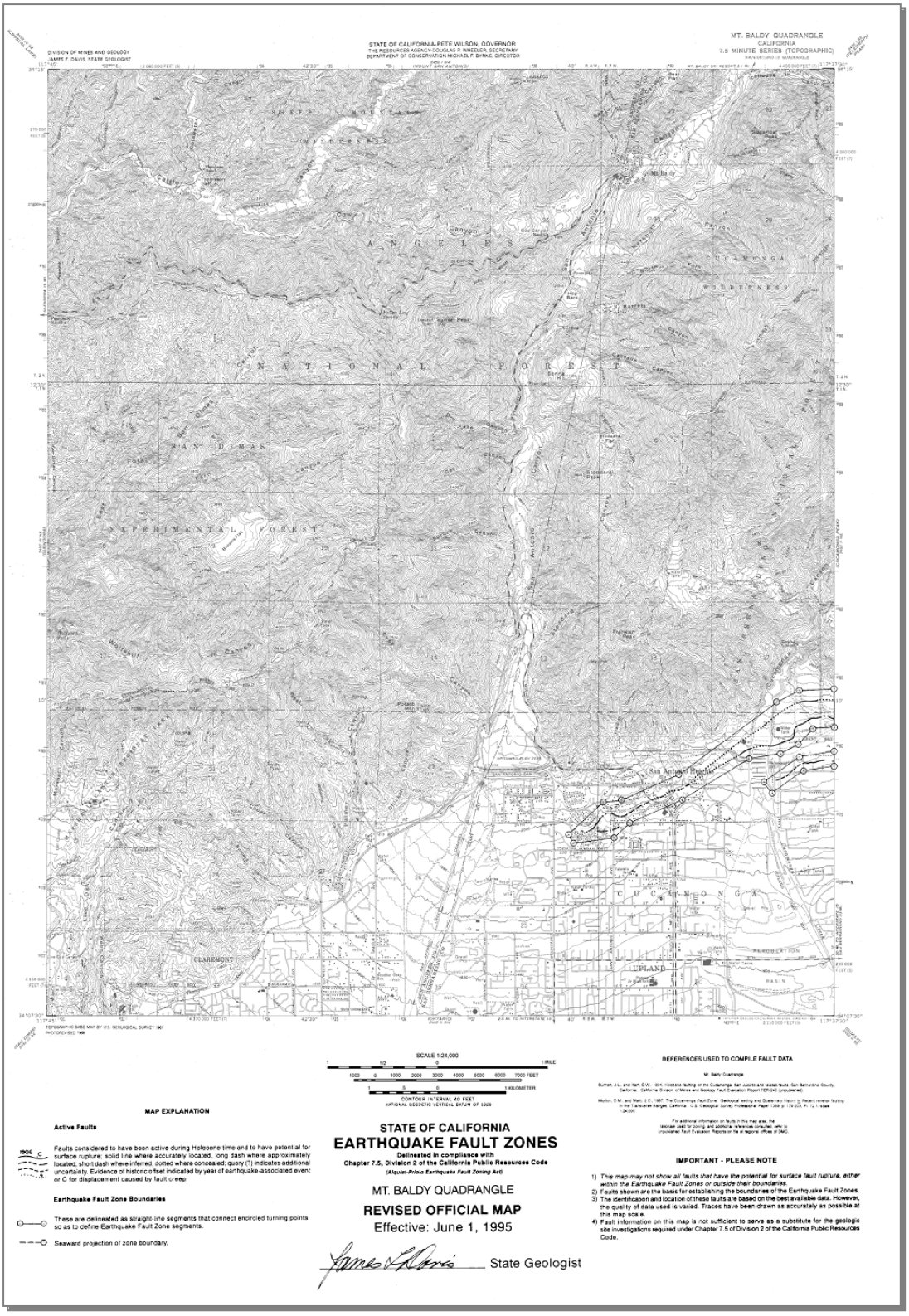
Frazier Mountain Quadrangle



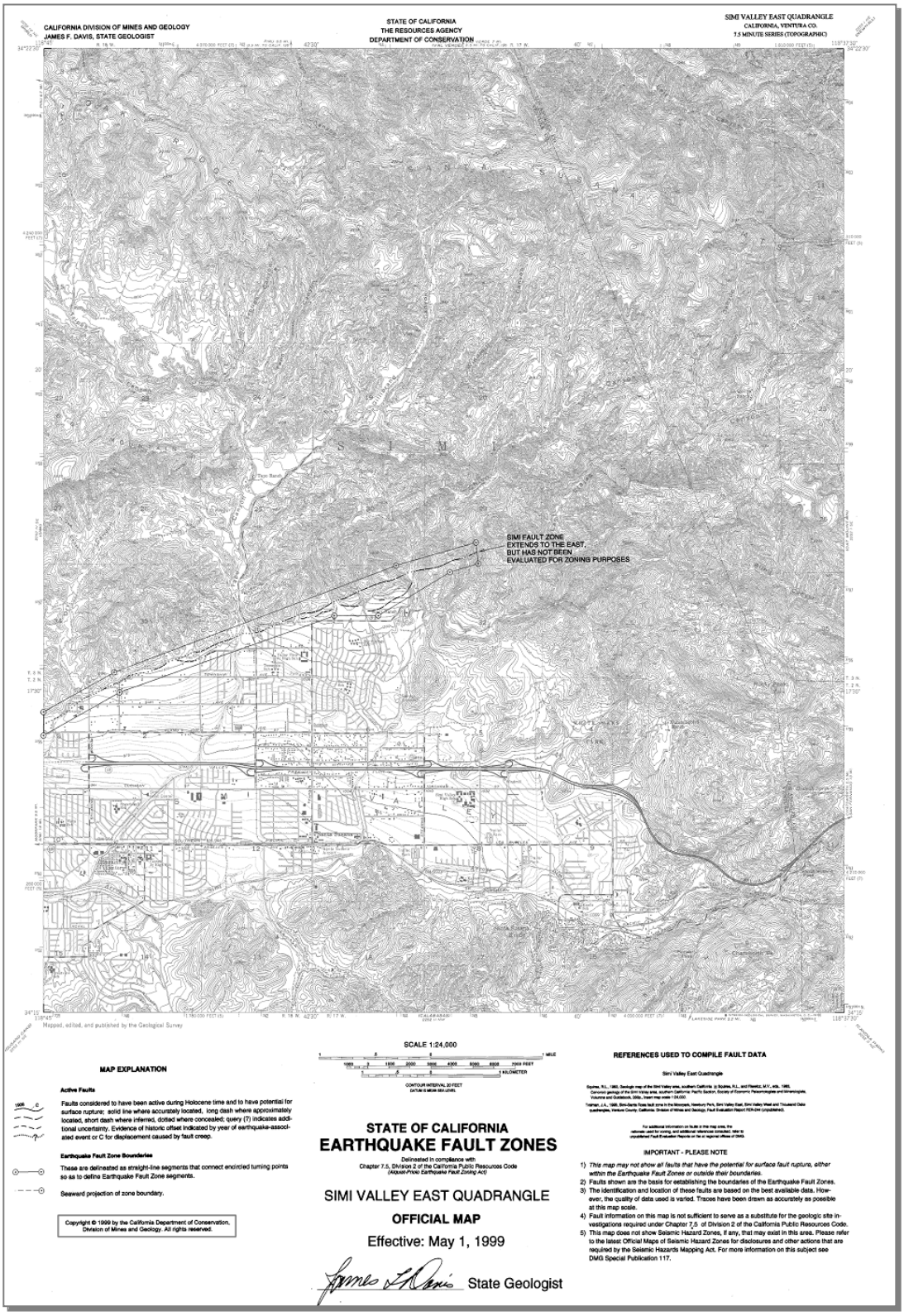
Point Dume Quadrangle



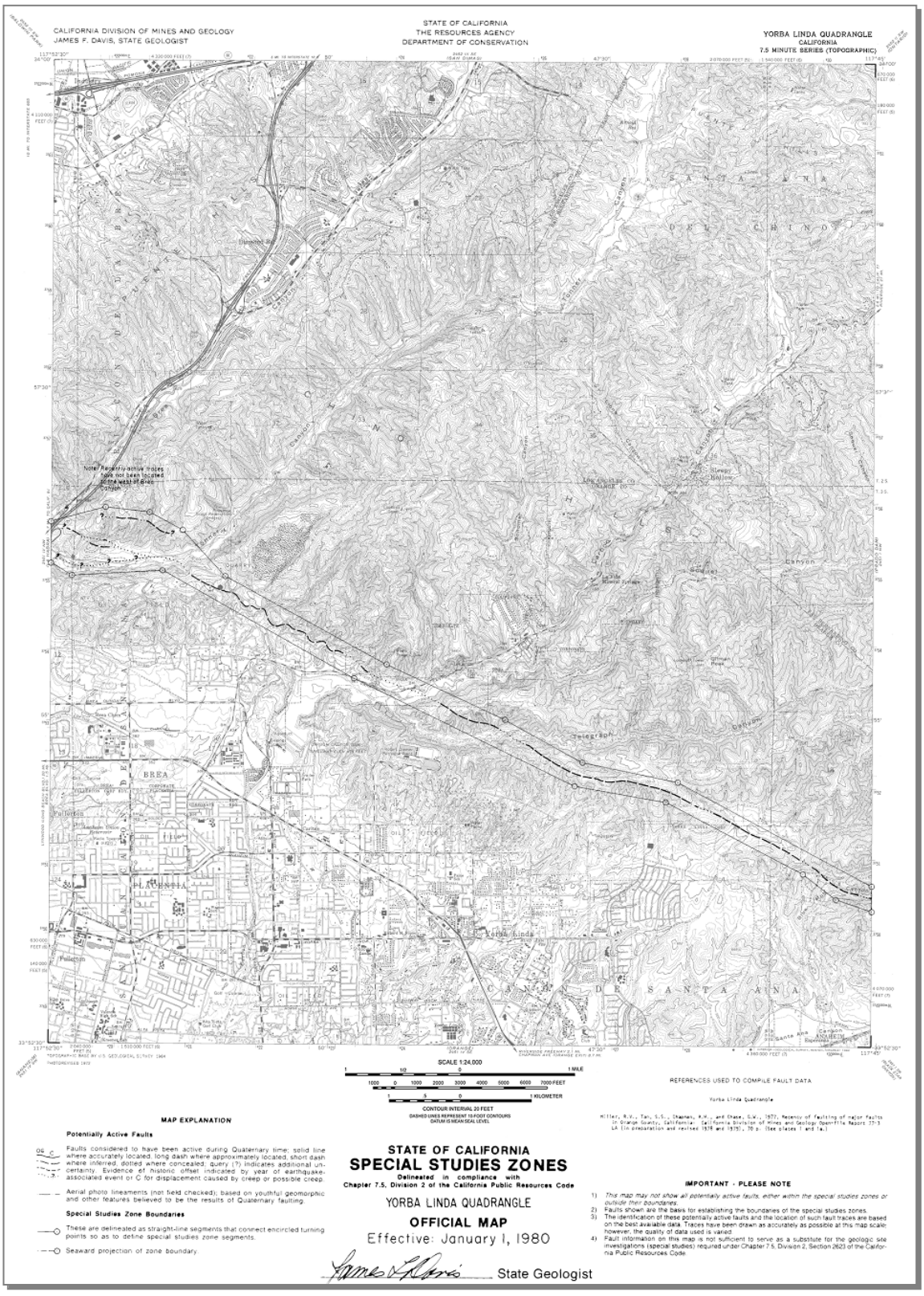
Mt. Baldy Quadrangle



Simi Valley East Quadrangle



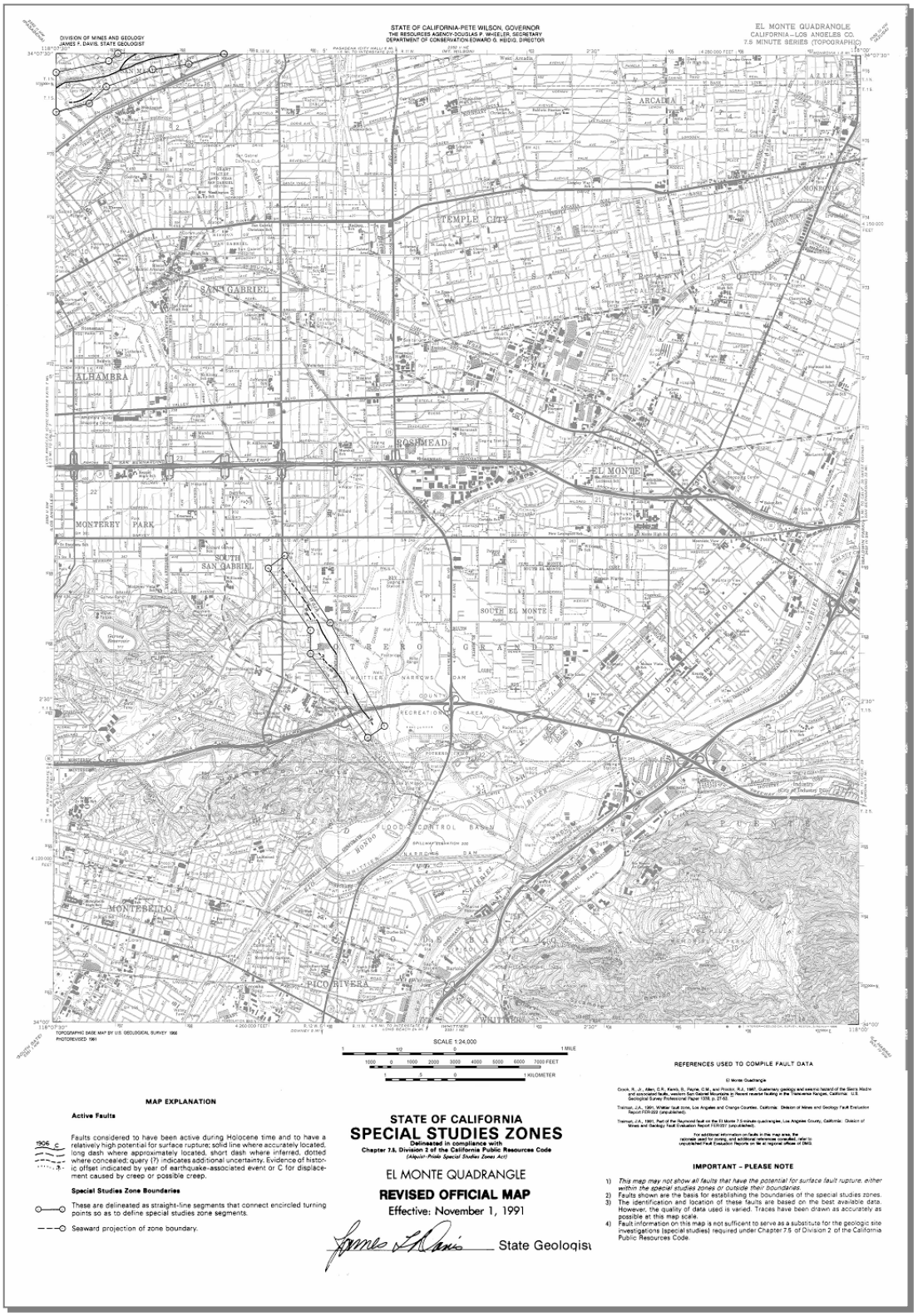
Yorba Linda Quadrangle



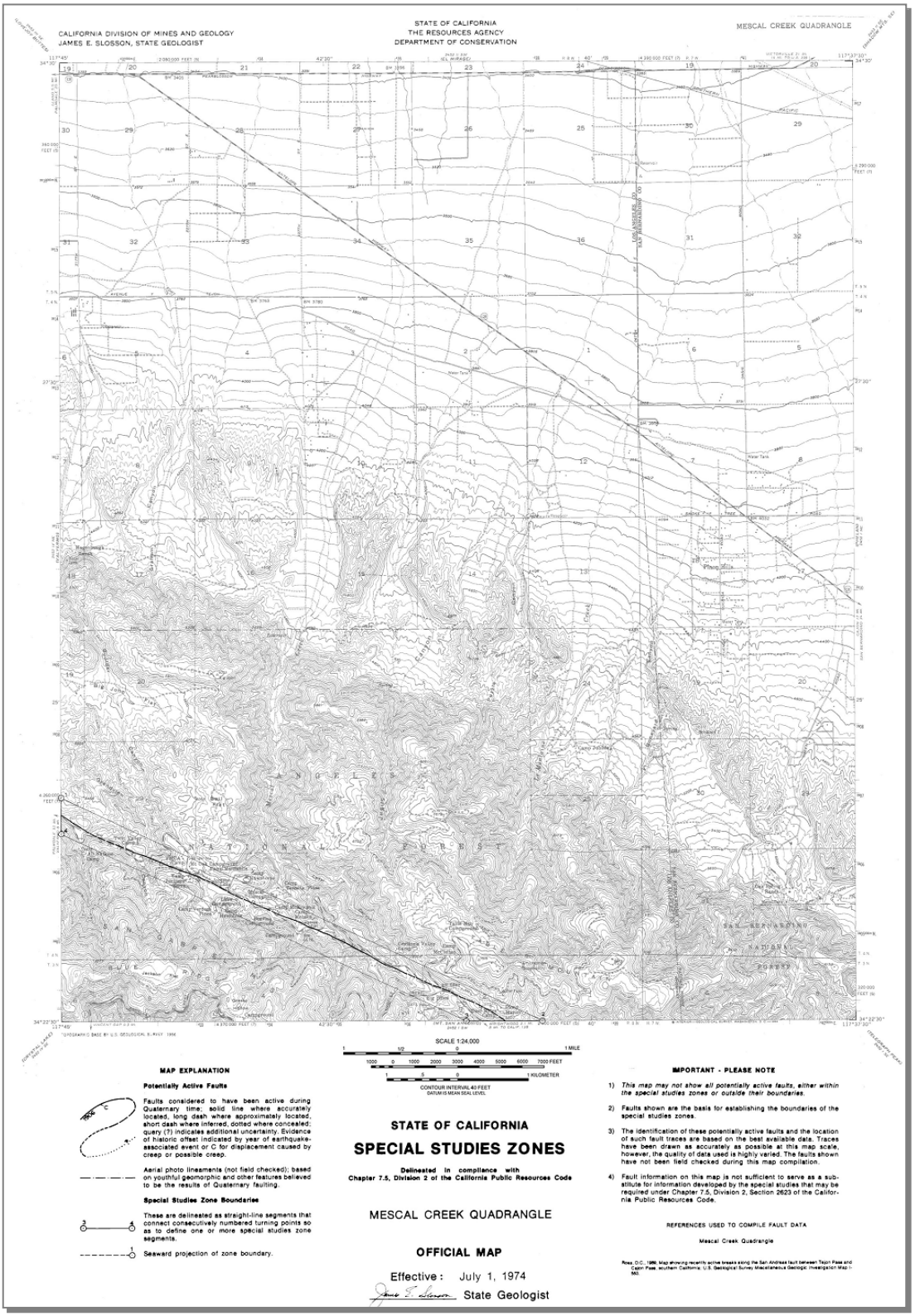
Torrance Quadrangle



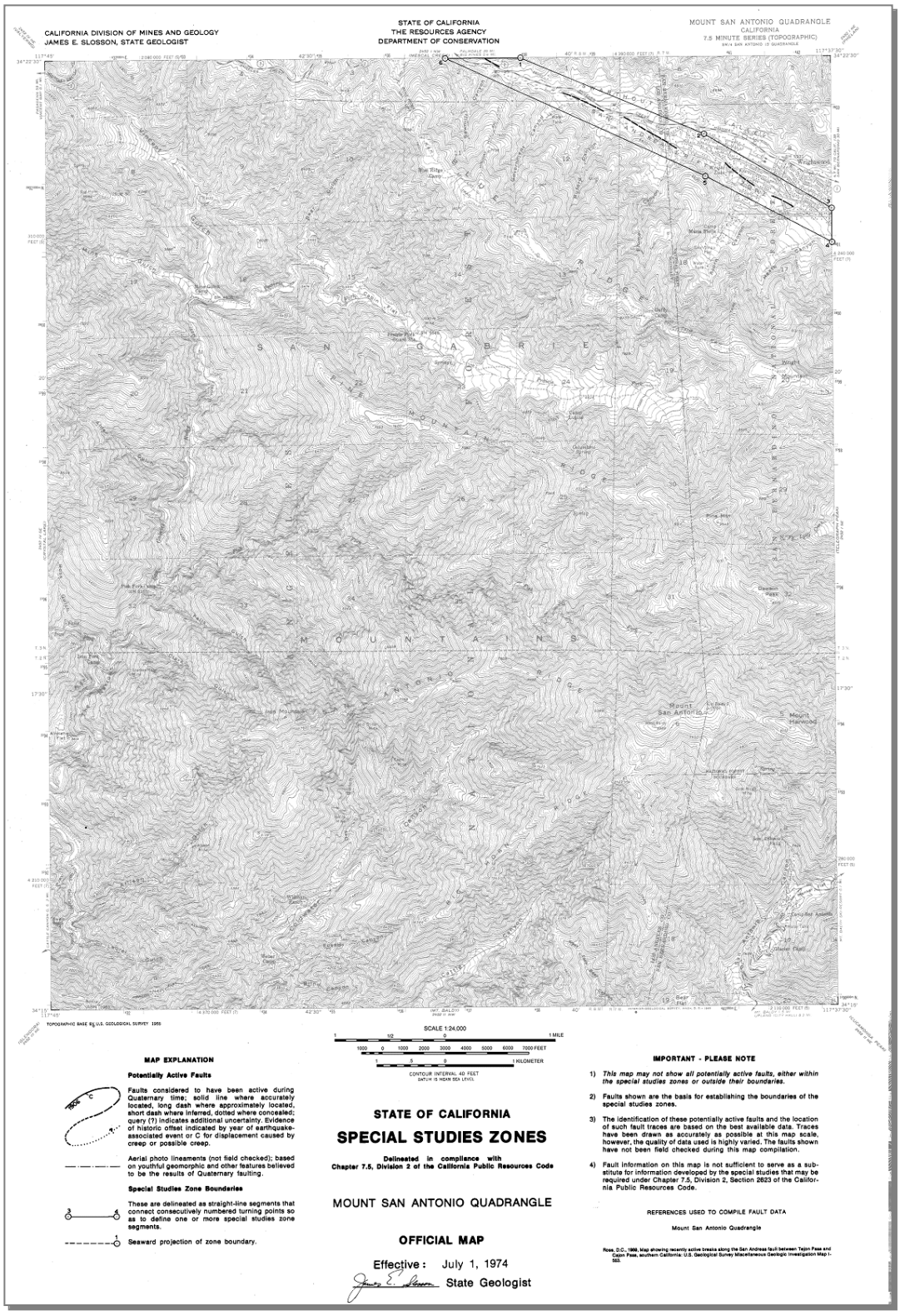
El Monte Quadrangle



Mescal Creek Quadrangle



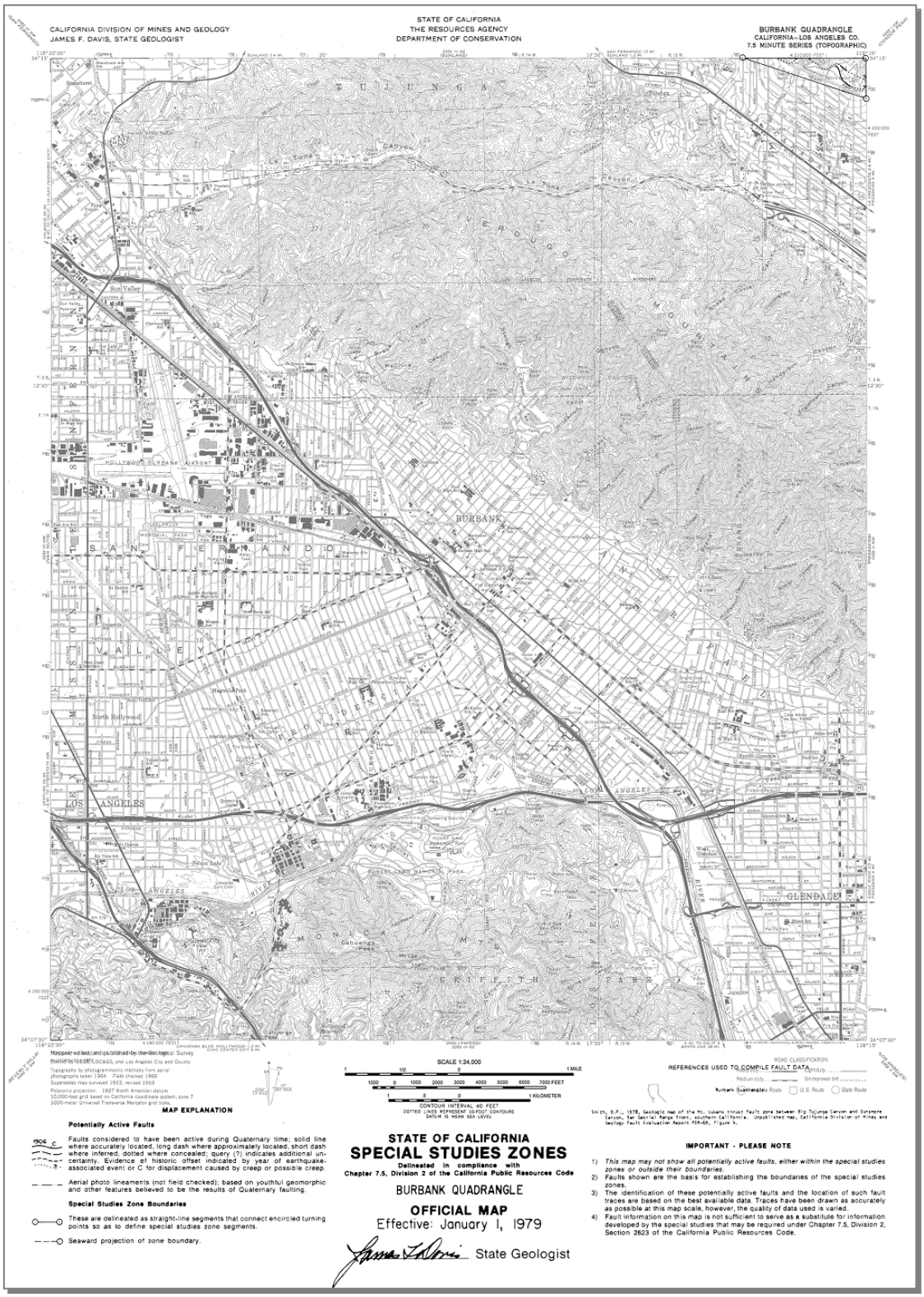
Mt. San Antonio Quadrangle



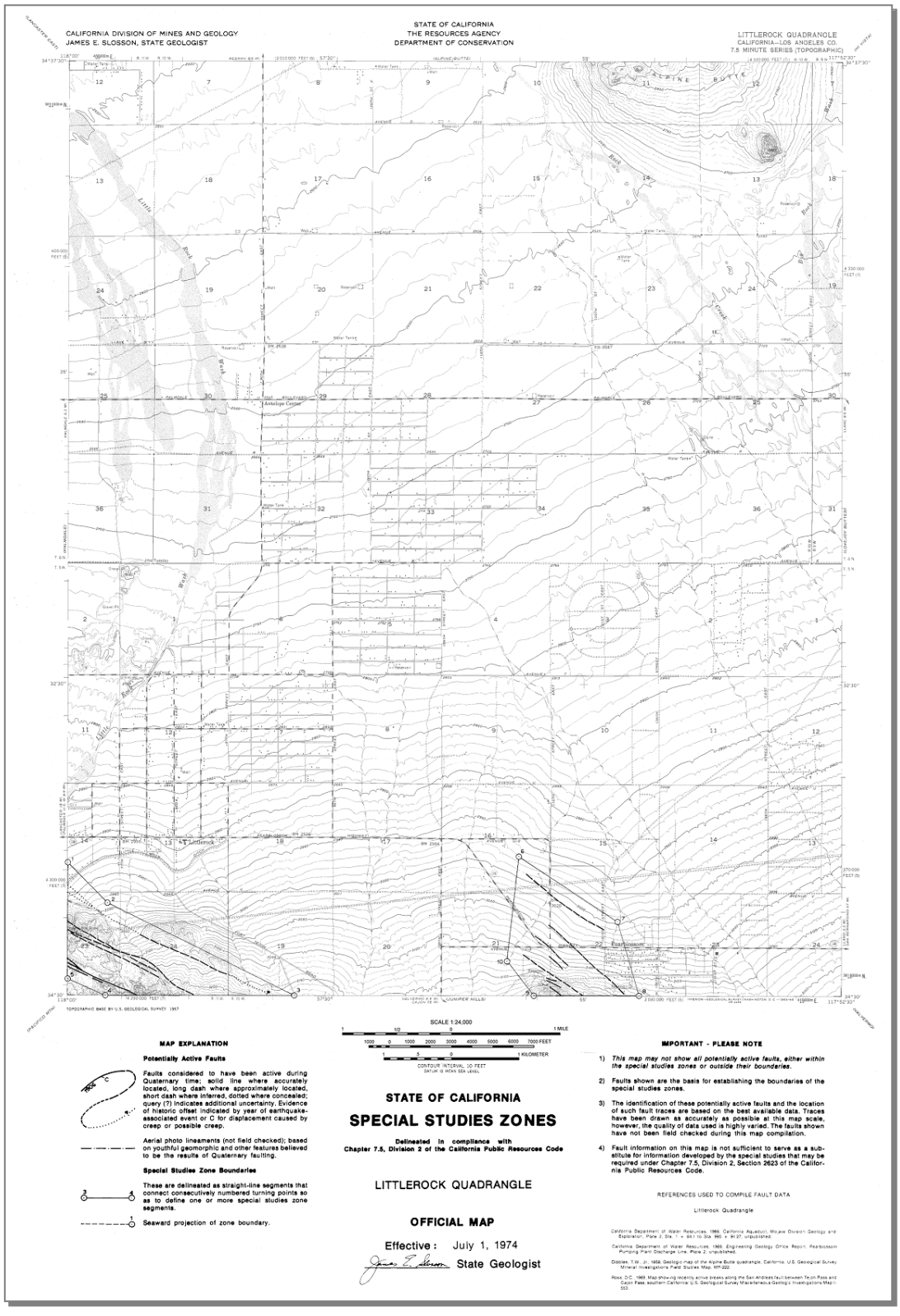
Beverly Hills Quadrangle



Burbank Quadrangle

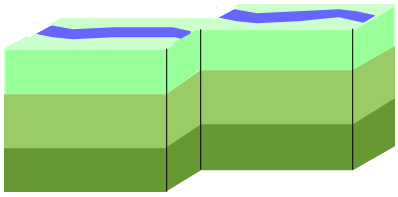


Little Rock Quadrangle



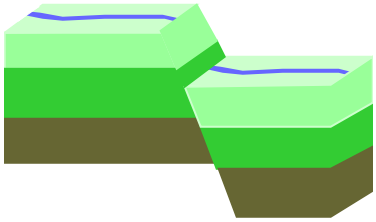
Causes and Characteristics of Earthquakes in Southern California

Fault



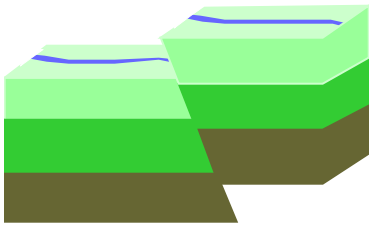
A fault is a fracture between blocks of the earth's crust, where either side moves relative to the other along a parallel plane to the fracture.

Strike-slip



Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observer's perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault; if the block moves left, the shift is called a left lateral fault.

Dip-slip



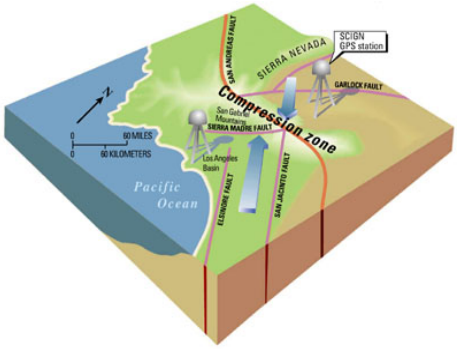
Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault.

Thrust faults

Thrust faults have a reverse fault with a dip of 45° or less.

The earthquakes of California are caused by the movement of huge blocks of the earth's crust. Southern California straddles the boundary between the Pacific and North American plates. These large sections of the earth's crust (the North American plate extends east to Iceland while the Pacific plate extends west to Japan) are moving past each other. The Pacific plate is moving northwest, scraping horizontally past North America at a rate of about 50 millimeters (2 inches) per year.

About two-thirds of those 50 millimeters per year occurs on the San Andreas Fault and some parallel faults—the San Jacinto, Elsinore, and Imperial Faults. These four faults are among the fastest moving, and therefore most dangerous, in Southern California. Over time, these four faults produce about half of the significant earthquakes of our region.



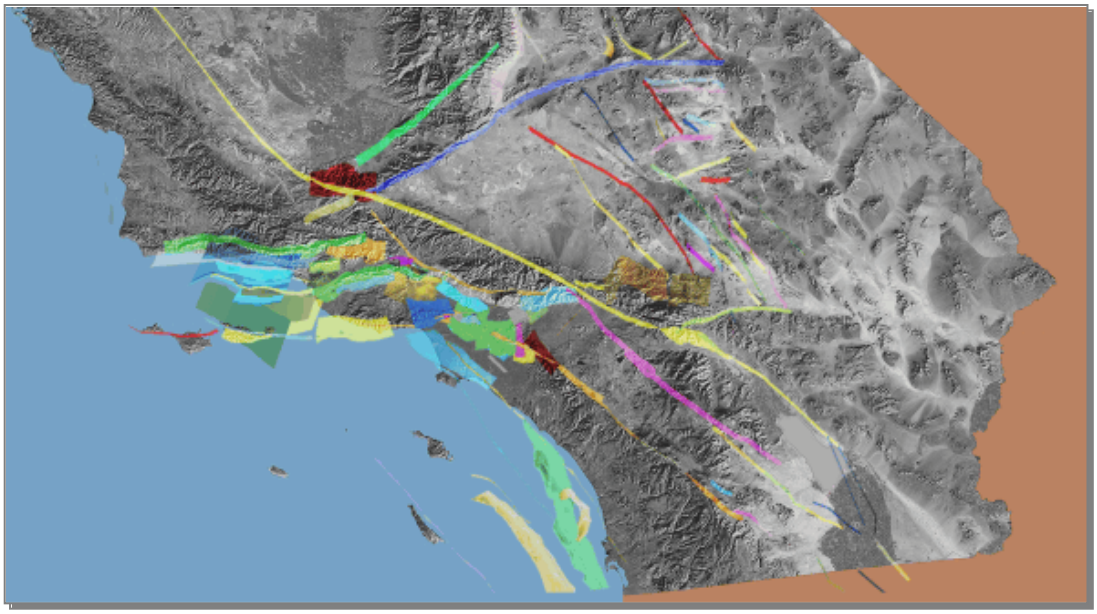
However, this is not the whole picture. Unlike Central and Northern California, much of this plate movement in Southern California is not parallel to the San Andreas Fault. Between the southern end of the San Joaquin Valley and the San Bernardino Mountains, in the so-called "big bend," the San Andreas Fault runs in a more westerly direction.

A schematic block model of Southern California showing the motion of the Pacific and North American plates, and the big bend of the San Andreas Fault where the plates squeeze together.

Where the fault bends, plate motion is complex. The Pacific and North American plates push into each other, compressing the earth's crust into the mountains of Southern California and producing faults and earthquakes. While these 300 or so faults are generally much shorter and slower moving than the four faults mentioned previously, over half of the significant earthquakes in Southern California occur on these faults.

The greatest concentration of these faults is in and near the mountains that have formed around the big bend of the San Andreas Fault (the San Bernardino, San Gabriel, and Santa Ynez Mountains). These mountains, like most mountains in California, are there because earthquakes are pushing them up. Many of these faults can be detected at the earth's surface, though some are buried beneath the sediments of the Los Angeles Basin and the inland valleys.

Map 5-16: Earthquake Faults in Southern California



(SCEC Community Fault Model courtesy of Andreas Plesch, Harvard) This map shows the three-dimensional structure of major faults beneath Southern California. Vertical faults such as the San Andreas (yellow band from top left to bottom right) are shown as a thin strip. Faults that are at an angle to the surface are shown as wider ribbons of color. The fault nearest to you might be a few miles beneath your home. Areas that seem to have few faults can still experience strong shaking from earthquakes on unmapped faults, or from large earthquakes on distant faults.

Geologic Rates

The movement between the Pacific and North American plates, 50 millimeters (2 inches) each year, is about how fast your fingernails grow, but it has been going on for eons. Los Angeles City Hall is now 3 meters (10 feet) closer to San Francisco than when it was built in 1924. It would take a mere (geologically speaking) 2 million years for your nails to extend 100 kilometers (60 miles) from San Bernardino to Palmdale. It took many millions of years for our faults to slip enough, and rocks to move enough, to shape Southern California's current landscape.

Unknown Faults

As the Northridge earthquake confirmed, some faults are not known until they move in large and damaging earthquakes. What do we do about the faults we can't see and don't know about yet? Do we still have to wait until the next earthquake reveals them?

Not necessarily. In 2001, scientists of the Southern California Earthquake Center completed the Southern California Integrated GPS Network (SCIGN), an advanced system of 250 global positioning system (GPS) receivers. With this network the positions of locations throughout Southern California can be precisely measured.

By measuring these locations for several years, we can see how different sites are moving relative to each other—for instance, Palos Verdes is moving toward Pasadena at about 4 millimeters (5/32 inch) per year. If movement between two locations is greater than the movement on known faults, then we have a reasonable idea that there may be another fault in the area, perhaps buried by sediment. This can lead to focused research using other methods to identify the unknown fault.

(Source: Southern California Earthquake Center)

Earthquake-Related Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Fault Rupture

The potential for ground rupture due to fault movement is related to the seismic activity of known fault zones. These regions are near major, active faults and will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong, modern buildings. The regions distant from known, active faults will experience lower levels of shaking.

Earthquake Shaking Potential in Southern California

Residents cannot live in Southern California worrying about every one of the more than 300 faults described on the previous page. We also do not need to. As described on [previous] pages, the ground shaking in an earthquake depends on the magnitude, the distance from the fault, and local soil conditions. For, example, look at the patterns of shaking for two different earthquakes in these figures. The magnitude 4.2 earthquake produced stronger shaking near Beverly Hills than did the much larger but more distant magnitude 7.1 Hector Mine earthquake. These patterns can be simulated by computers to make maps of the shaking to expect from any potential earthquake. Shaking intensities from all possible earthquakes are added to determine the total hazard for each site.

Each area of Southern California will be shaken by a different set of earthquakes, though larger earthquakes may shake many areas. In the long run most everywhere in Southern California will experience heavy earthquake shaking. Some locations will experience such shaking more frequently because they are closer to more faults or have local soil conditions that amplify earthquake shaking.

Unfortunately, scientists do not yet have the information needed to predict which earthquakes will happen first, so we must be ready for the shaking in our area from any possible earthquake. To help, scientists have summed up the probable shaking from all our known faults to create this map.

It shows the relative intensity of ground shaking in California from all anticipated future earthquakes. Areas in red and pink are nearer major, active faults and on average experience stronger earthquake shaking more frequently. Although the greatest hazard is in these areas, no region within the state is immune from the potential for earthquake damage.

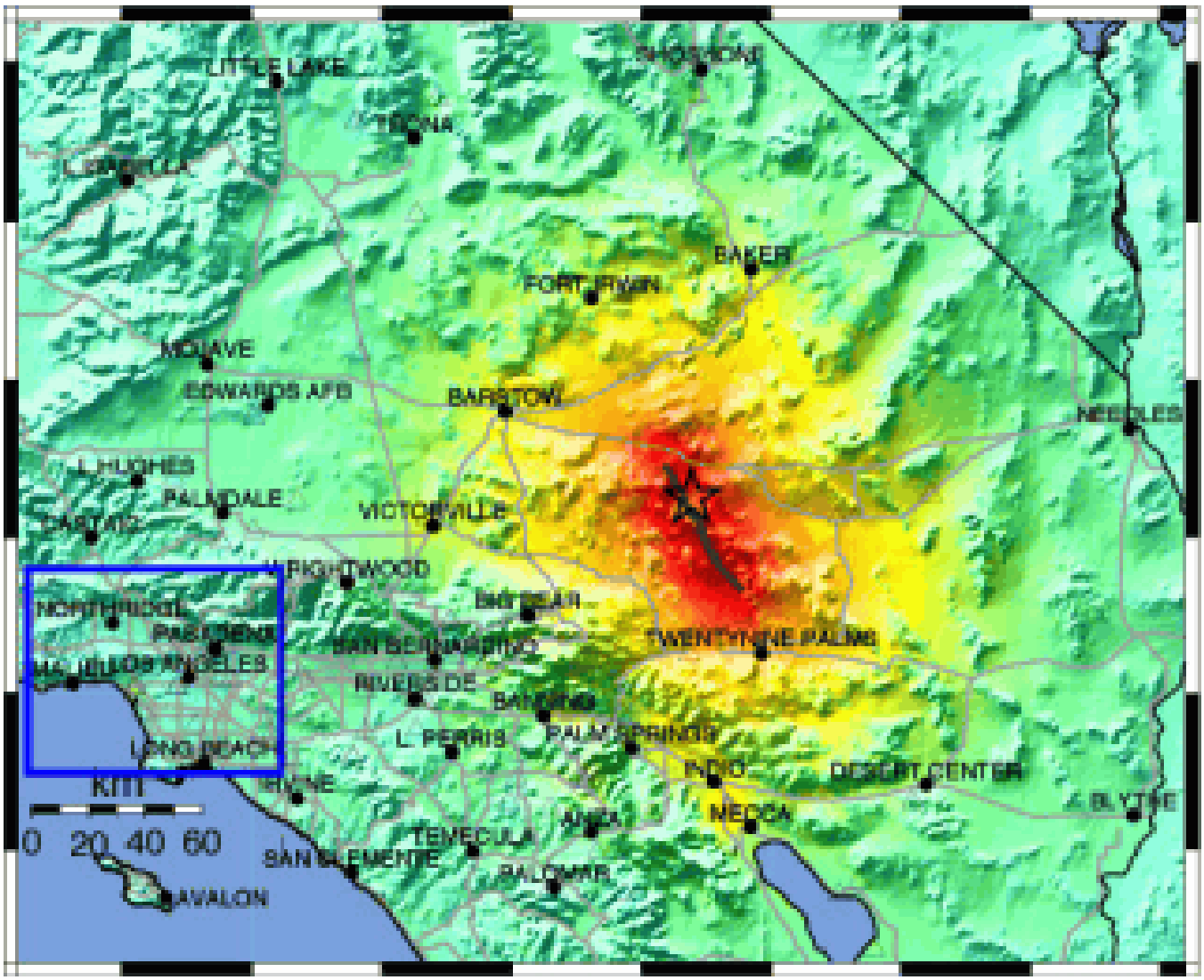
Rapid Instrumental Intensity Maps

A small nearby earthquake can cause more shaking than a distant large earthquake, as shown in the intensity maps for the magnitude 7.1 Hector Mine earthquake and the magnitude 4.2 Beverly Hills earthquake. The following ShakeMaps are for historical and projected seismic events.

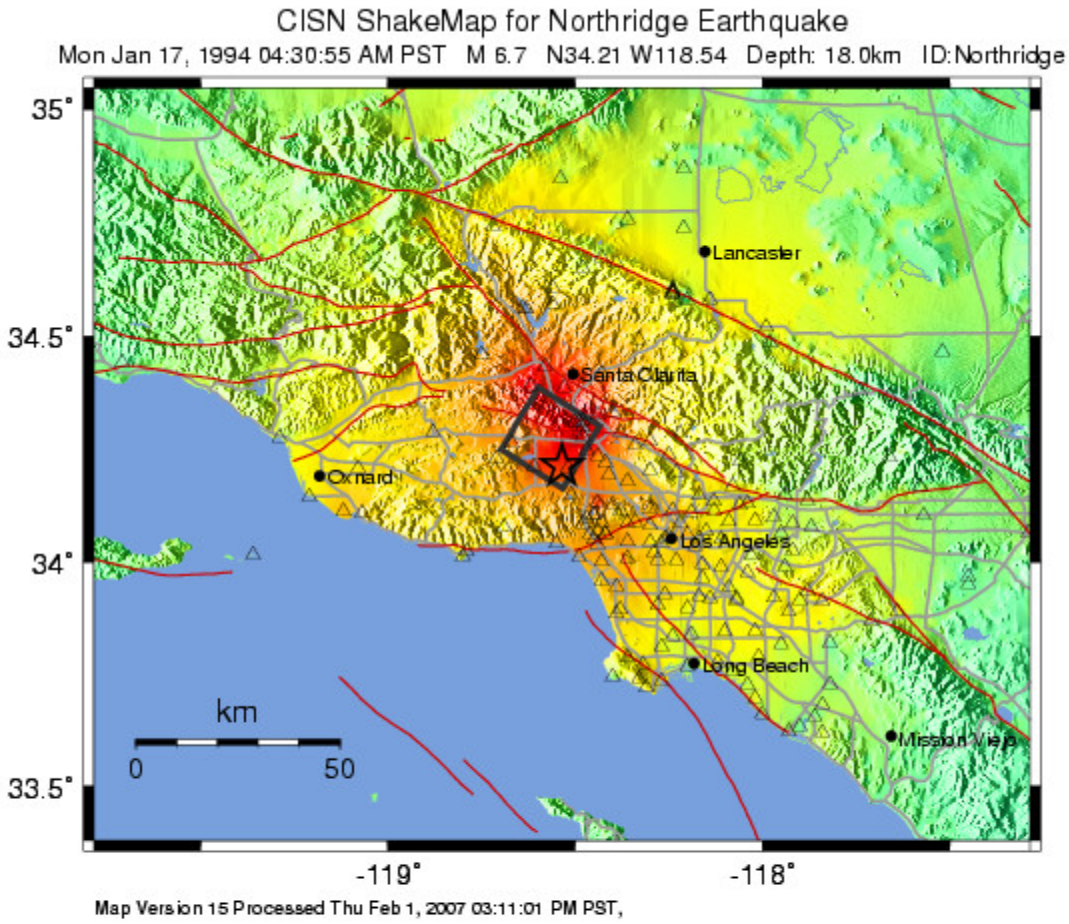
Map 5-17: Magnitude 7.1 Hector Mine Earthquake

Saturday, October 16, 1999 03:04:53 a.m. PDT

(Source: conserve.ca.gov)



Map 5-18: ShakeMap for Northridge Earthquake
(Source: conserve.ca.gov)



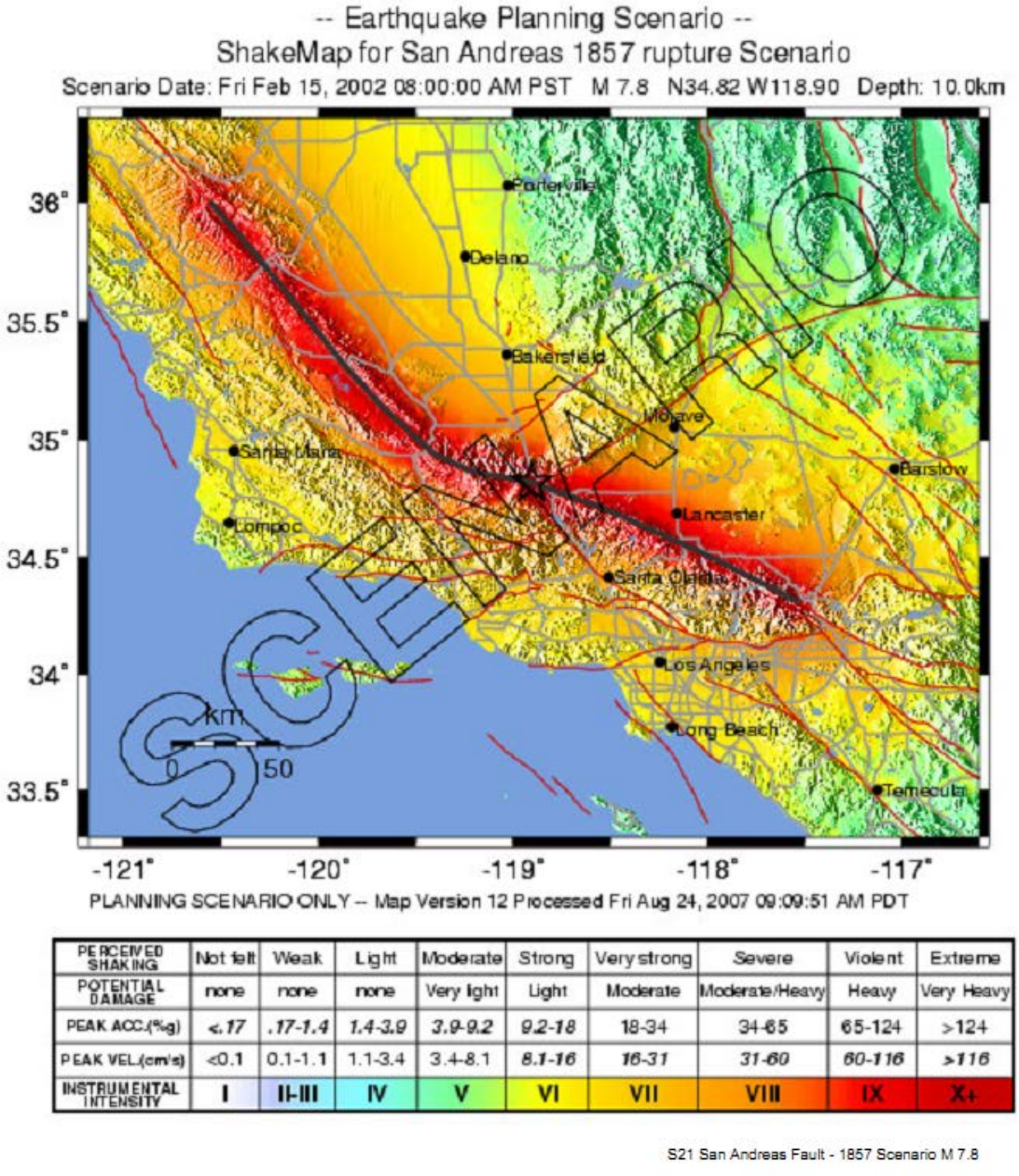
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Map 5-19: ShakeMap for Whittier-Narrows Earthquake
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

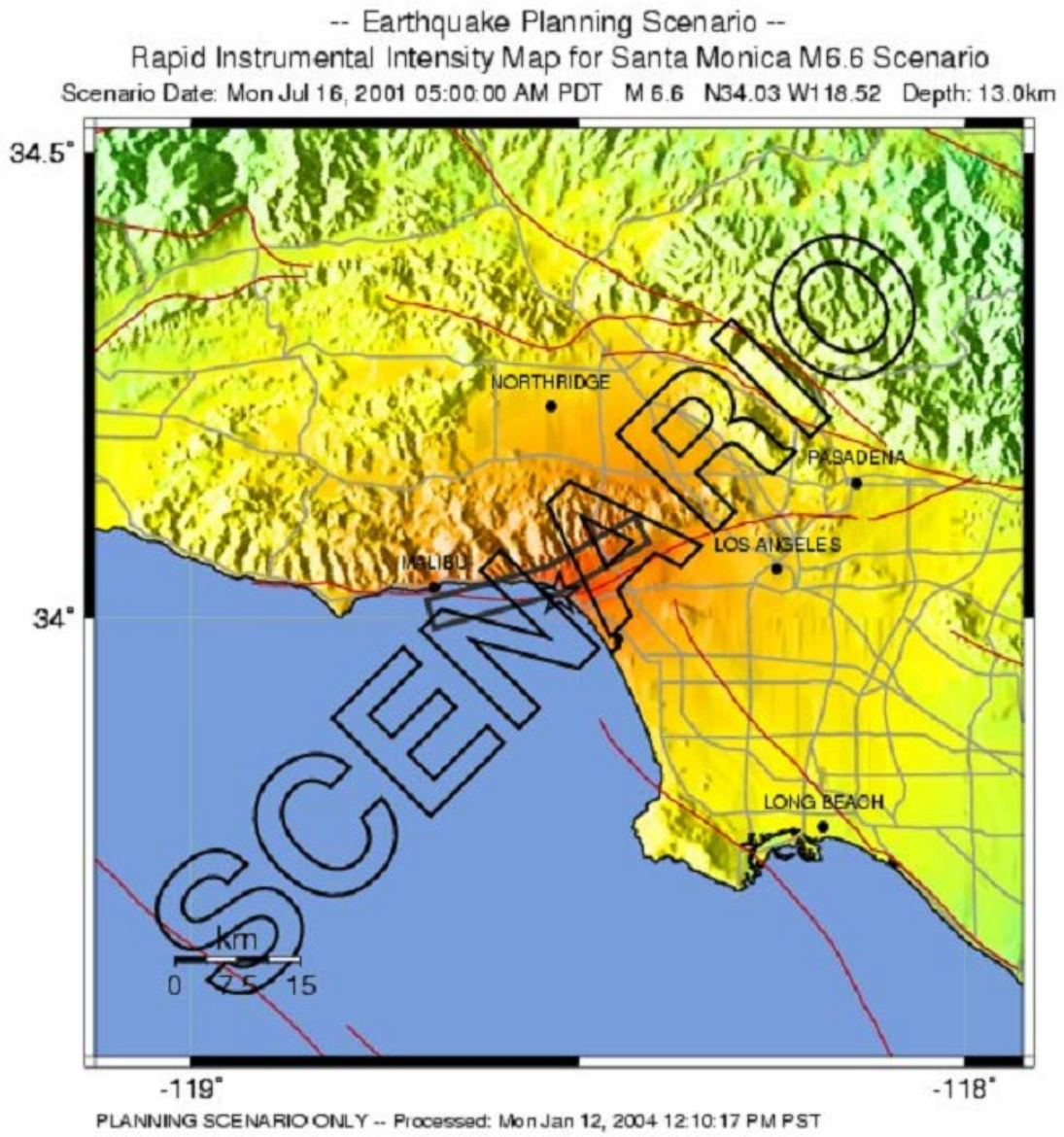
Map 5-20: ShakeMap for San Andreas 1857 Rupture M7.8
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S21 San Andreas Fault - 1857 Scenario M 7.8

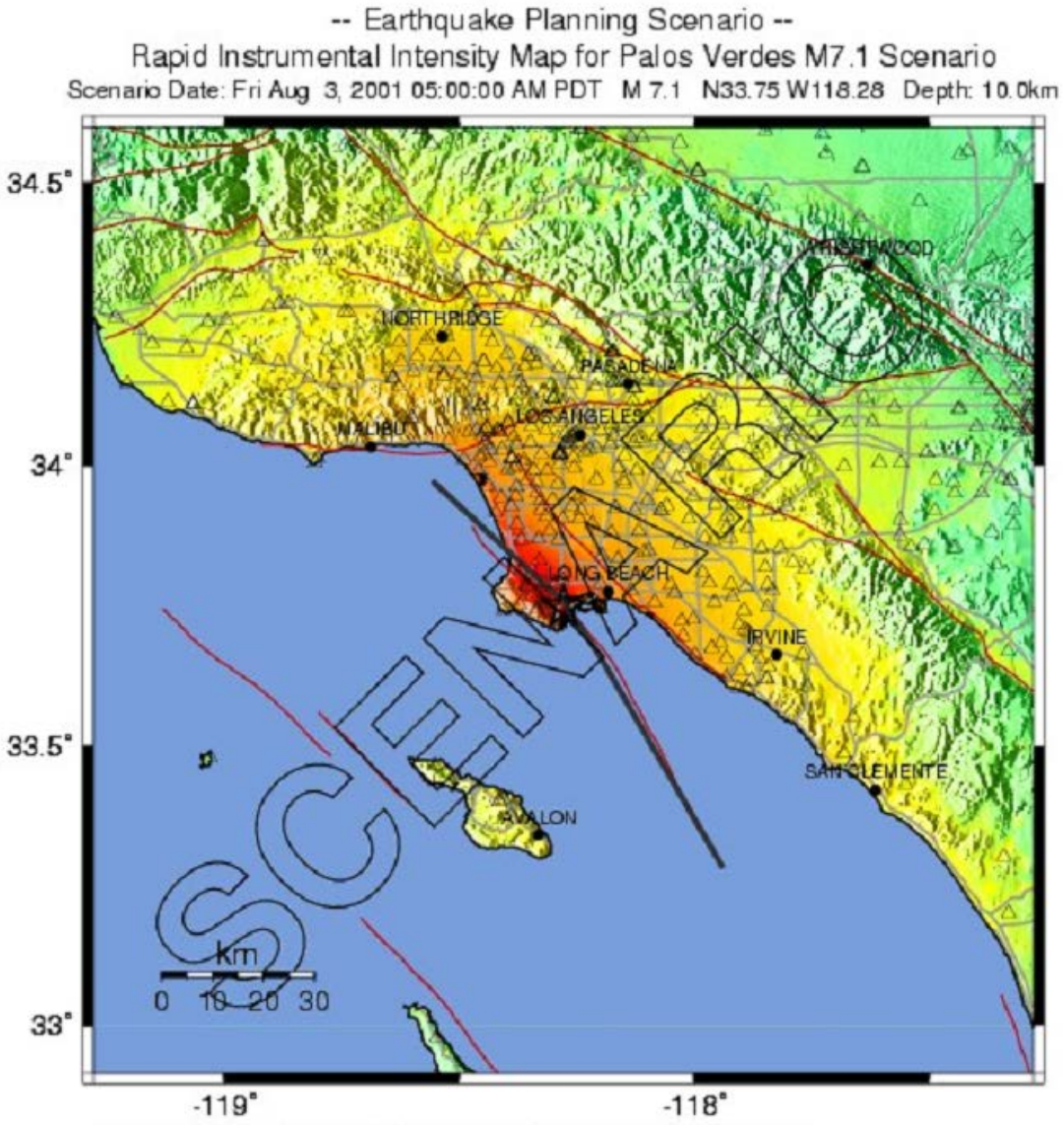
Map 5-21: ShakeMap for Santa Monica M6.6
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S19 Santa Monica Fault Scenario M 6.6

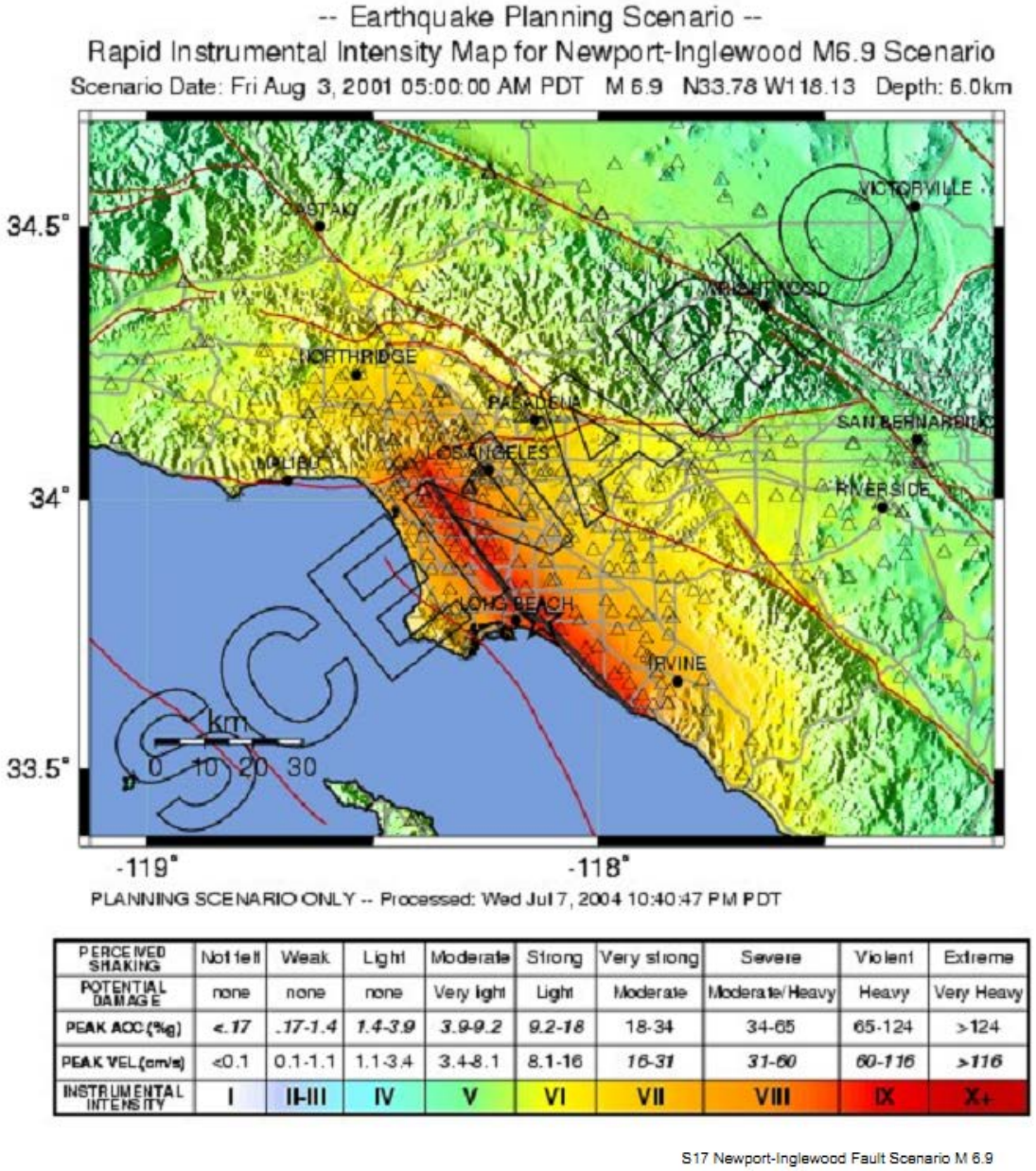
Map 5-22: ShakeMap for Palos Verdes M7.1
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S18 Palos-Verdes Fault Scenario M 7.1

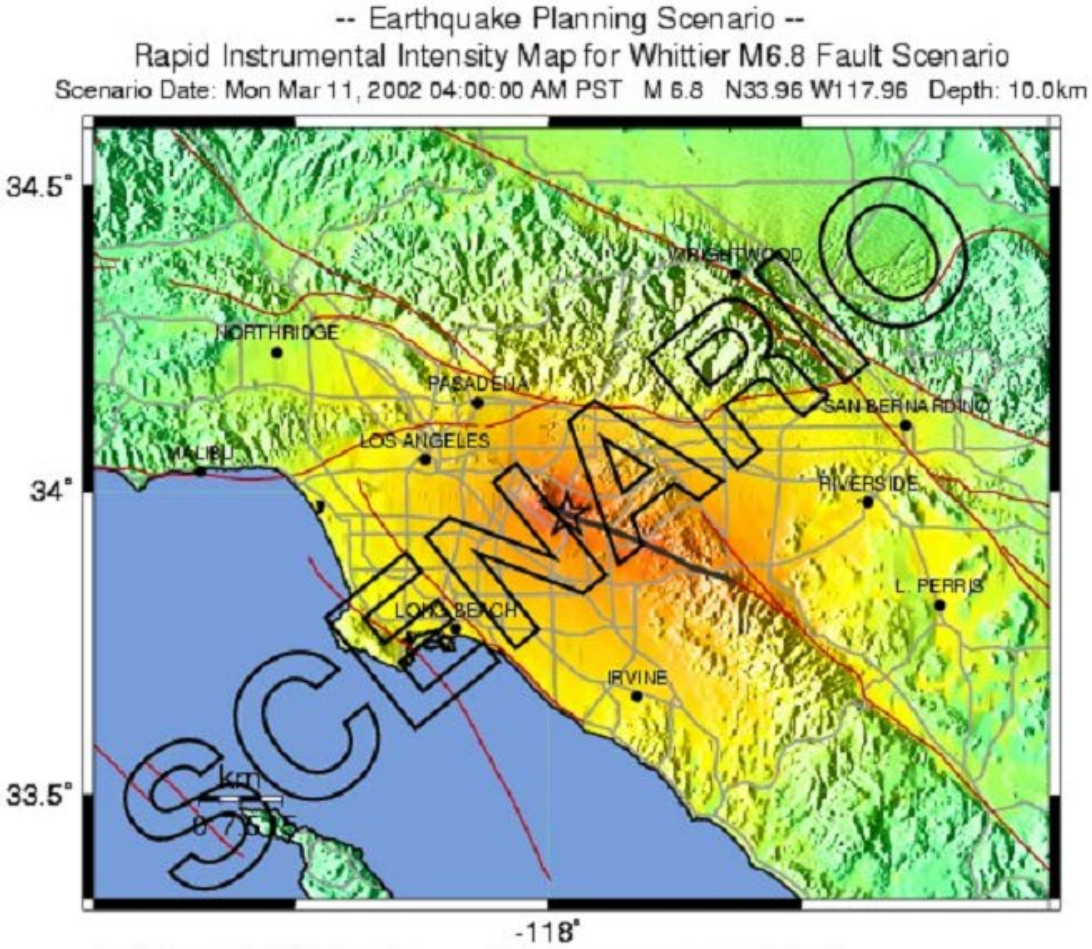
Map 5-23: ShakeMap for Newport-Inglewood M6.9
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S17 Newport-Inglewood Fault Scenario M 6.9

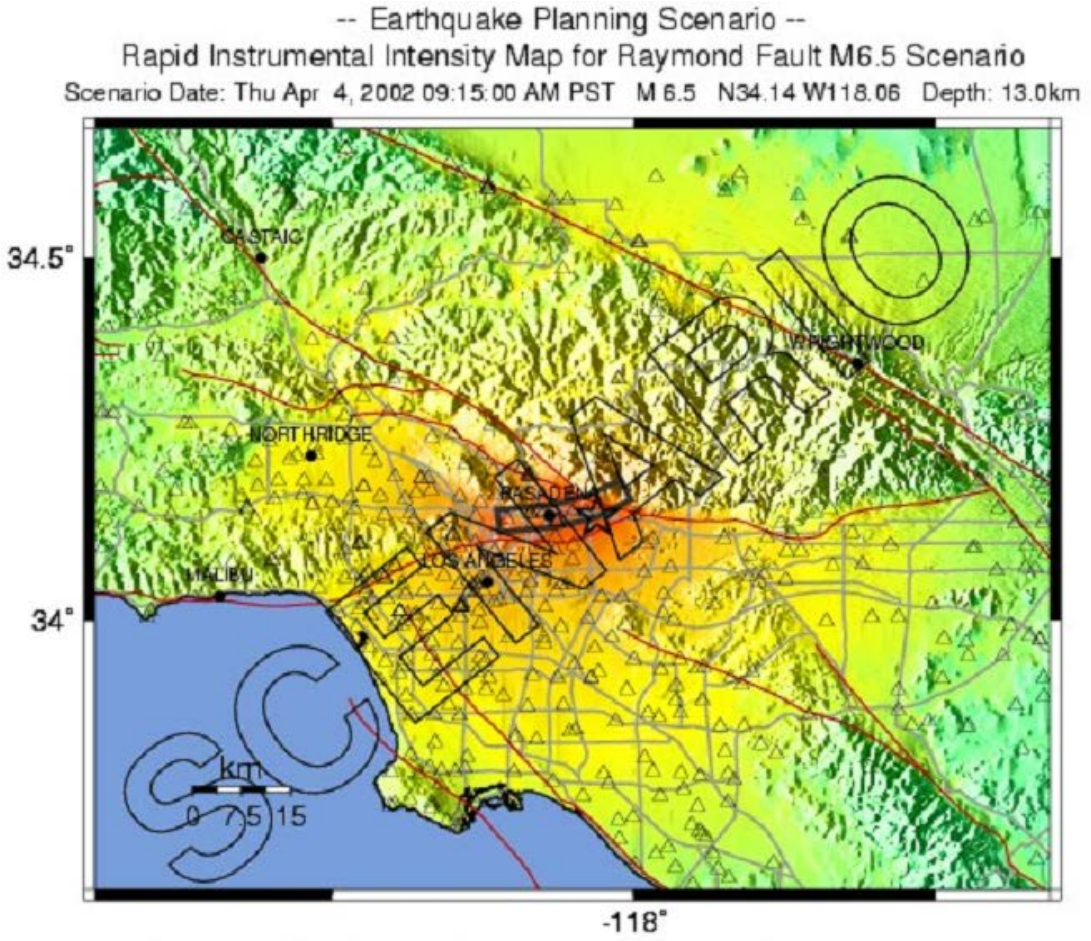
Map 5-24: ShakeMap for Whittier M6.8
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S12 Whittier Fault Scenario M 6.8

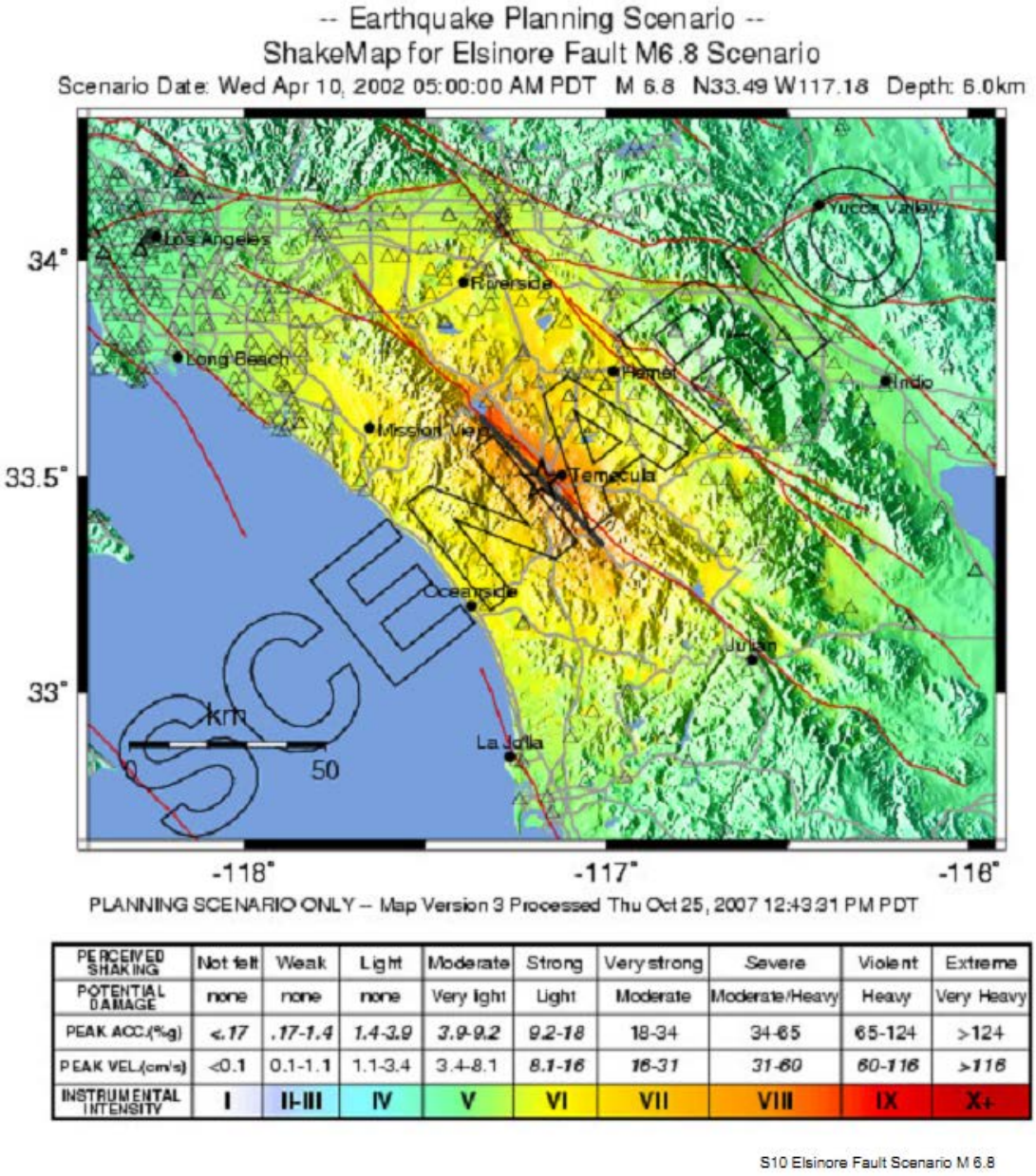
Map 5-25: ShakeMap for Raymond Fault M6.5
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S11 Raymond Fault Scenario M 6.5

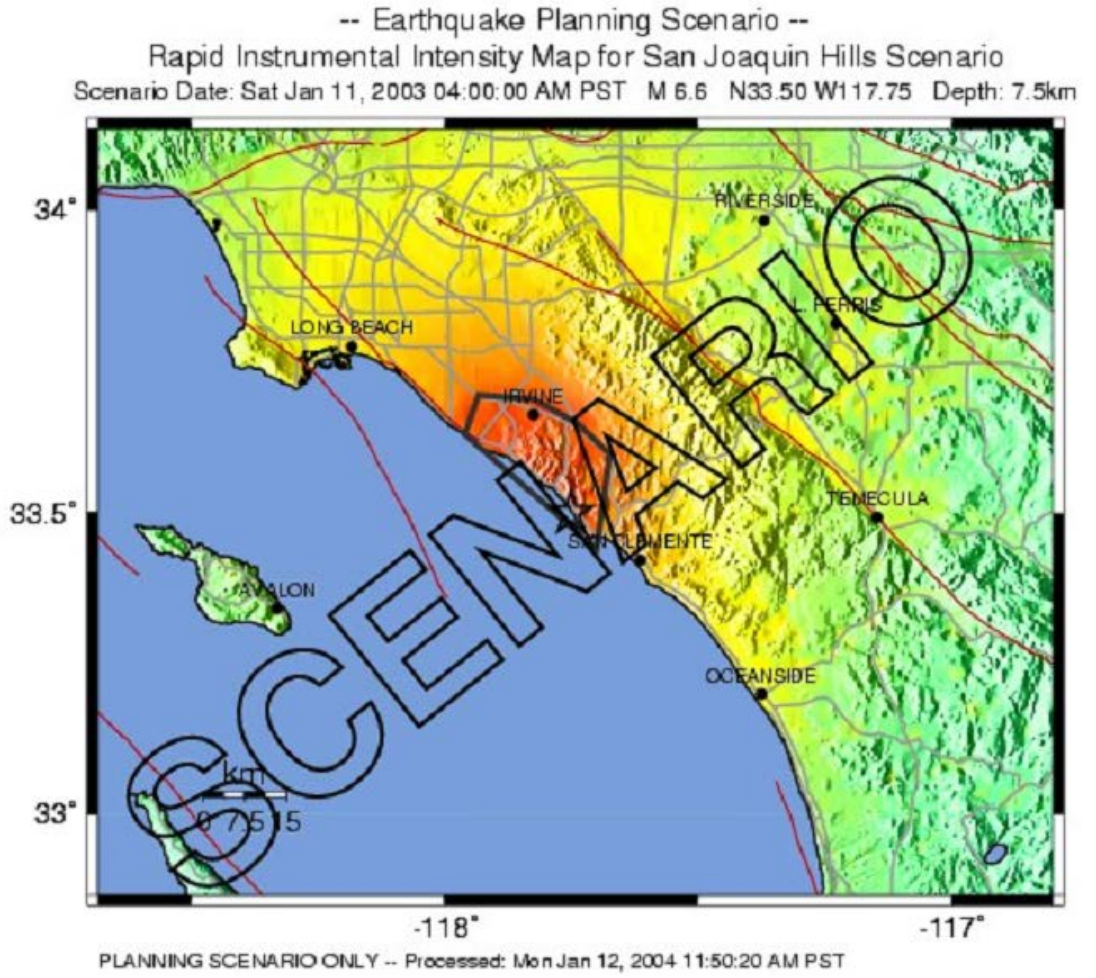
Map 5-26: ShakeMap for Elsinore Fault M6.8
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S10 Elsinore Fault Scenario M 6.8

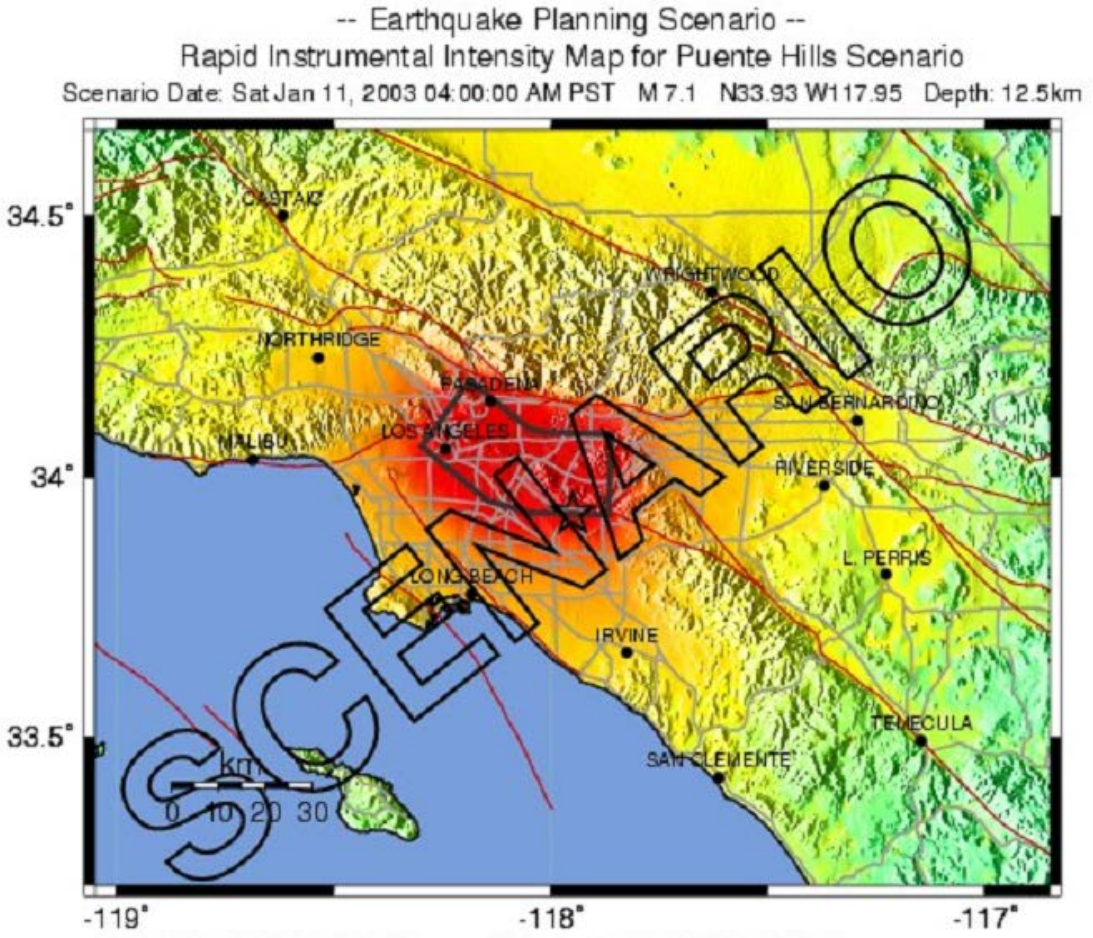
Map 5-27: ShakeMap for San Joaquin Hills M6.6
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S9 San Joaquin Hills Fault Scenario M 6.6

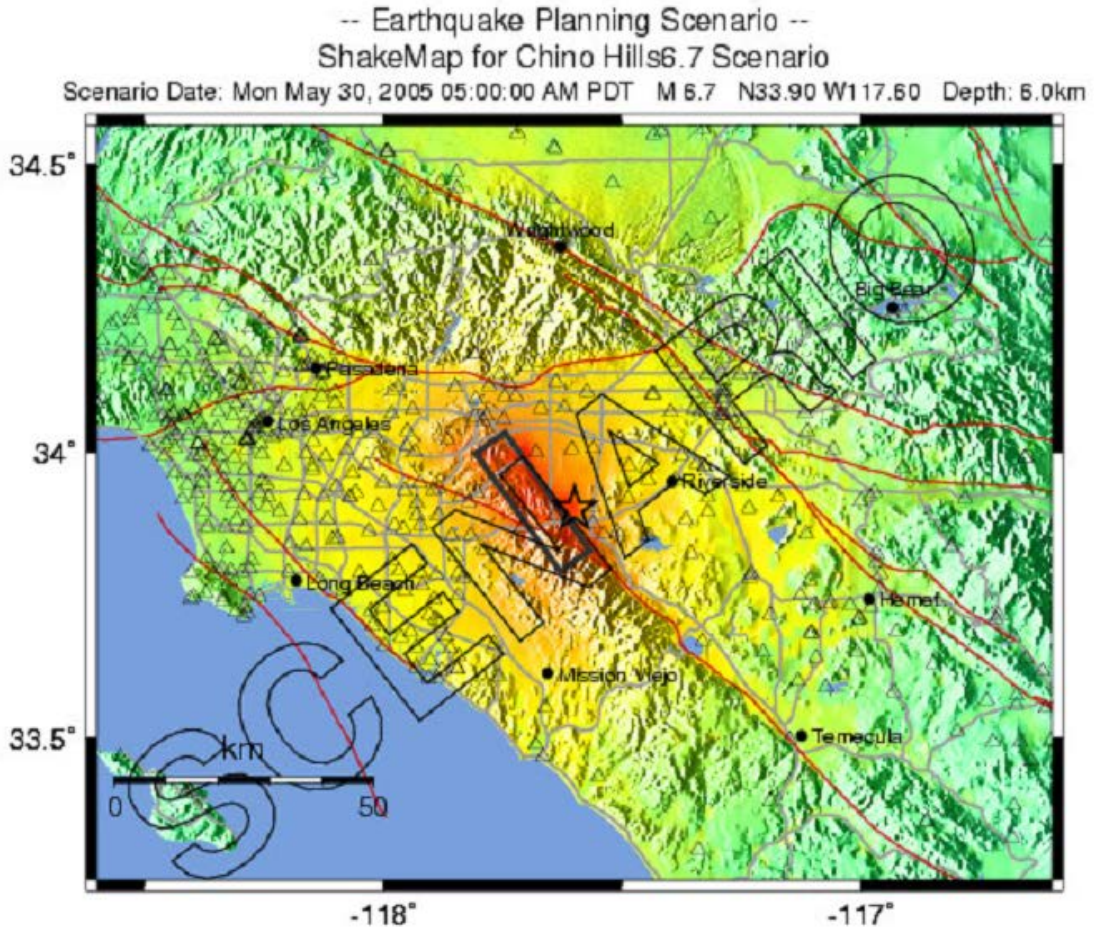
Map 5-28: ShakeMap for Puente Hills M7.1
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S8 Puente Hills Fault Scenario M 7.1

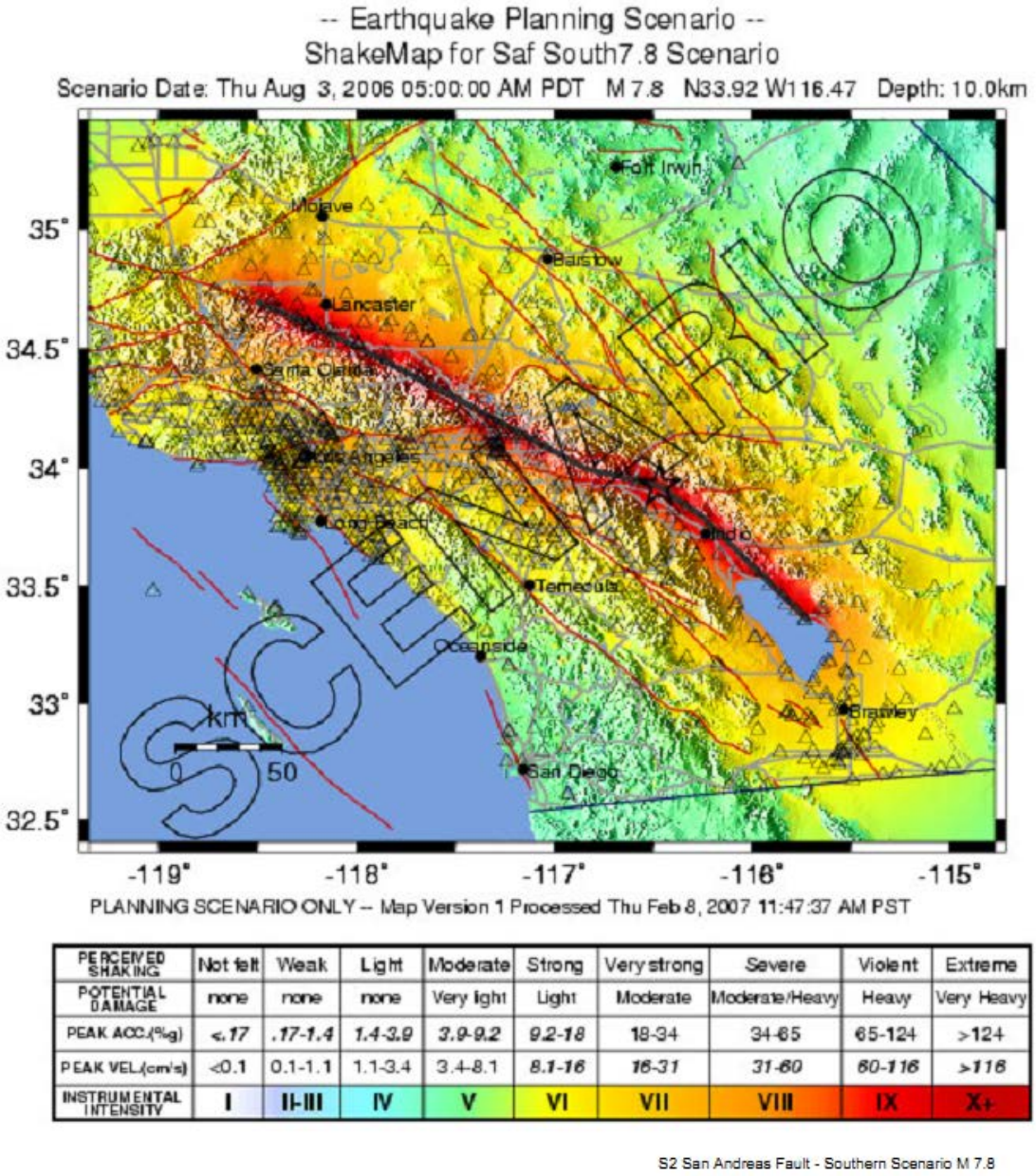
Map 5-29: ShakeMap for Chino Hills M6.7
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S3 Chino Hills Fault Scenario M 6.7

Map 5-30: ShakeMap for San Andreas M7.8
(Source: conserve.ca.gov)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

S2 San Andreas Fault - Southern Scenario M 7.8

Earthquake-Induced Landslides

Earthquake induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond to and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes (see Landslide Hazard – Specific Section).

Liquefaction

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Many communities in Southern California are built on ancient river bottoms and have sandy soil. In some cases this ground may be subject to liquefaction, depending on the depth of the water table.

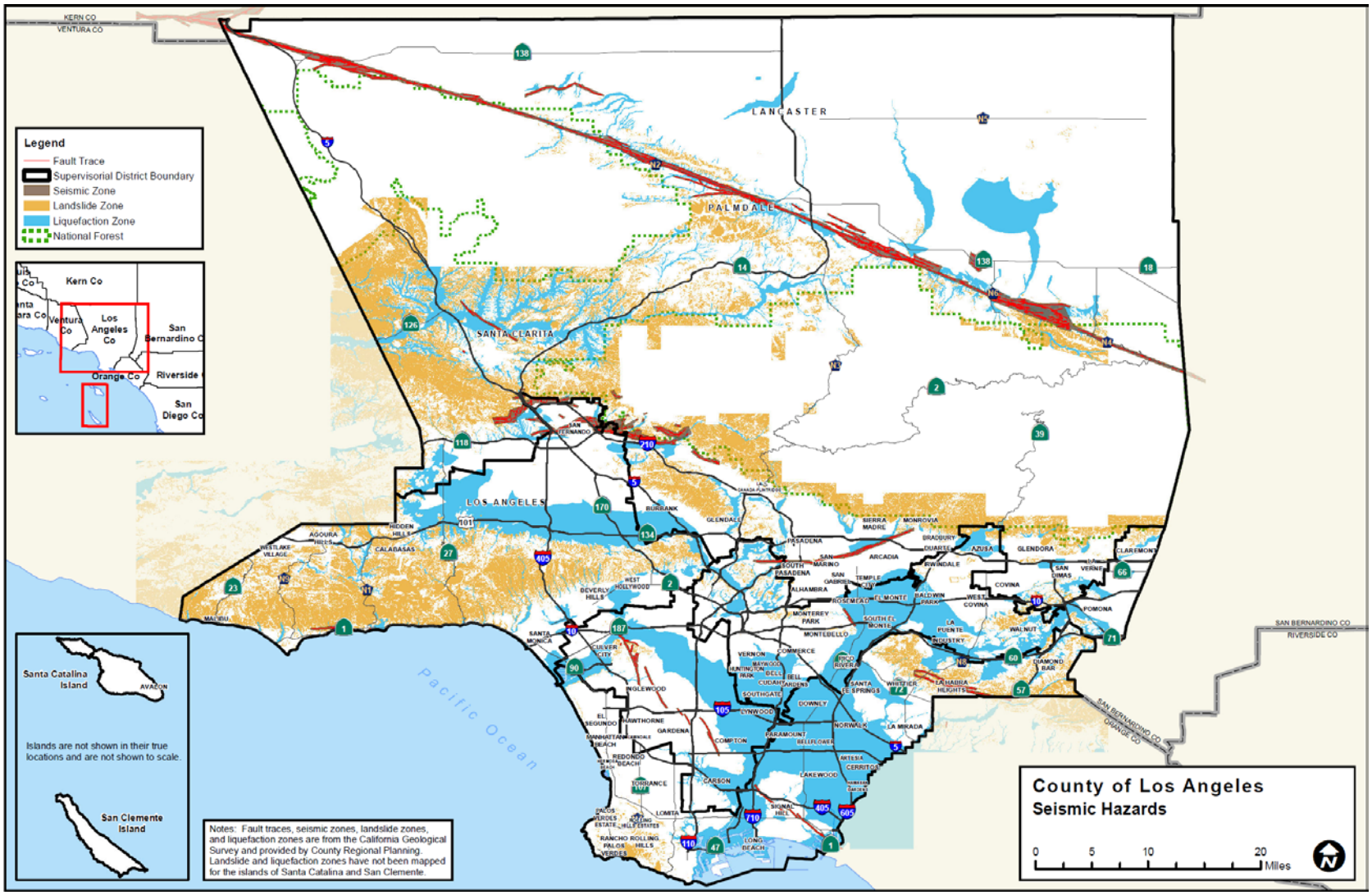
Soil liquefaction is a seismically induced form of ground failure, which has been a major cause of earthquake damage in Southern California. During the 1971 San Fernando and 1994 Northridge earthquakes, significant damage to roads, utility pipelines, buildings, and other structures in the Los Angeles area was caused by liquefaction. Research and historical data indicate that loose, granular materials situated at depths of less than 50 feet, with fines (silt and clay) contents of less than 30 percent, and which are saturated by a relatively shallow groundwater table, are most susceptible to liquefaction. These geological and groundwater conditions exist in parts of Southern California and in the County of Los Angeles, typically in valley regions and alluviated floodplains.

For liquefaction to occur, three general conditions must be met. The first condition— strong ground shaking of relatively long duration—can be expected to occur in the County of Los Angeles area as a result of an earthquake on any of the several active faults in the region. The second condition—loose, or unconsolidated, recently deposited sediments consisting primarily of silt and sand—occurs in a large portion of the valley floors, and in the larger canyon bottoms prevalent throughout Los Angeles County. The third condition is water-saturated sediments within about 50 feet of the surface.

In accordance with the Seismic Hazard Mapping Act, the California Division of Mines and Geology has evaluated liquefaction susceptibility for most of the County of Los Angeles area. Map 5-31: County of Los Angeles Seismic Hazards Map shows the results of these studies.

The California Geological Survey has identified areas most vulnerable to liquefaction. Map 5-31: County of Los Angeles Seismic Hazards Map identified areas in the vicinity that are subject to liquefaction and landslides associated with earthquake activities. The County of Los Angeles has facilities near liquefaction zones, as shown on Map 5-31: County of Los Angeles Seismic Hazards Map.

Map 5-31: Los Angeles County Seismic Hazards Map
(Source: County of Los Angeles CEO – ITS GIS)



Amplification

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils can face greater risk (Source: *Planning for Natural Hazards: The California Technical Resource Guide*, Department of Land Conservation and Development, July 2000). Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

Seismic Hazard Zone Maps

Following are the seismic hazard zone maps created by the State of California Department of Conservation. These maps provide for close-up examination of vulnerability to liquefaction and earthquake-induced landslides, along with proximity of the quadrangle to known earthquake faults. To assist in reading the maps, a flyer from the California Department of Conservation is inserted here.

:

Flyer 5-1: Seismic Hazard Zone Map Fact Sheet
(Source: California Department of Conservation)

Fact Sheet

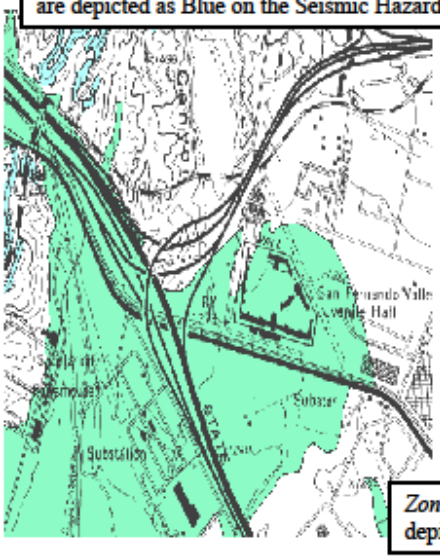
Department of Conservation
California Geological Survey
Seismic Hazards Zonation Program

The Seismic Hazards Mapping Act (SHMA) of 1990 (Public Resources Code, Chapter 7.8, Section 2690-2699.6) directs the Department of Conservation, California Geological Survey to identify and map areas prone to liquefaction, earthquake-induced landslides and amplified ground shaking. The purpose of the SHMA is to minimize loss of life and property through the identification, evaluation and mitigation of seismic hazards. The SHMA was passed by the legislature following the 1989 Loma Prieta earthquake.

Staff geologists in the Seismic Hazard Zonation Program gather existing geological, geophysical and geotechnical data from numerous sources to produce the Seismic Hazard Zone Maps. They integrate and interpret these data regionally in order to evaluate the severity of the seismic hazards and designate as *Zones of Required Investigation (ZORI)* those areas prone to liquefaction and earthquake–induced landslides. Cities and counties are then required to use the Seismic Hazard Zone Maps in their land use planning and building permit processes.

The Seismic Hazards Mapping Act requires site-specific geotechnical investigations be conducted within the Zones of Required Investigation to identify and evaluate seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy.

Portion of a Seismic Hazard Zone Map below:



Zones of Required Investigation for Earthquake-Induced Landslides are depicted as Blue on the Seismic Hazard Zone Maps.





Zones of Required Investigation for Liquefaction are depicted as Green on the Seismic Hazard Zone Maps.

Seismic Hazards

Liquefaction

Liquefaction occurs when loose, water-saturated sediments lose strength and fail during strong ground shaking. Liquefaction is defined as the transformation of granular material from a solid state into a liquefied state as a consequence of increased pore-water pressure. The process of zonation for liquefaction combines Quaternary geologic mapping, historical ground-water information and subsurface geotechnical data. The liquefaction hazard *Zone of Required Investigation* boundaries are based on the presence of shallow (< 40 feet depth) historic groundwater in uncompacted sands and silts deposited during the last 15,000 years and sufficiently strong levels of earthquake shaking expected during the next 50 years.

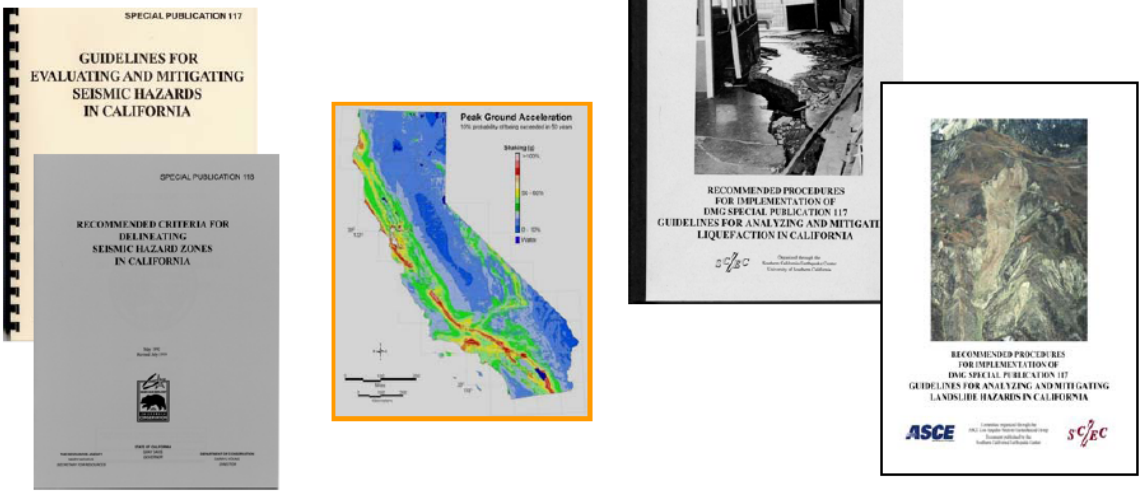
Earthquake-Induced Landslides

Landslides tend to occur in weak soil and rock on sloping terrain. The *Zone of Required Investigation* for earthquake-induced landslides generally indicate areas characterized by steep slopes composed of weak materials that may fail when shaken by an earthquake. The process for zonation of earthquake-induced landslides incorporates expected levels of future earthquake shaking, evidence of existing landslides, slope gradient and strength of hillslope materials.

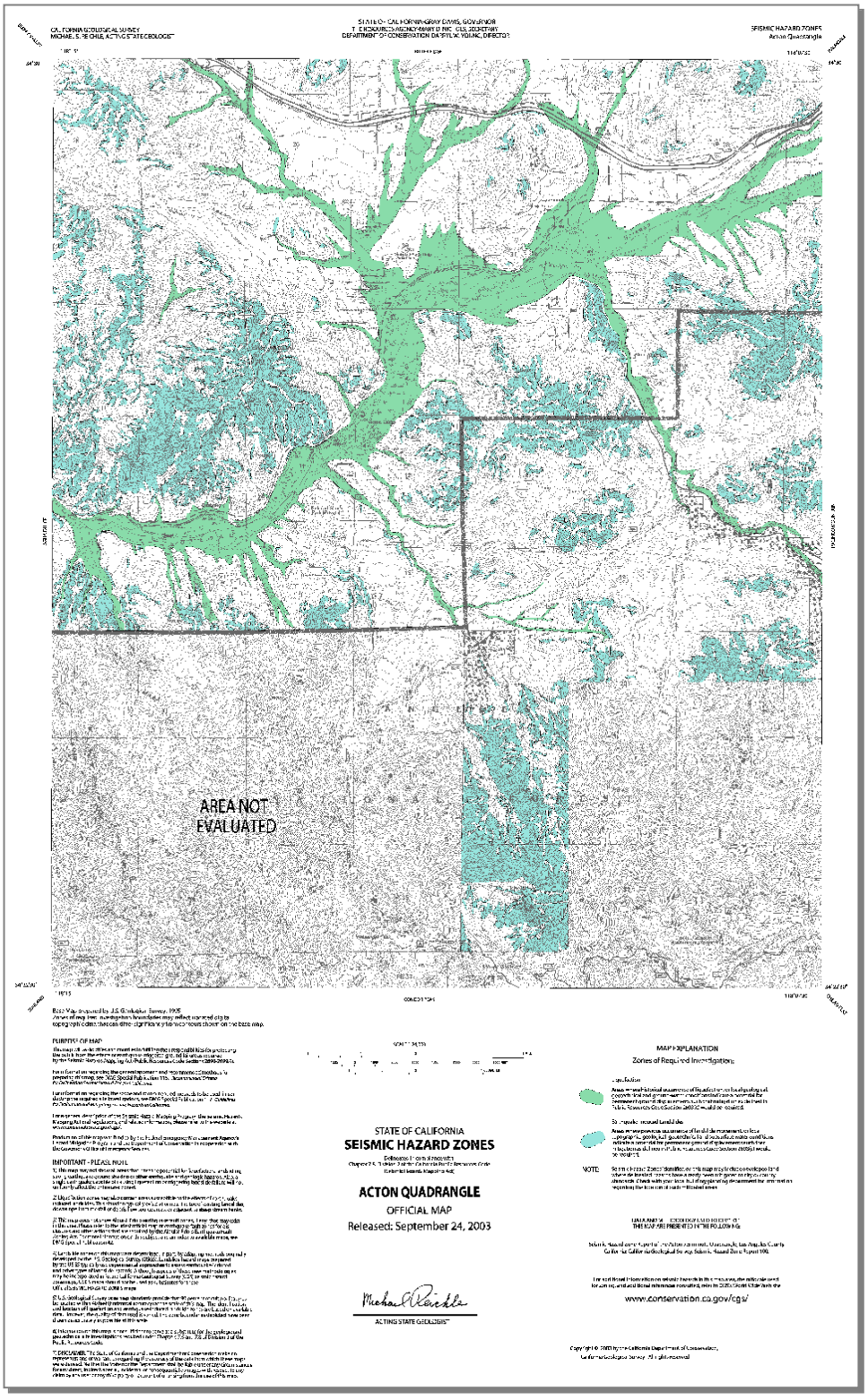
Additional Information

The maps are distributed in two releases - Preliminary and Official. The Preliminary Release maps provide a 90-day public comment period for technical review and comment. Once the public review period has ended, the Department of Conservation has 90 days to revise the maps, as appropriate, and issue the Official maps to affected cities, counties and state agencies. The Program will ultimately map the principal urban and major growth areas in seismically active areas of California. Each map covers an area of approximately 60 square miles at a scale of 1 inch = 2,000 feet.

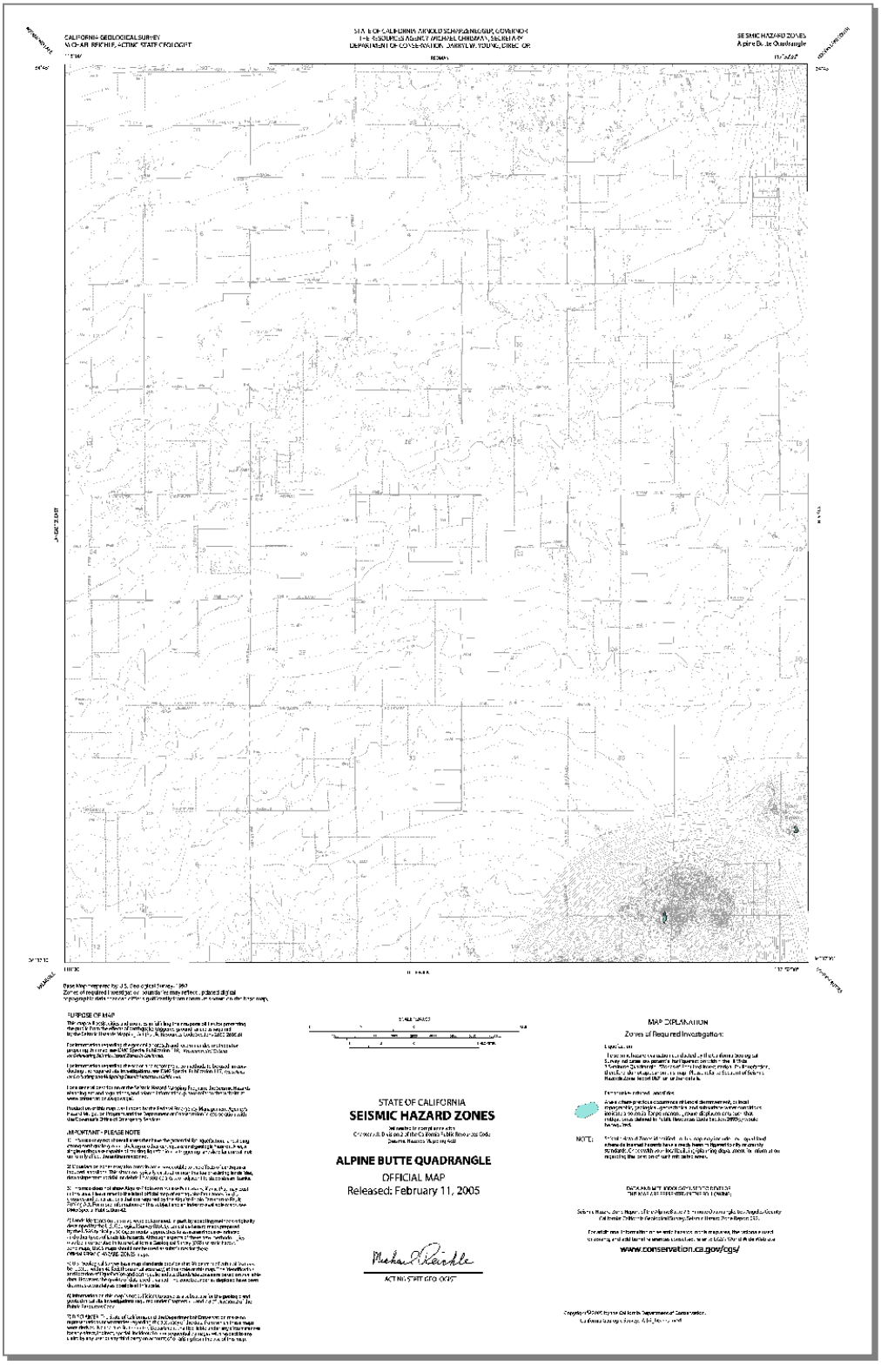
Visit our website at www.conservation.ca.gov/cgs to view and download Seismic Hazard Zone Maps and GIS data, Evaluation Reports, Special Publications 117, 118, Map Sheet 48 and Southern California Earthquake Center documents --- or contact us at (916) 324-7299 or Seismic Hazard Zonation Program, 801 K Street MS 12-31, Sacramento, CA 95814.



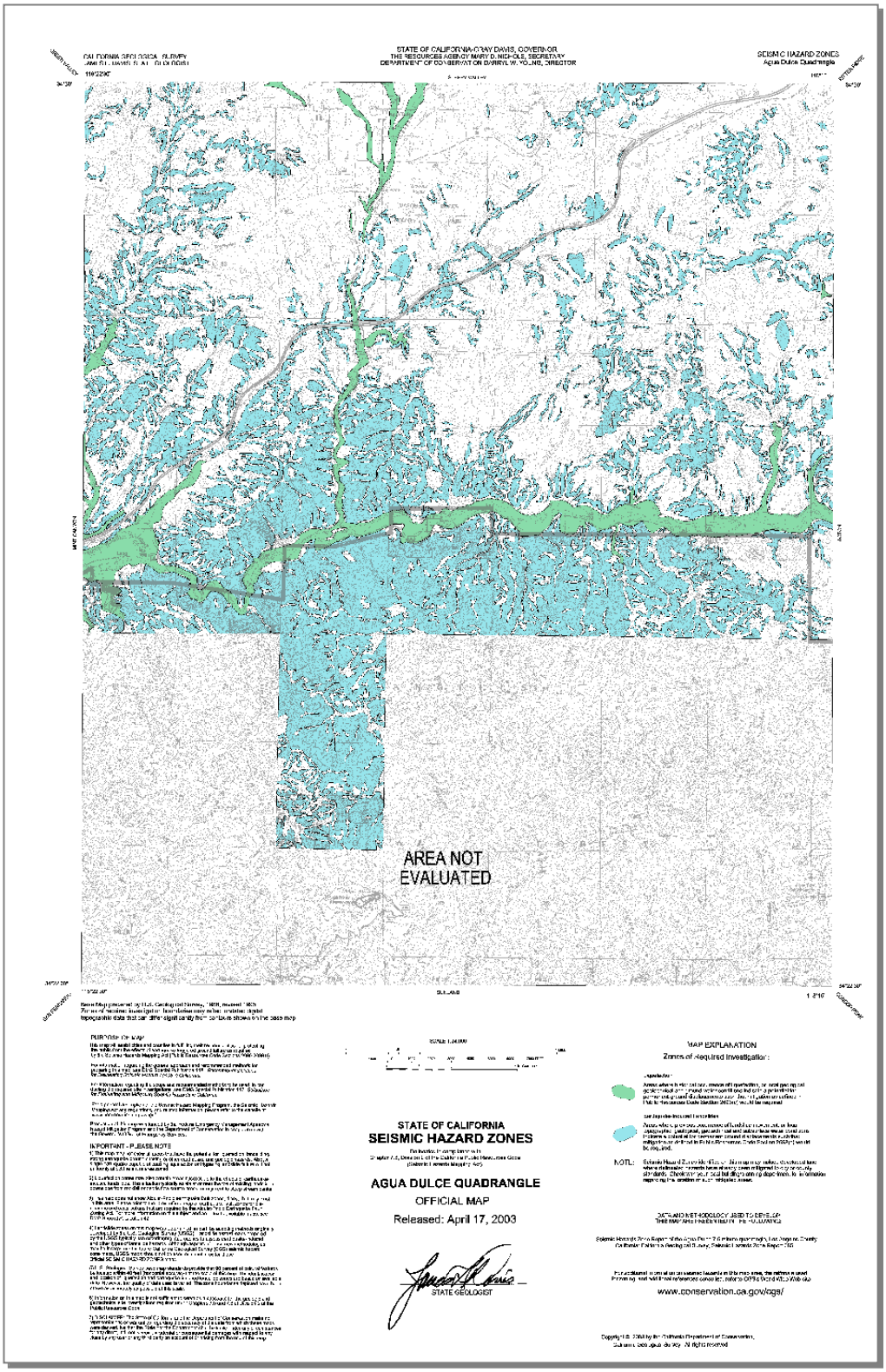
Acton Quadrangle



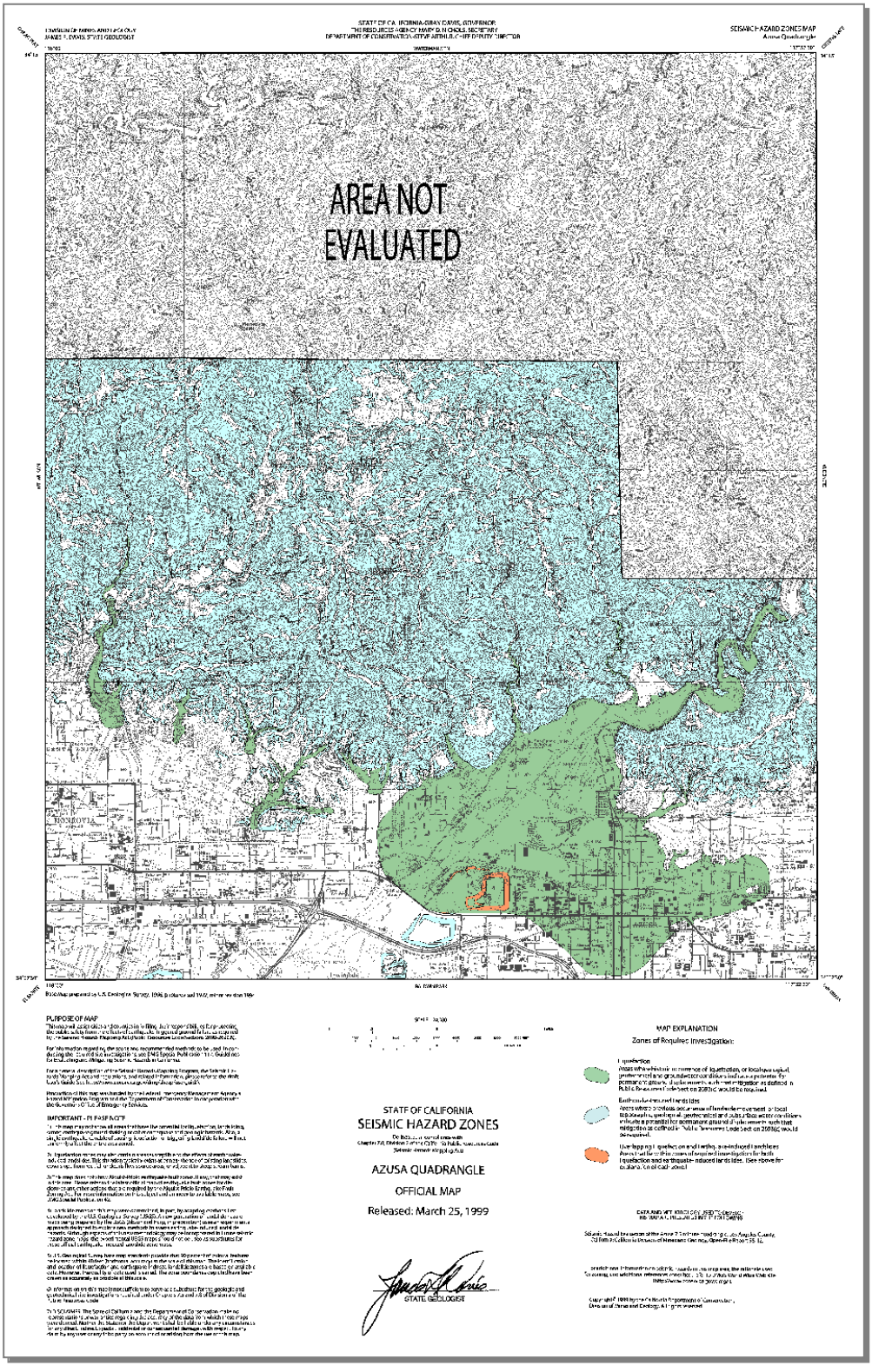
Alpine Butte Quadrangle



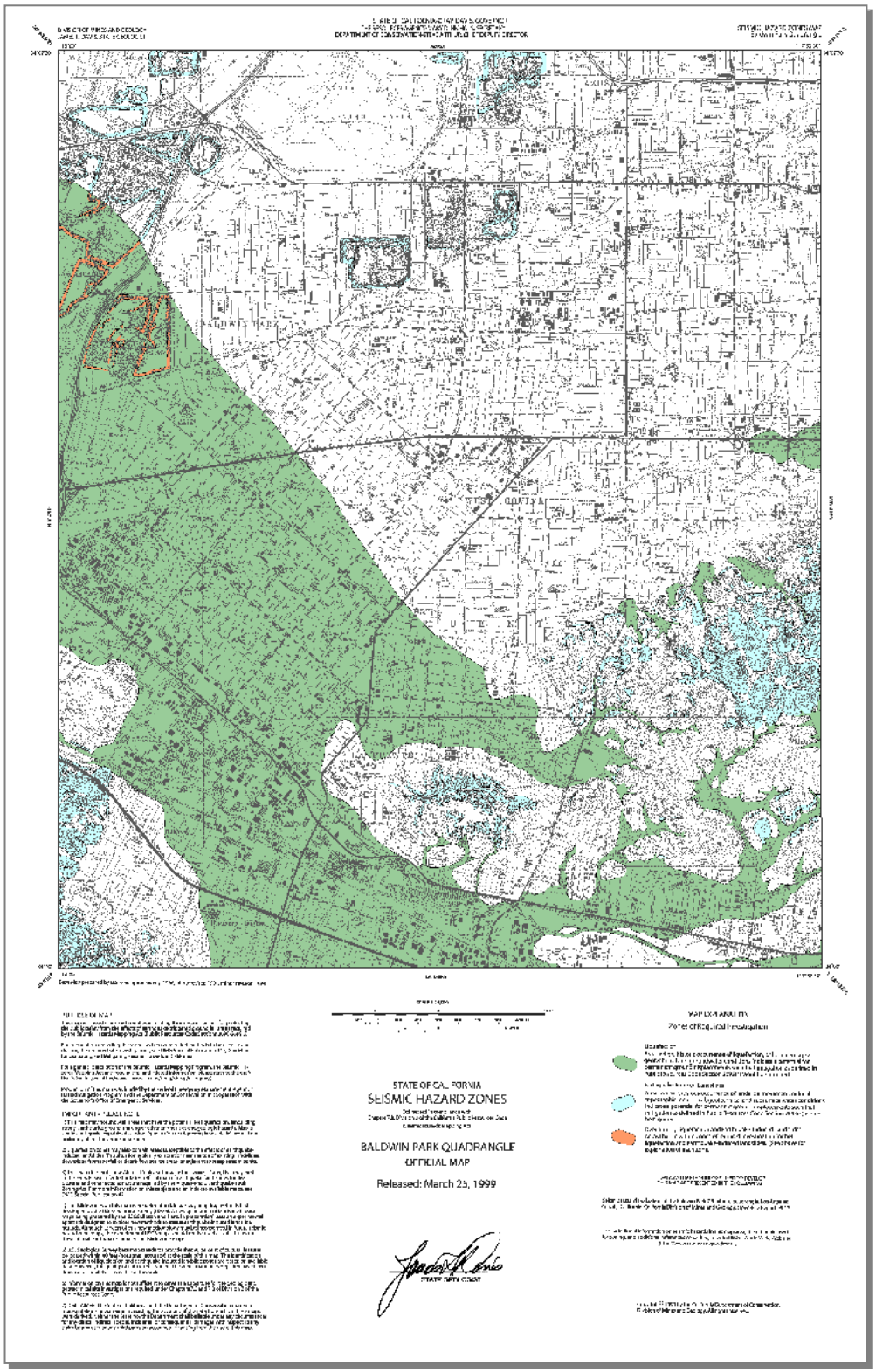
Agua Dulce Quadrangle



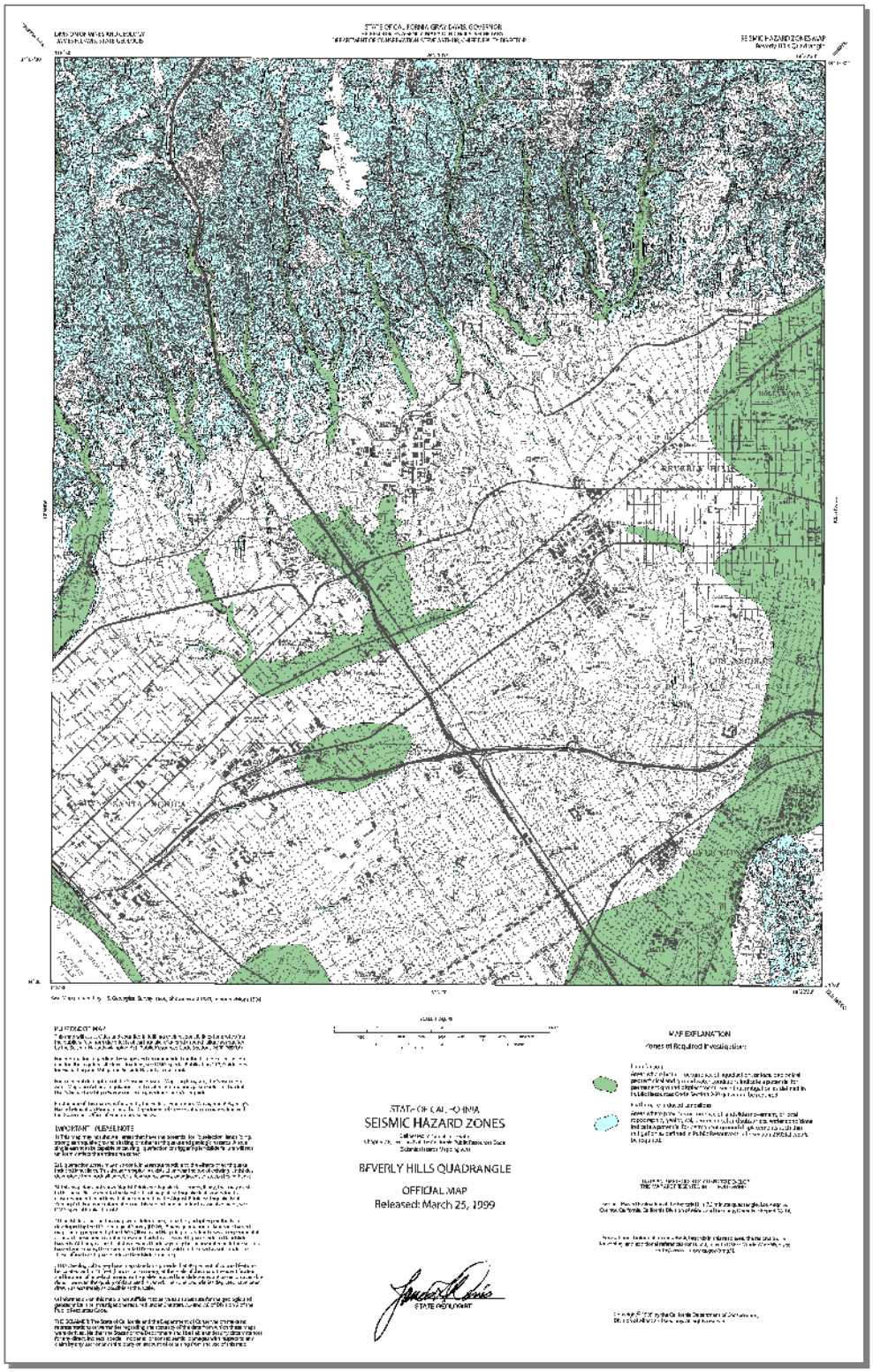
Azusa Quadrangle



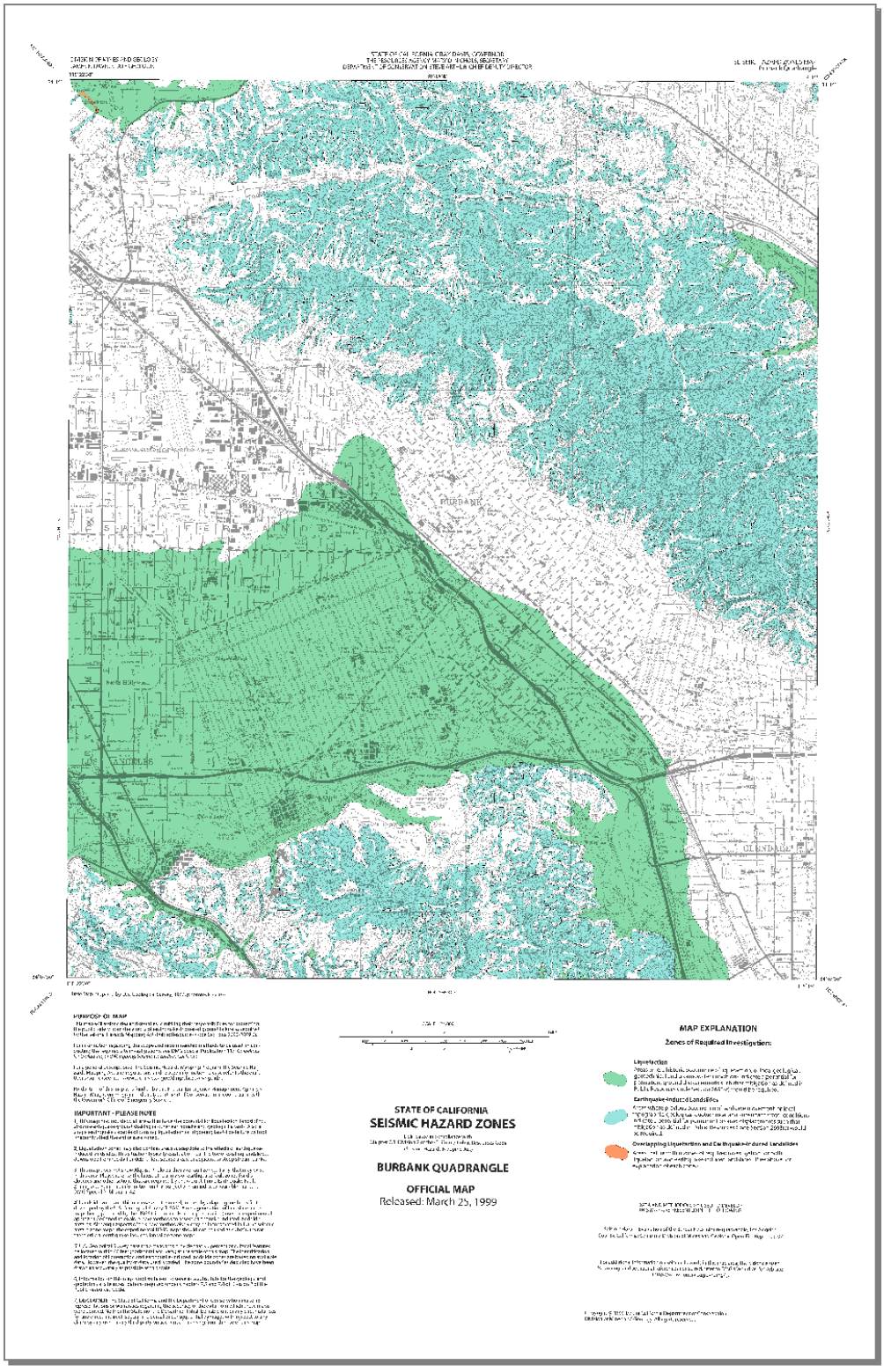
Baldwin Park Quadrangle



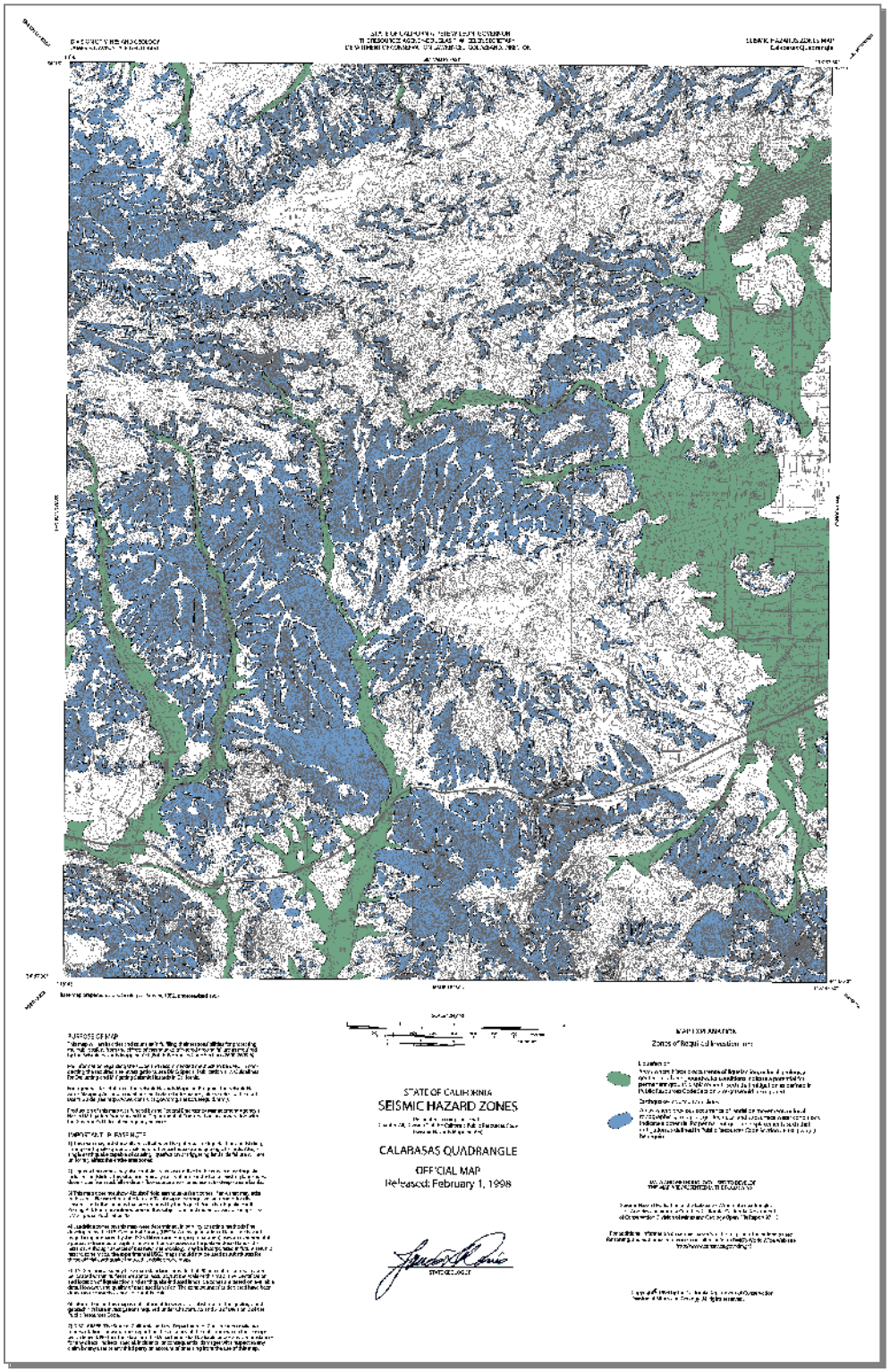
Beverly Hills Quadrangle



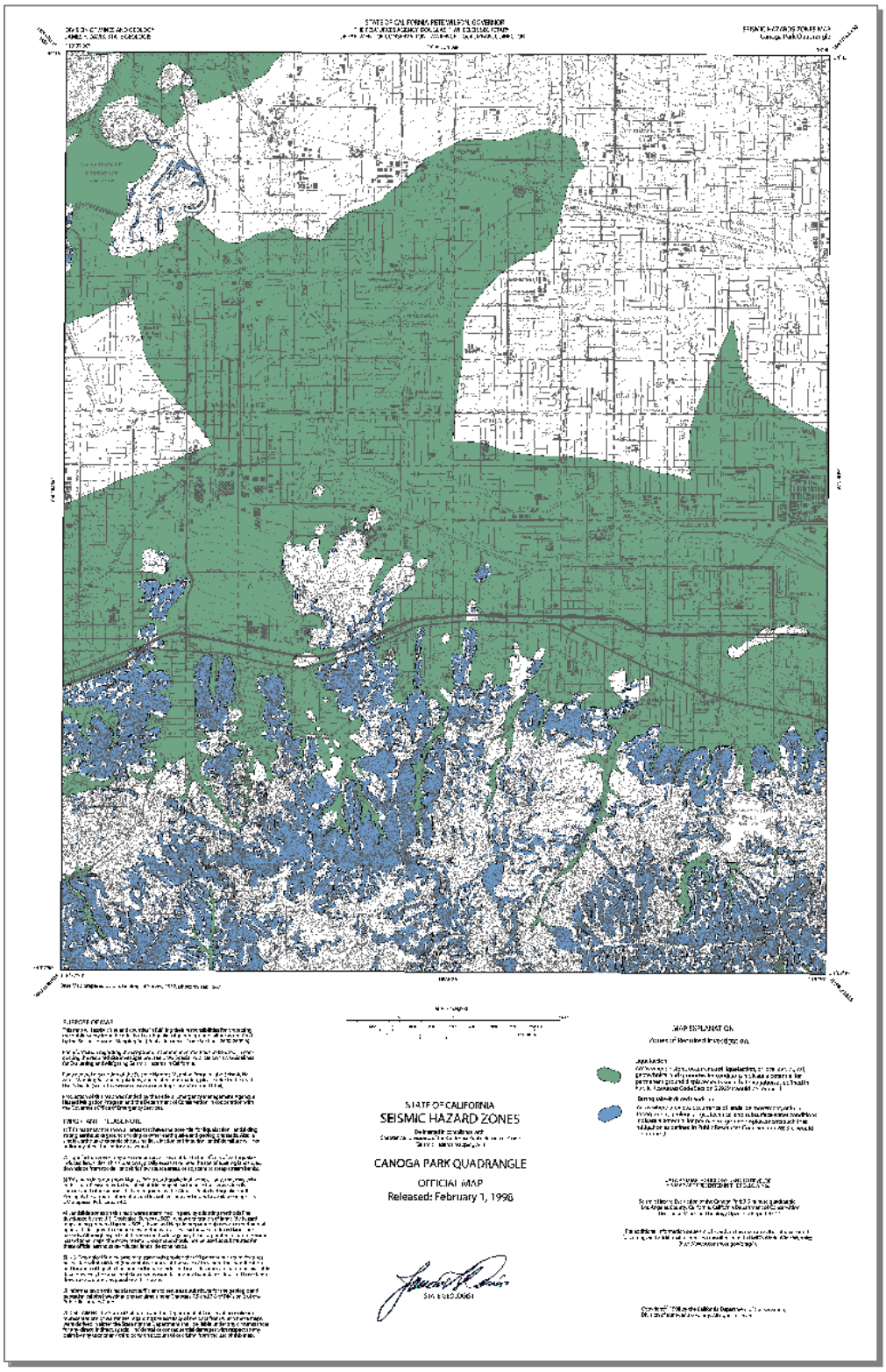
Burbank Quadrangle



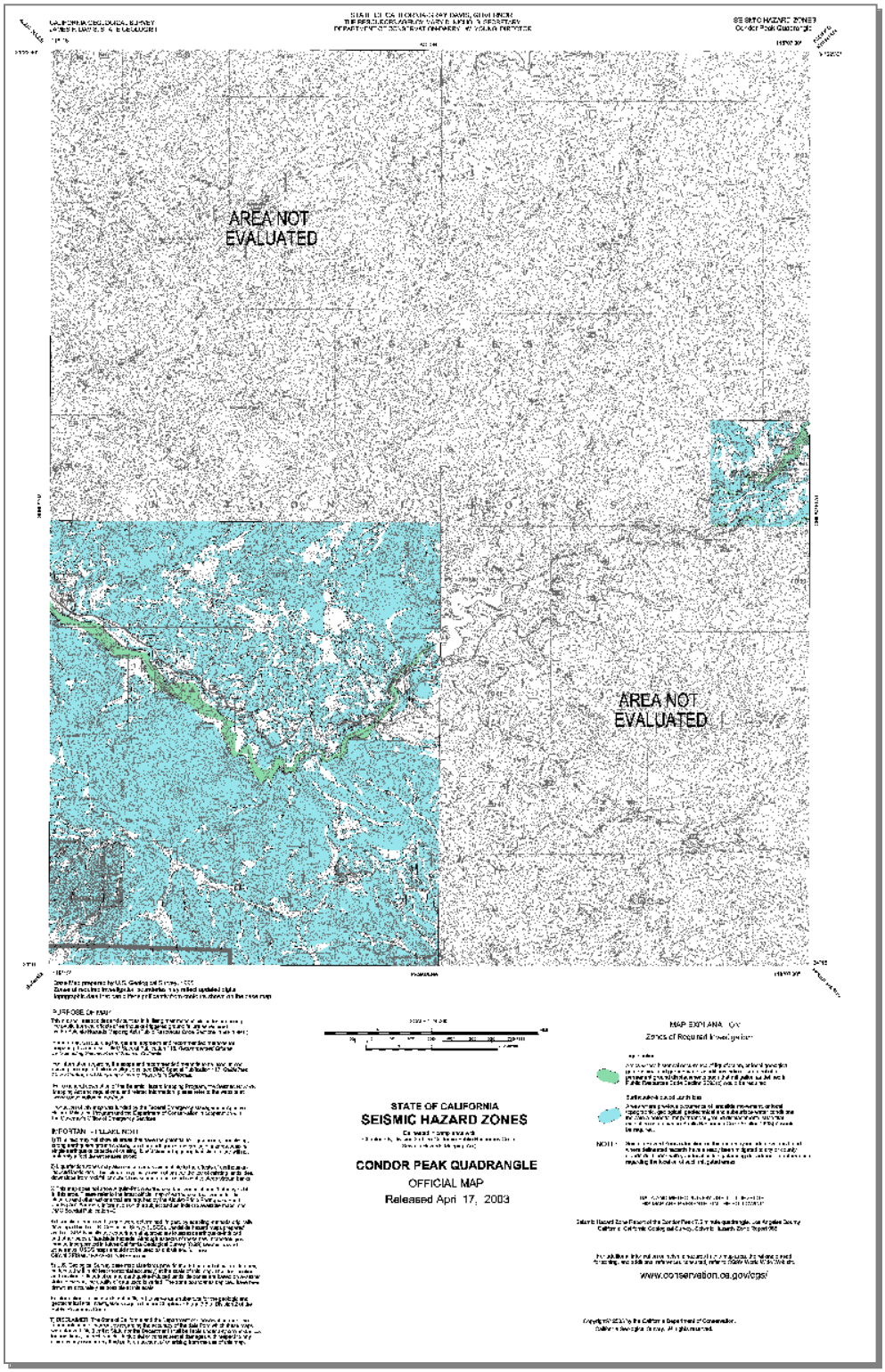
Calabasas Quadrangle



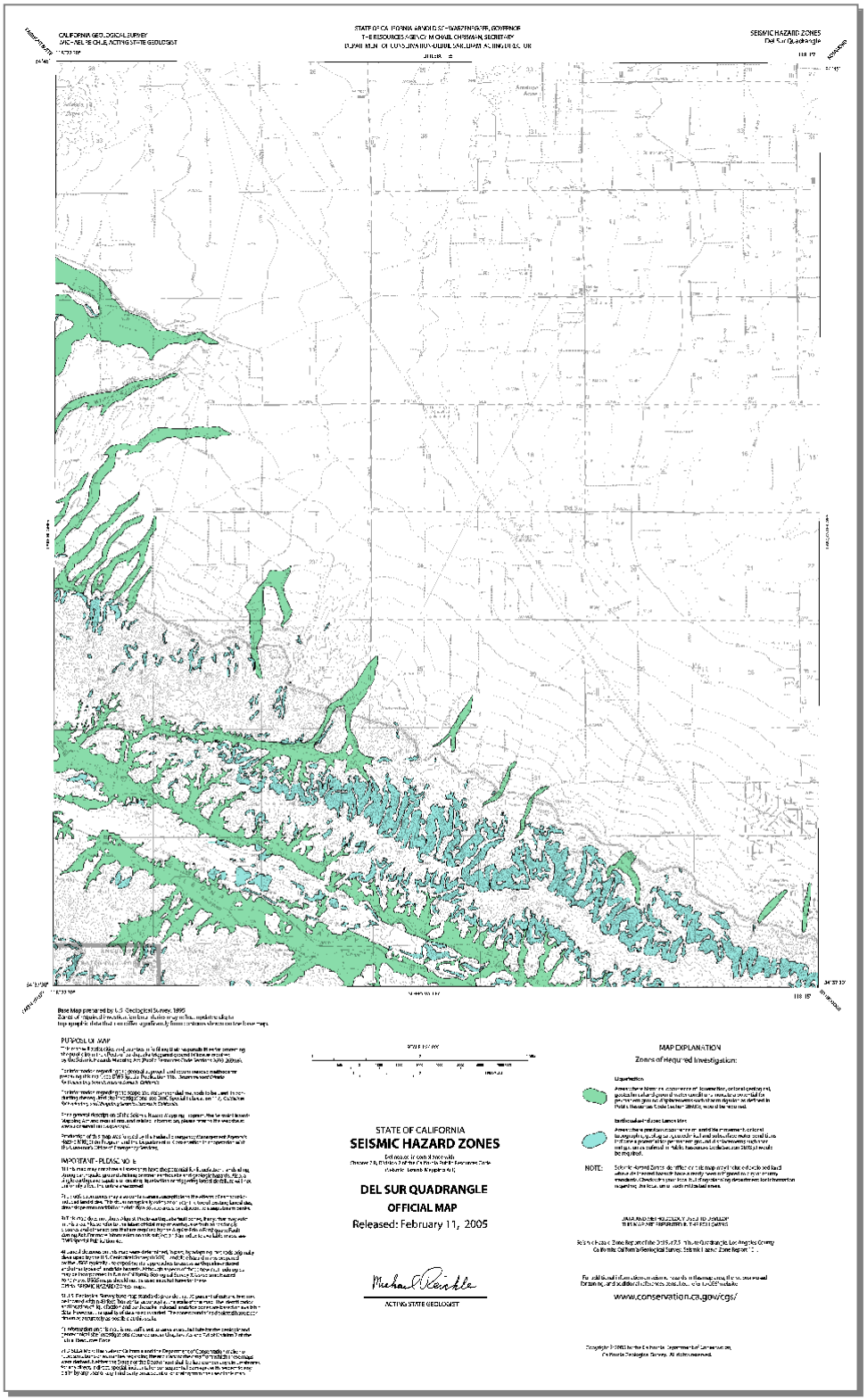
Canoga Park Quadrangle



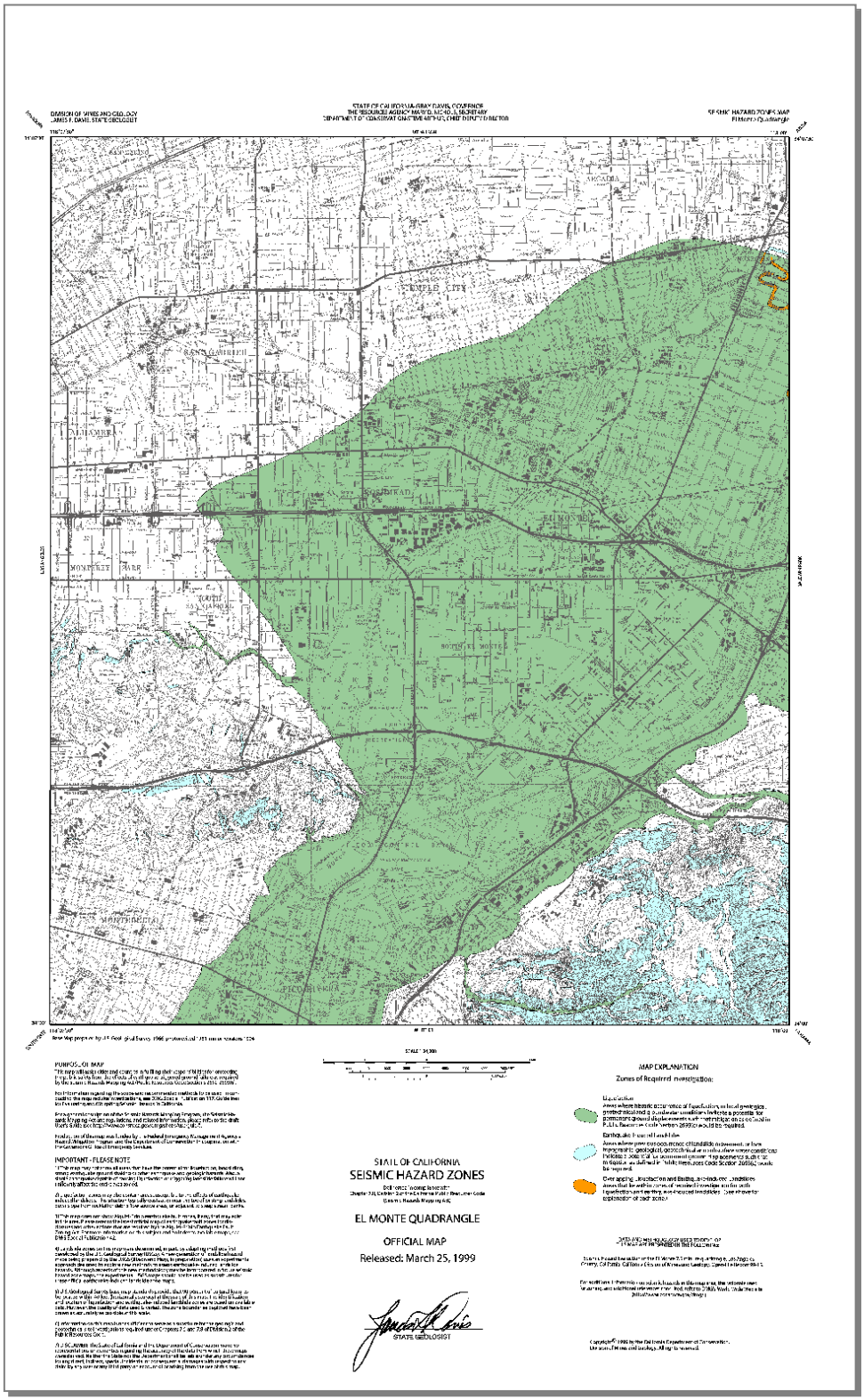
Condor Peak Quadrangle



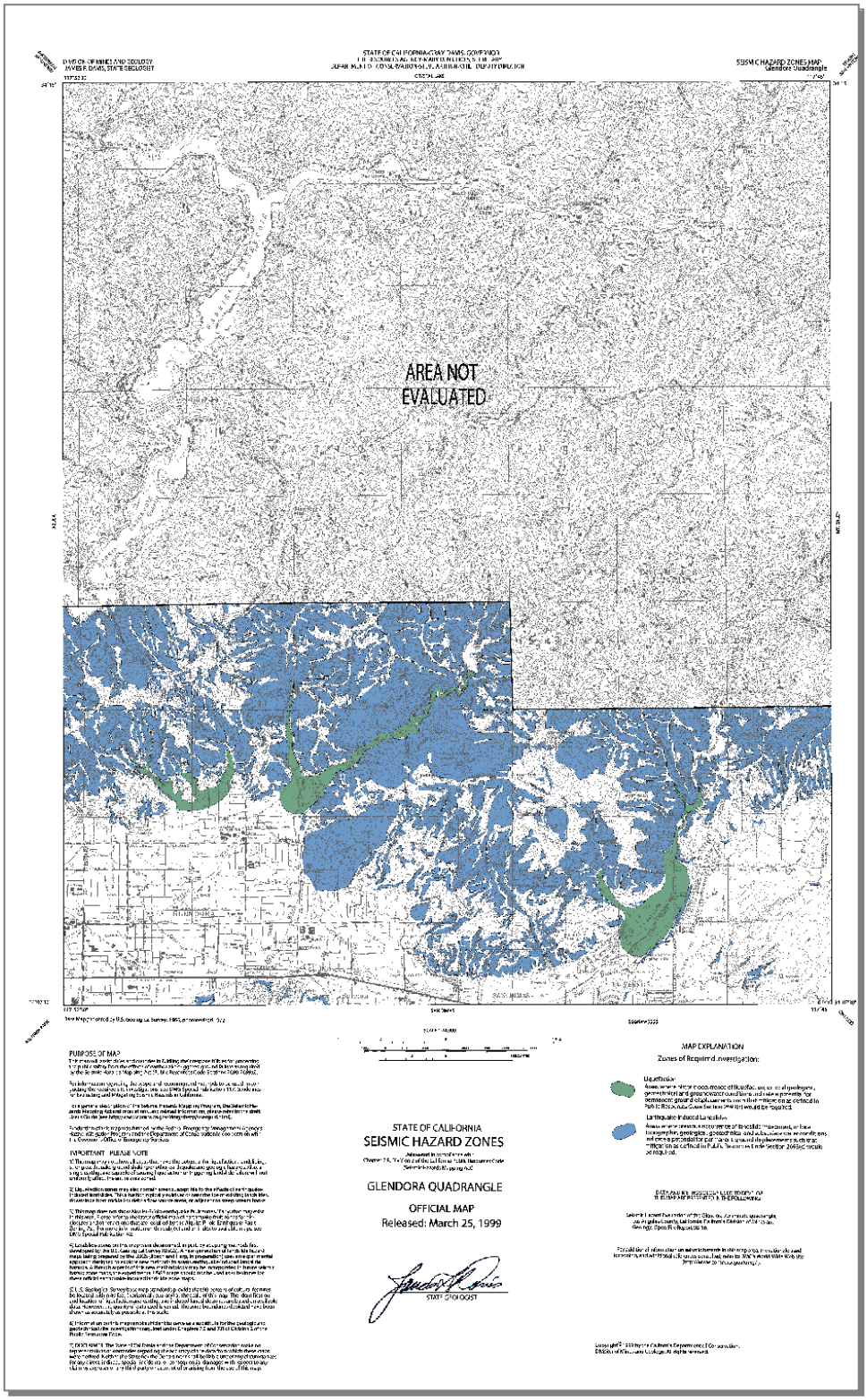
Del Sur Quadrangle



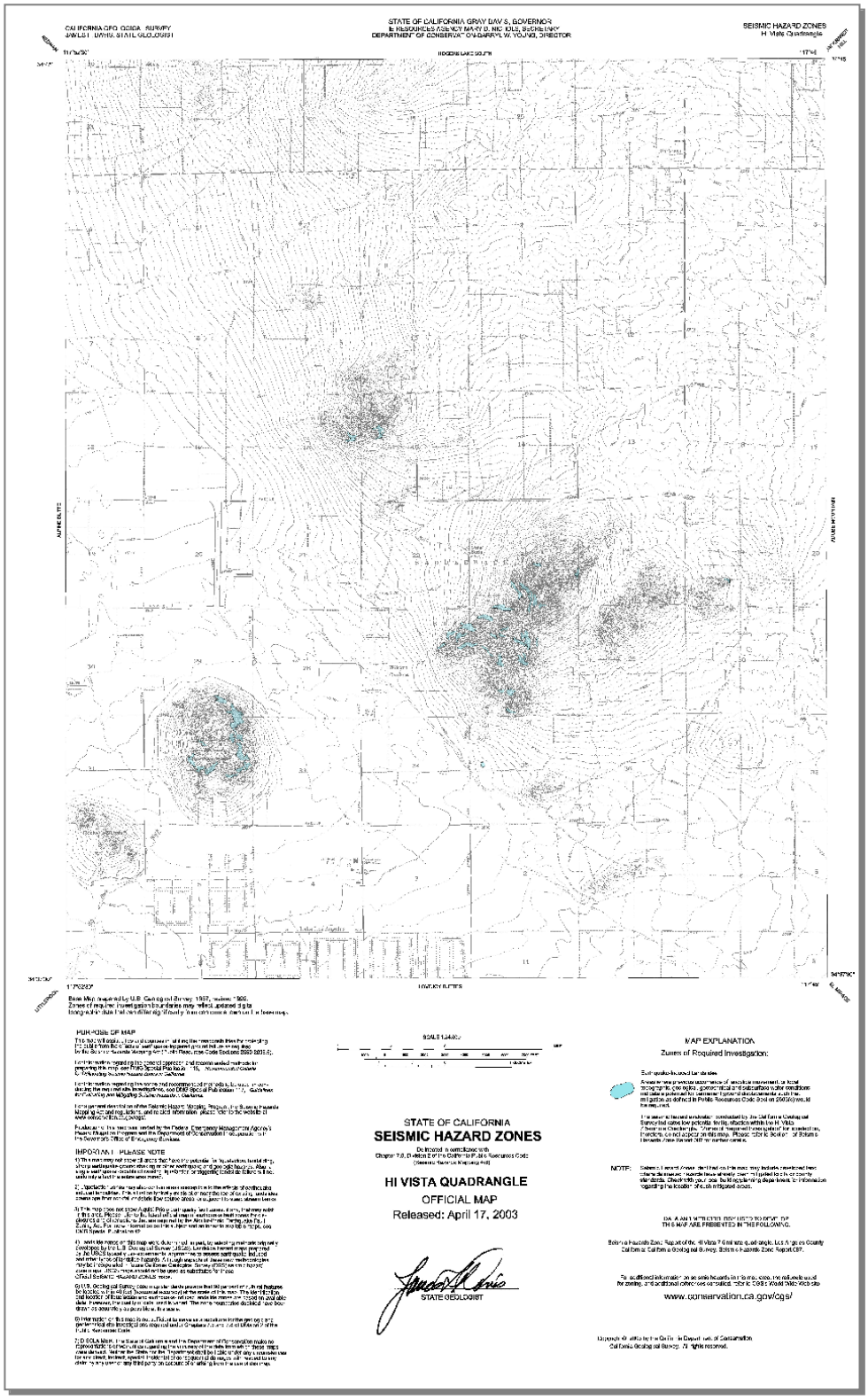
El Monte Quadrangle



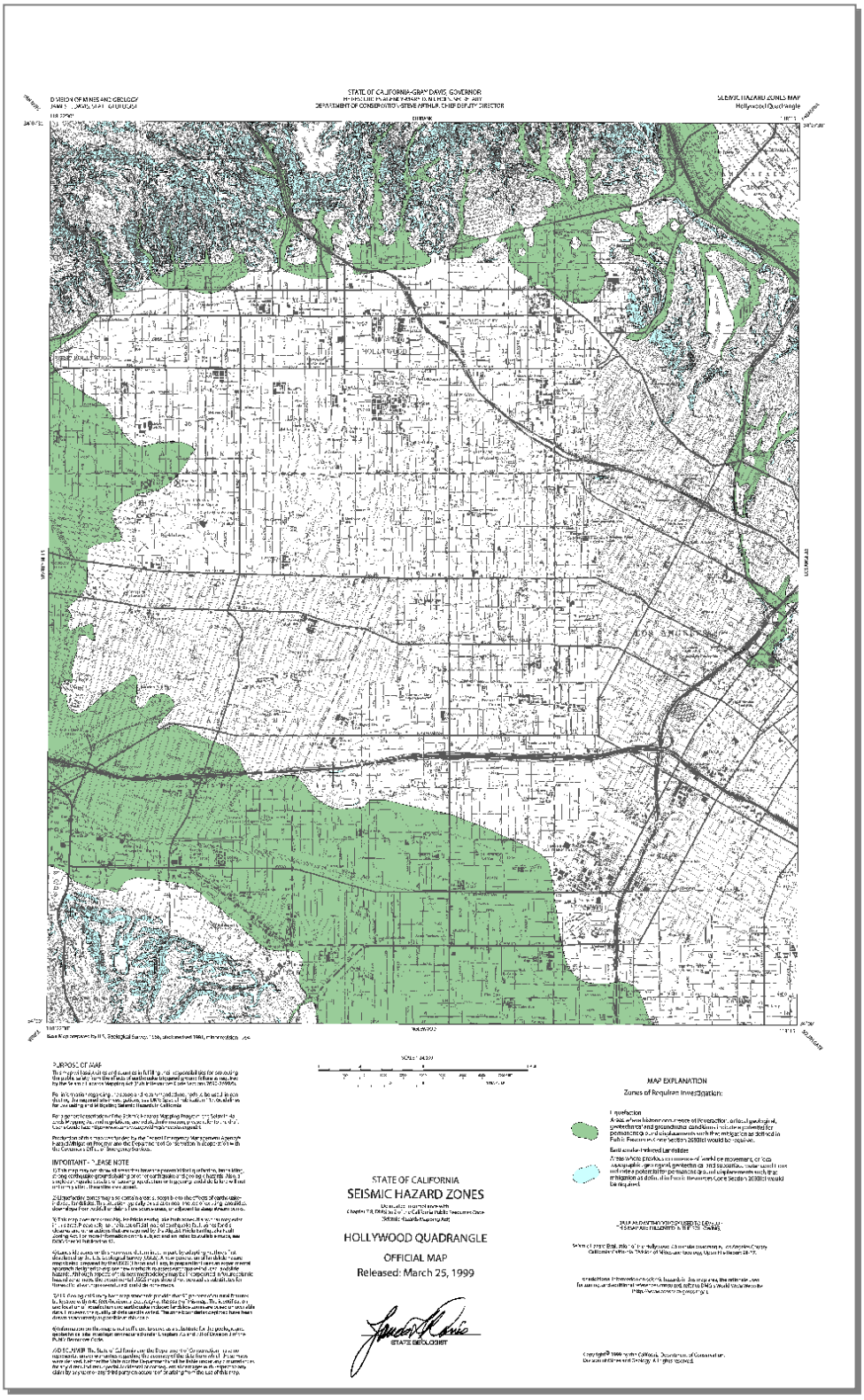
Glendora Quadrangle



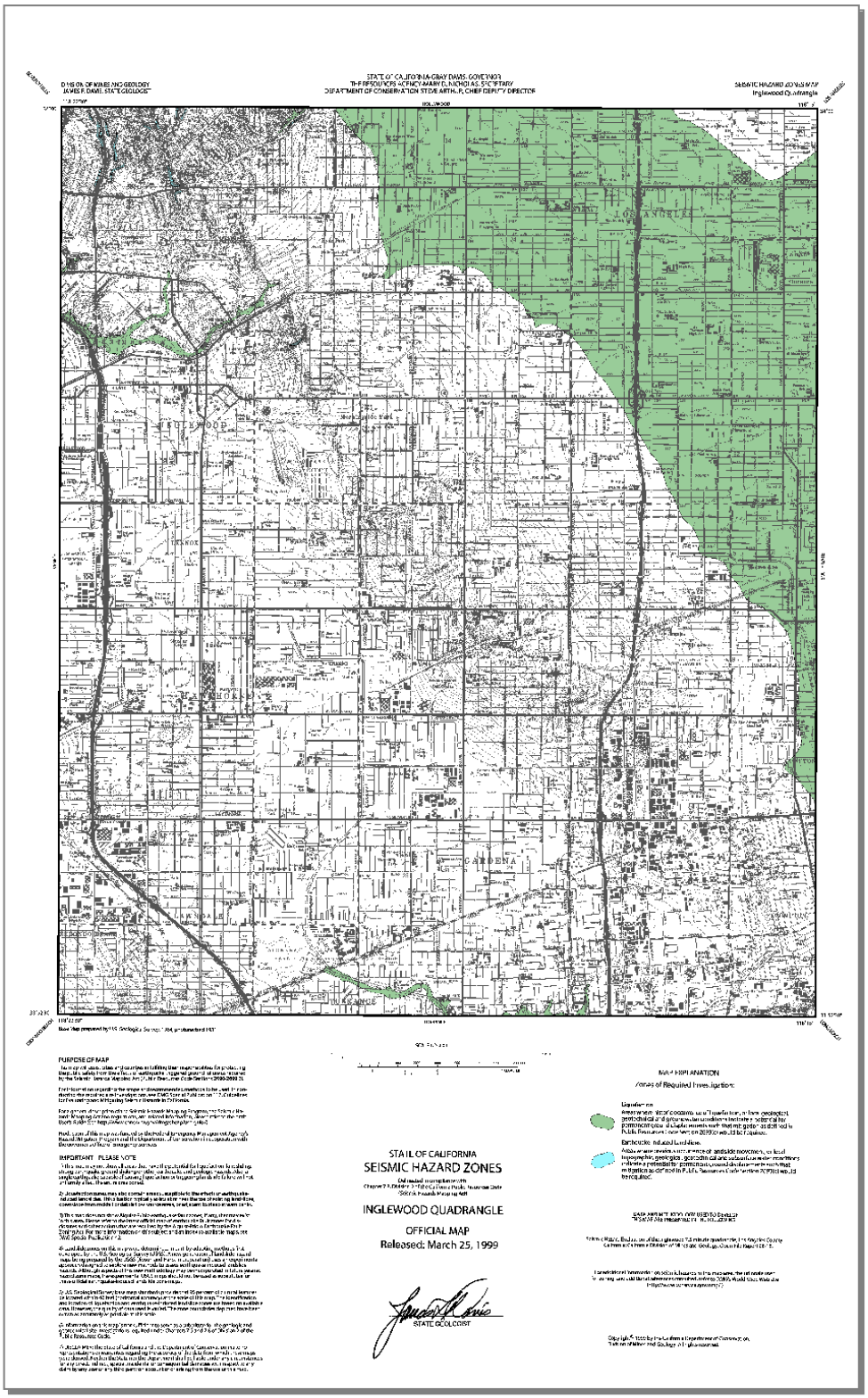
Hi Vista Quadrangle



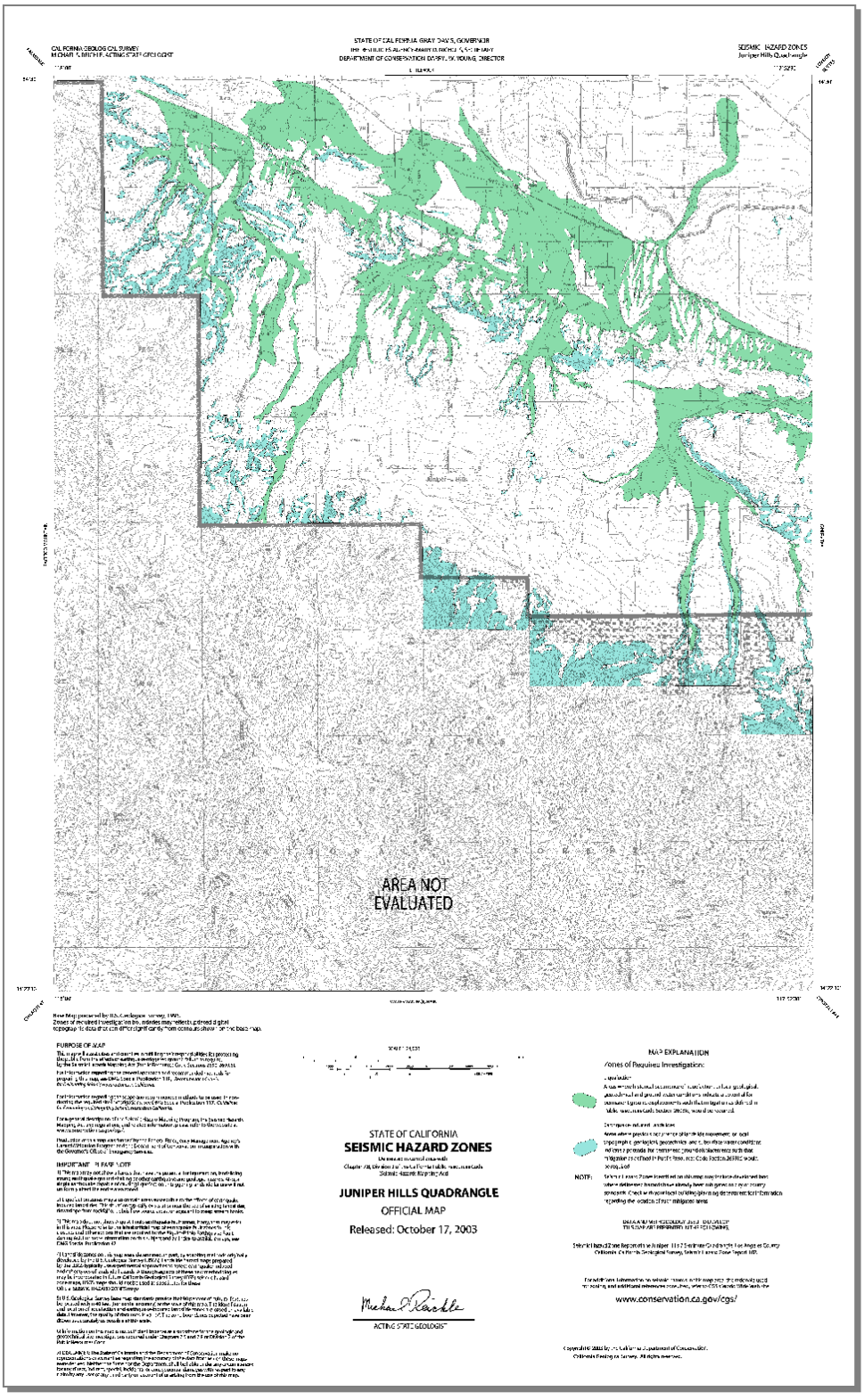
Hollywood Quadrangle



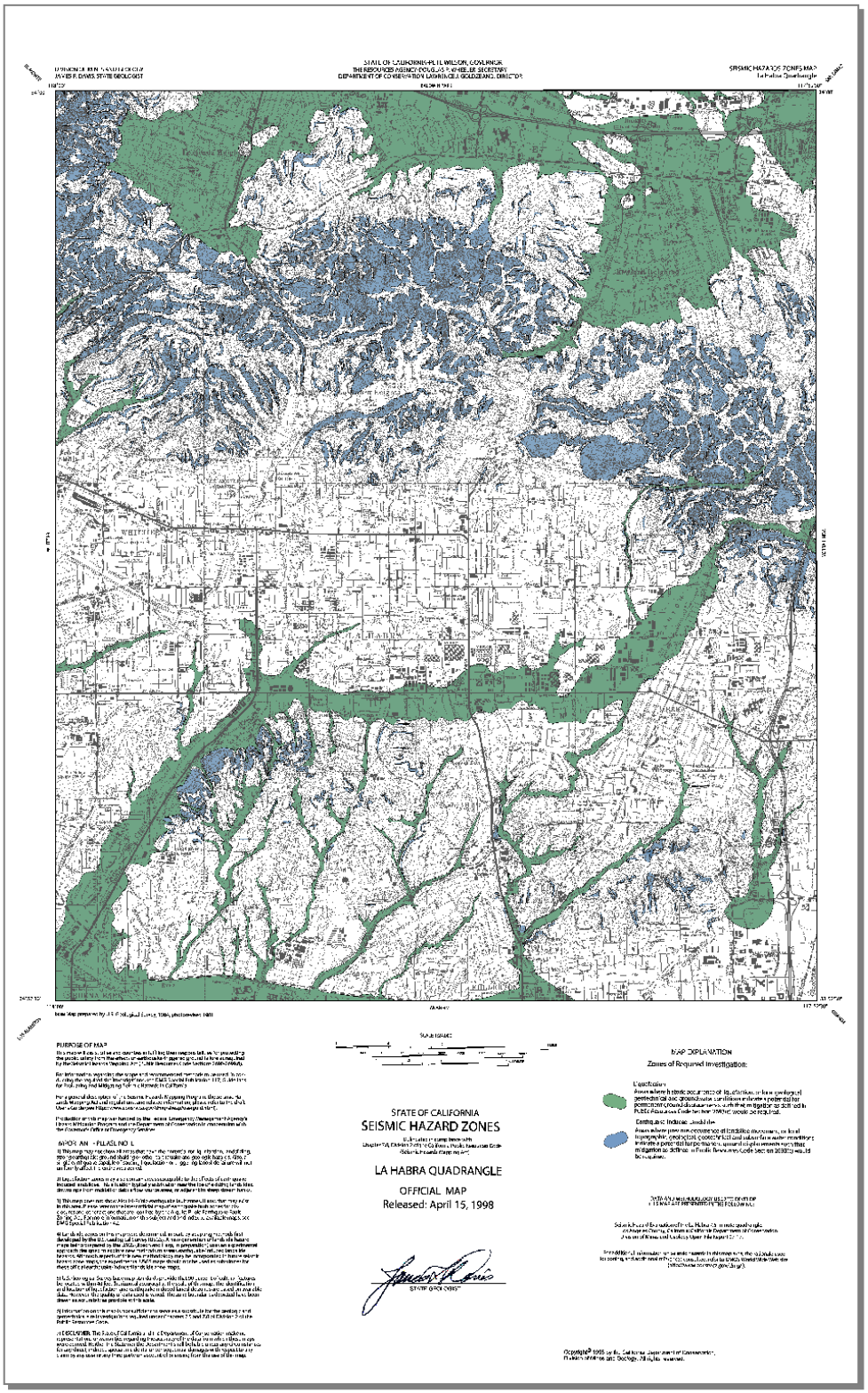
Inglewood Quadrangle



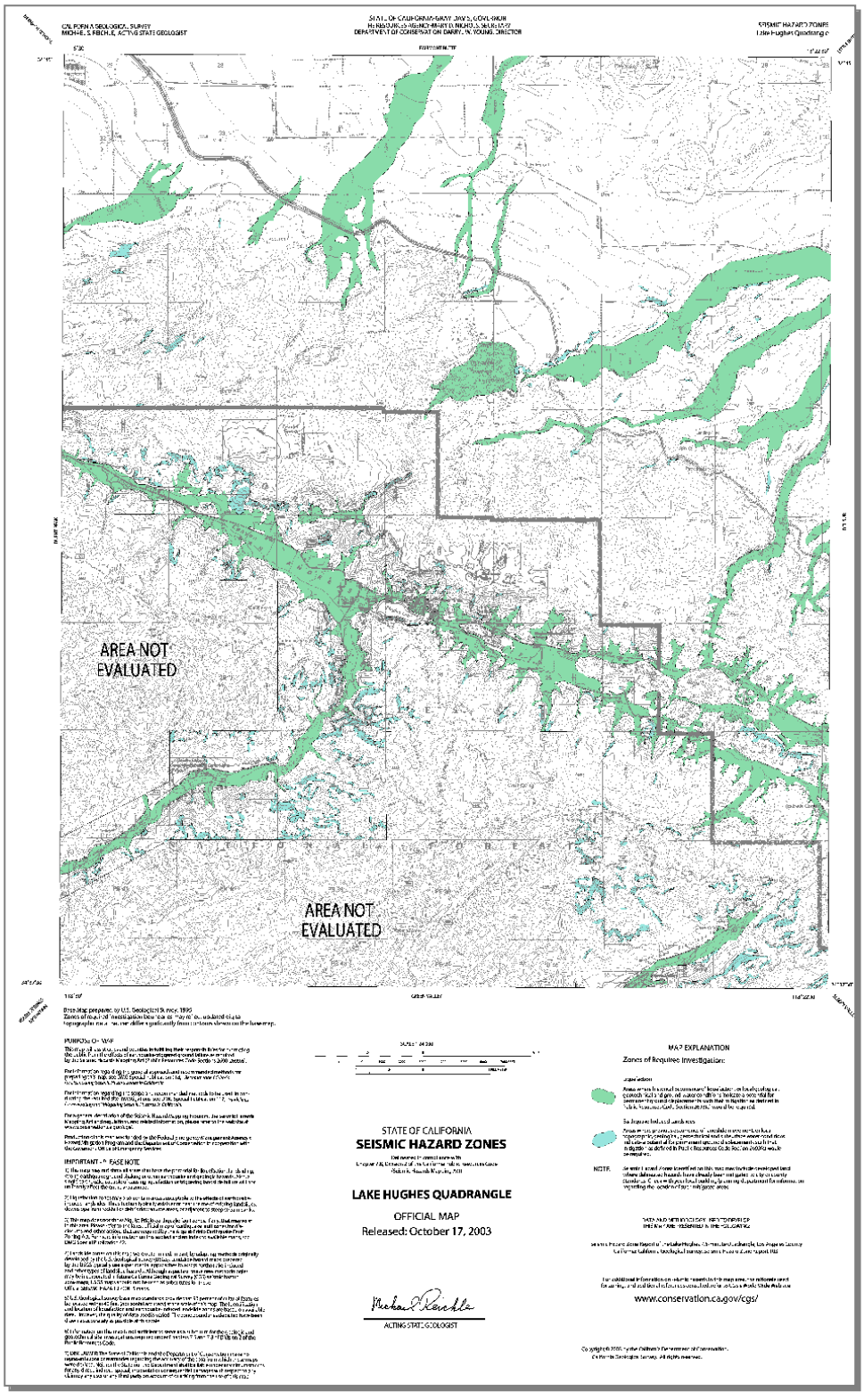
Juniper Hills Quadrangle



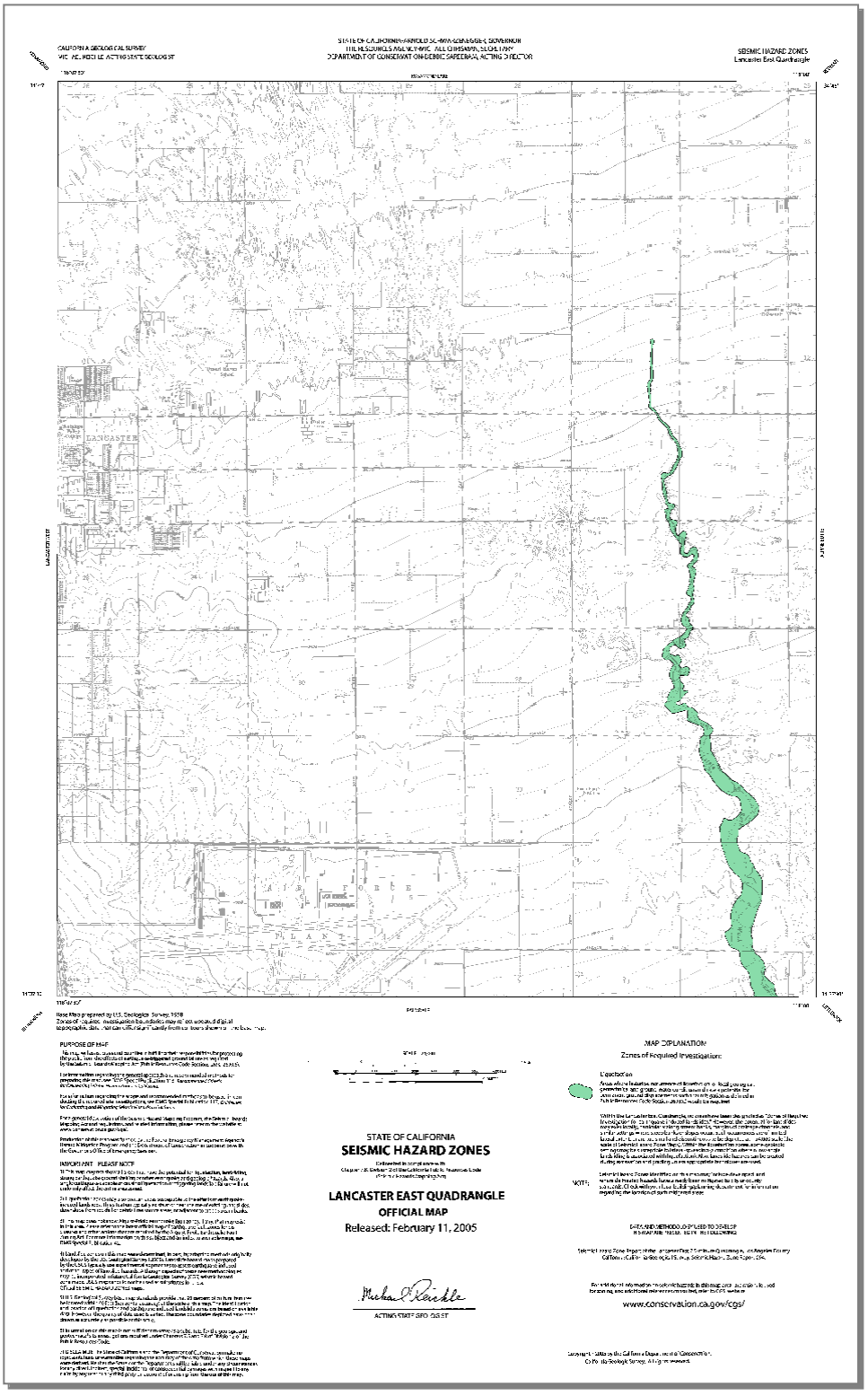
La Habra Quadrangle



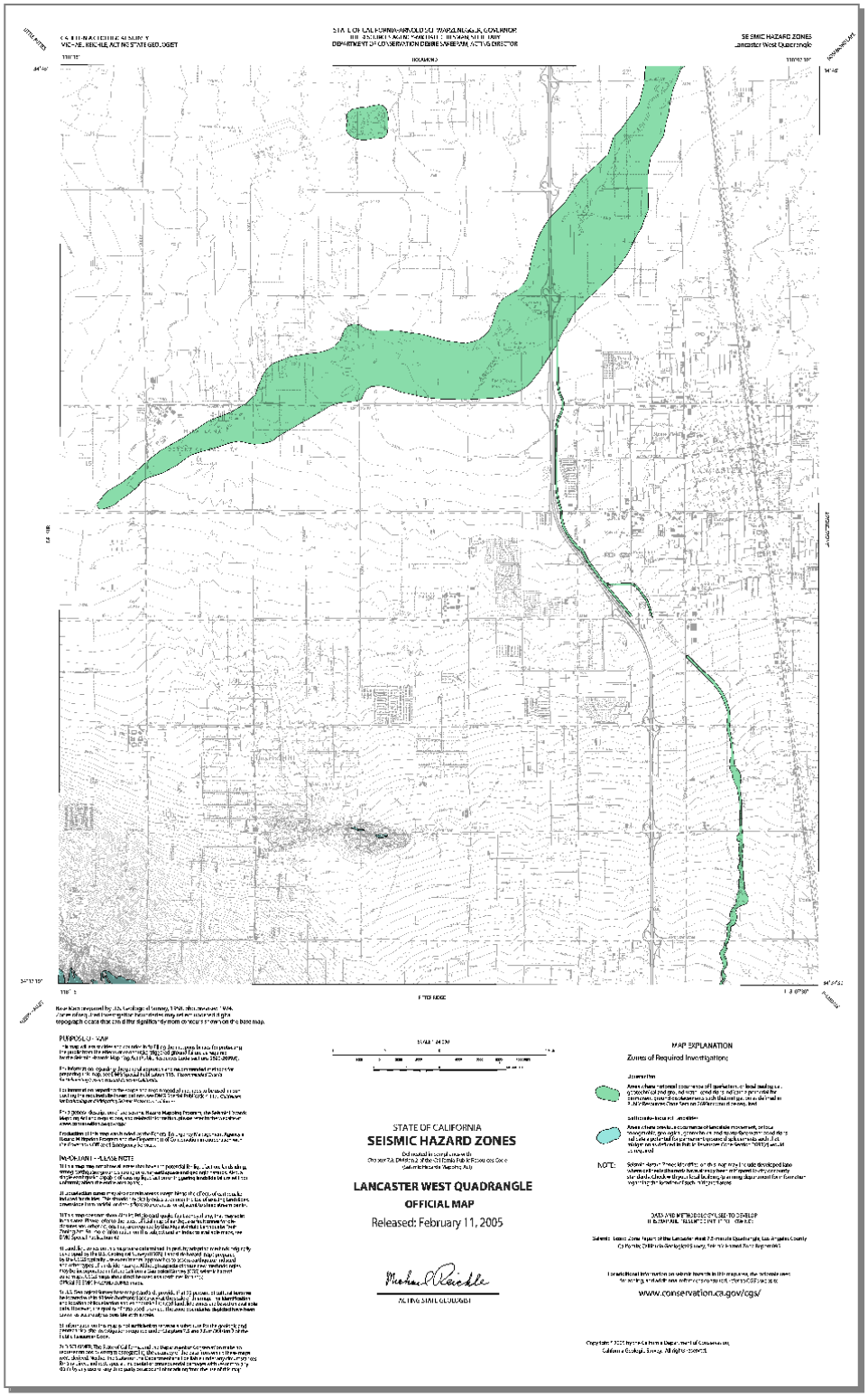
Lake Hughes Quadrangle



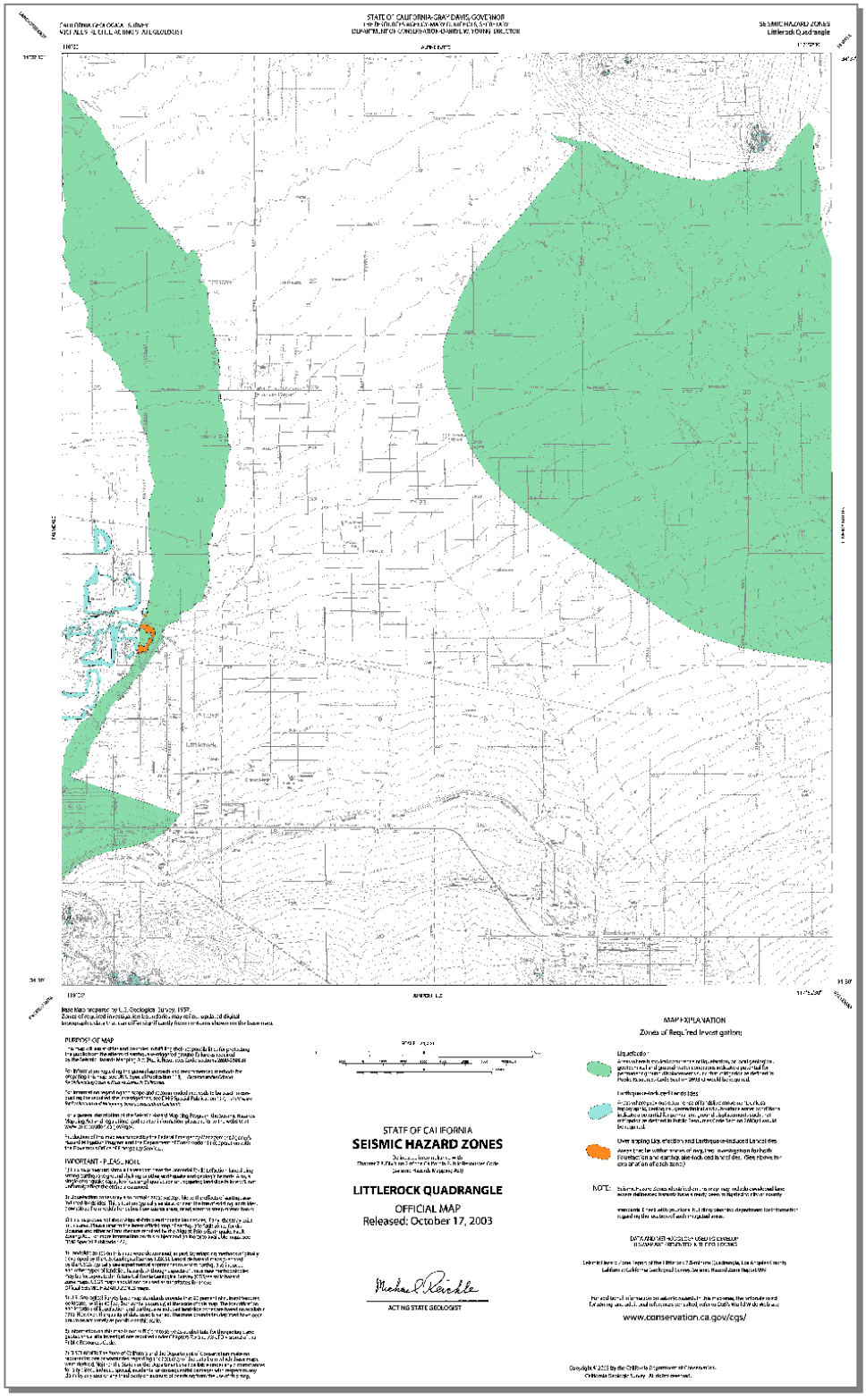
Lancaster East Quadrangle



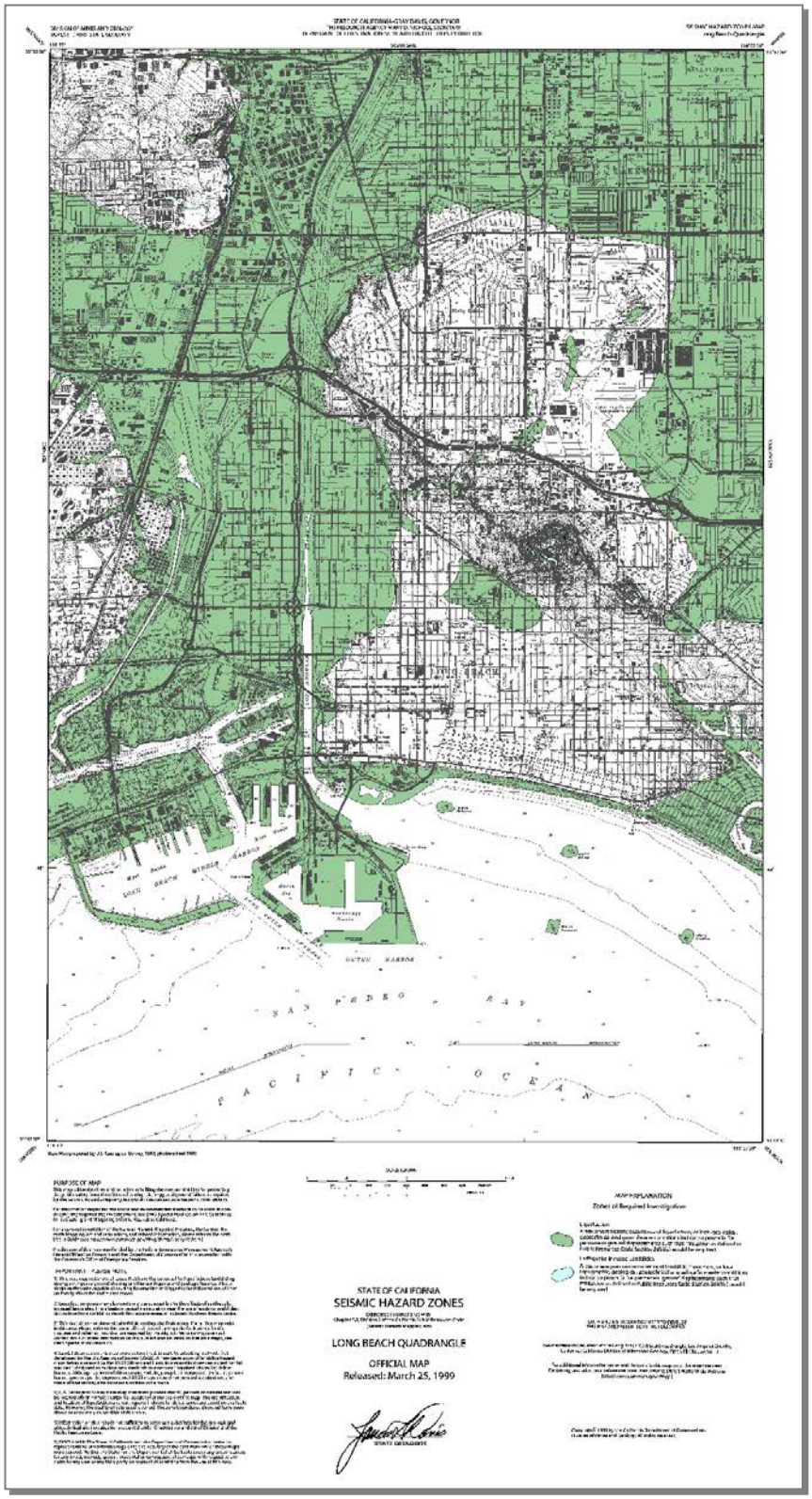
Lancaster West Quadrangle



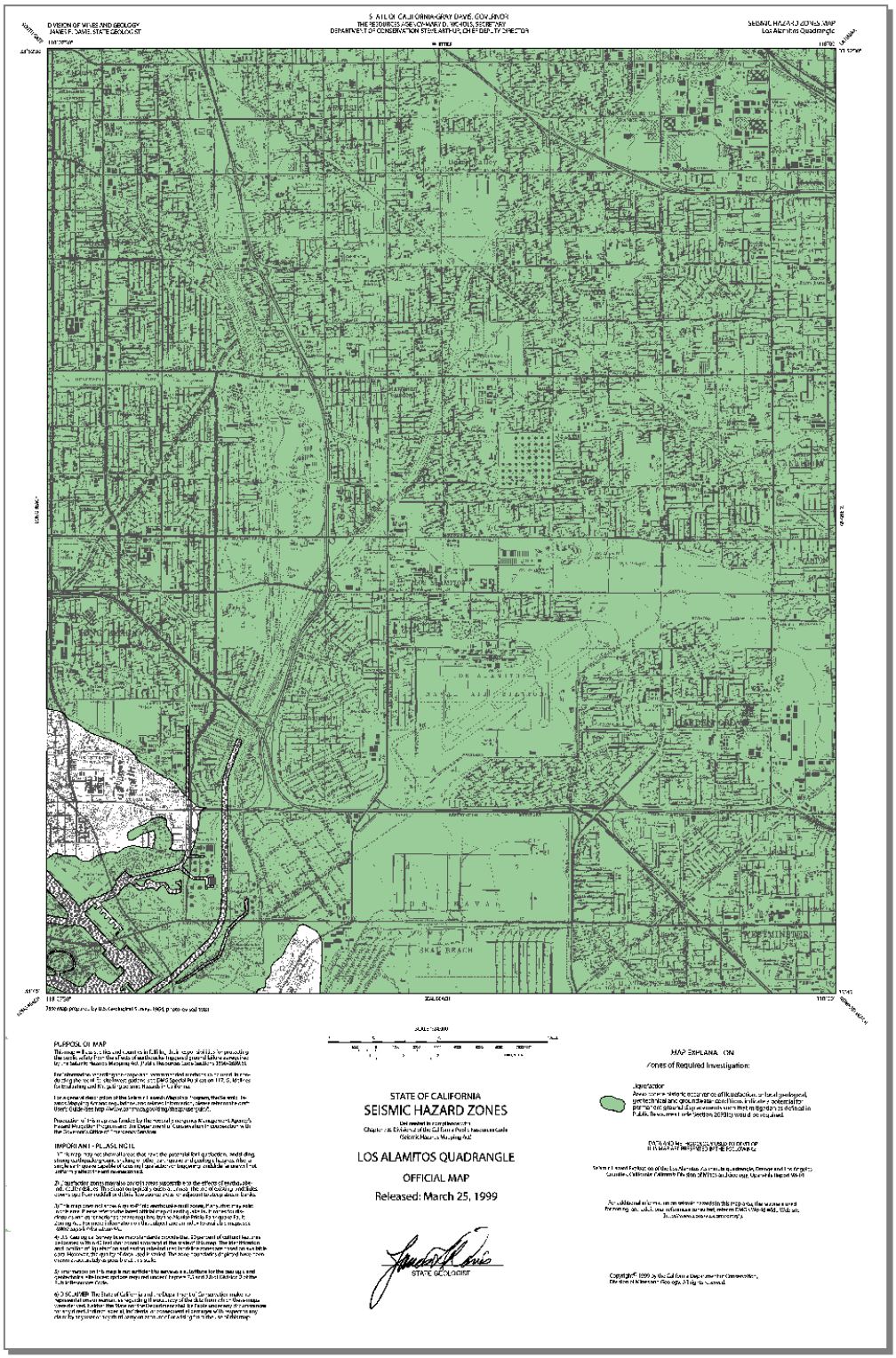
Littlerock Quadrangle



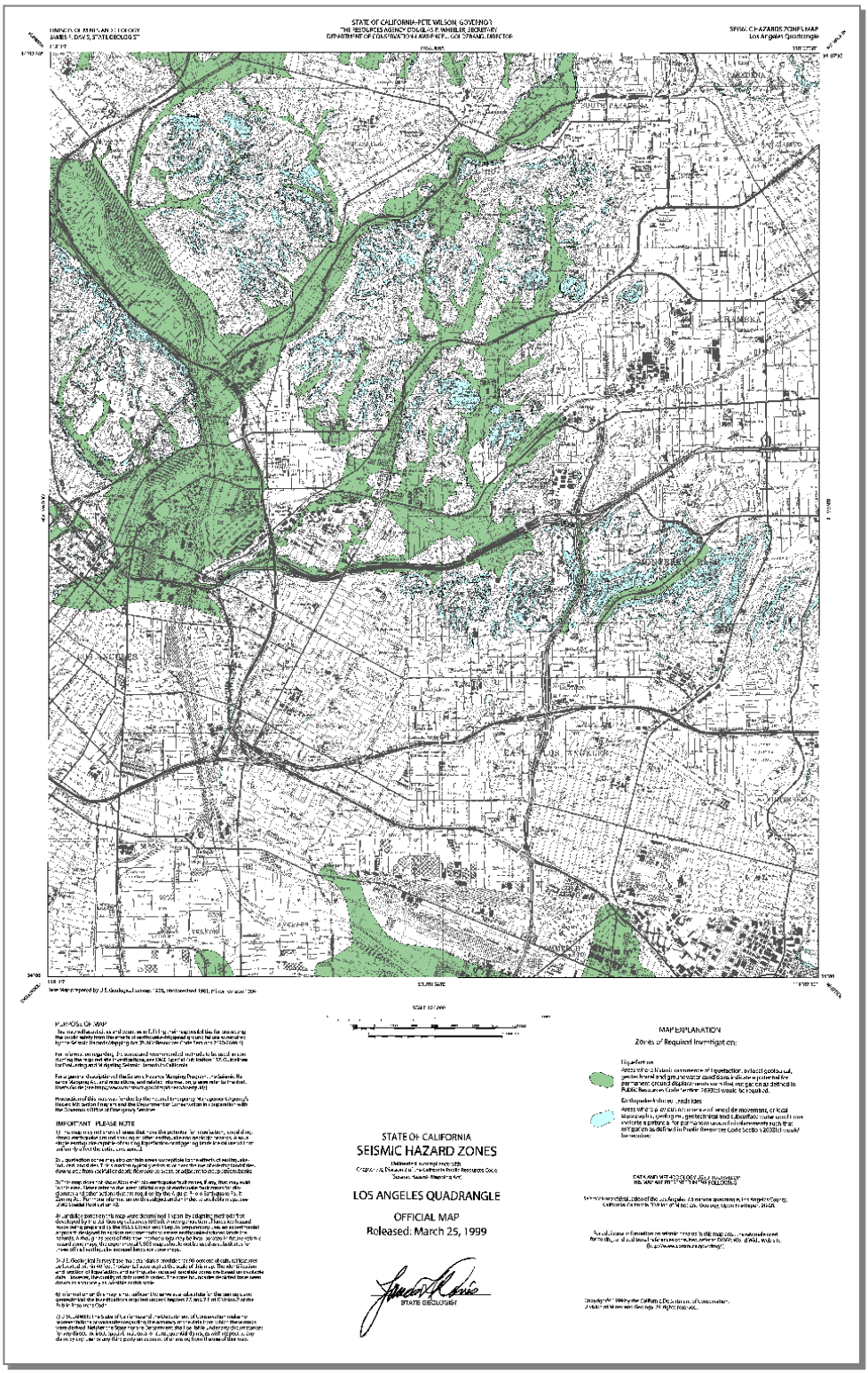
Long Beach Quadrangle



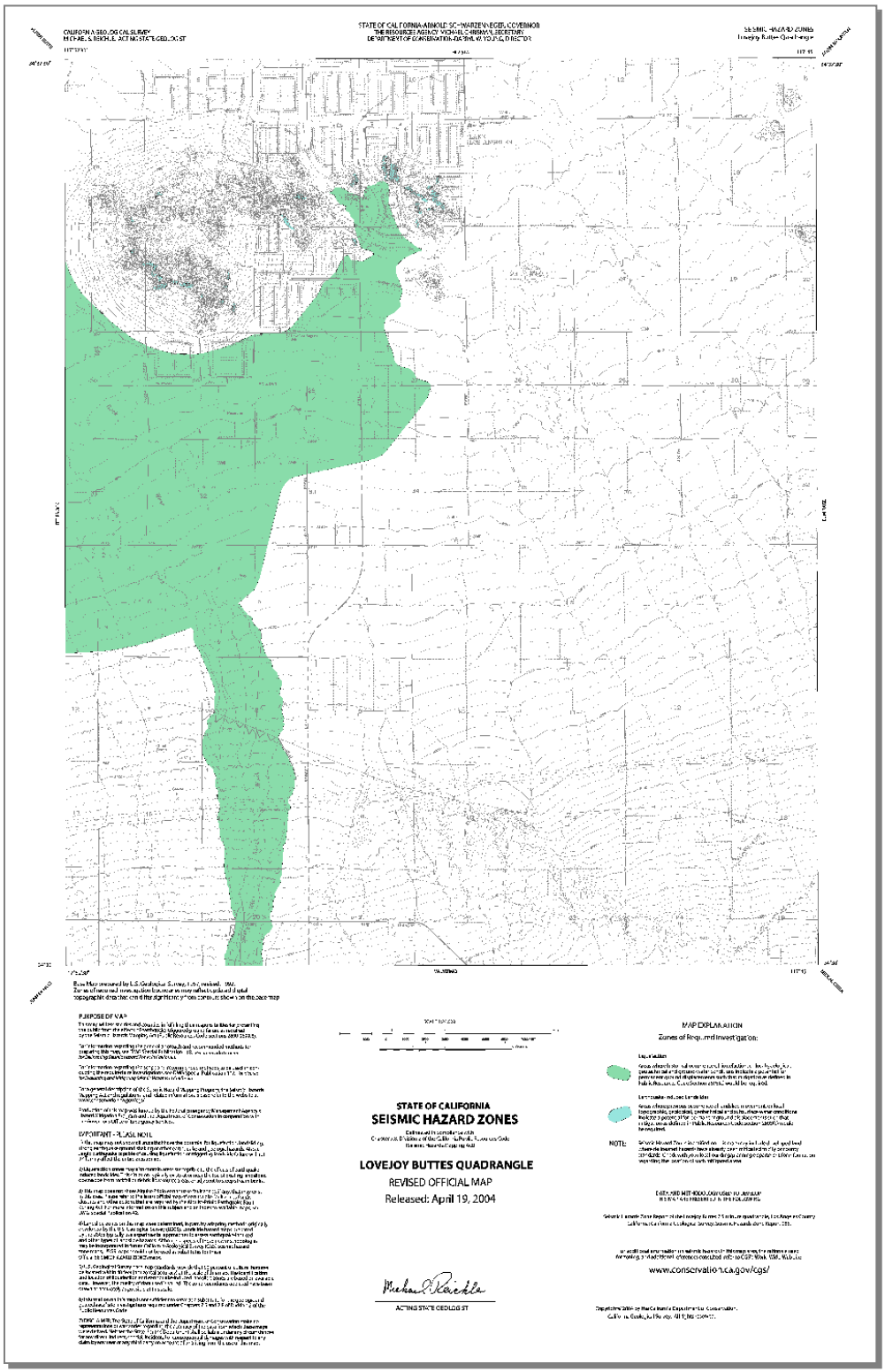
Los Alamitos Quadrangle



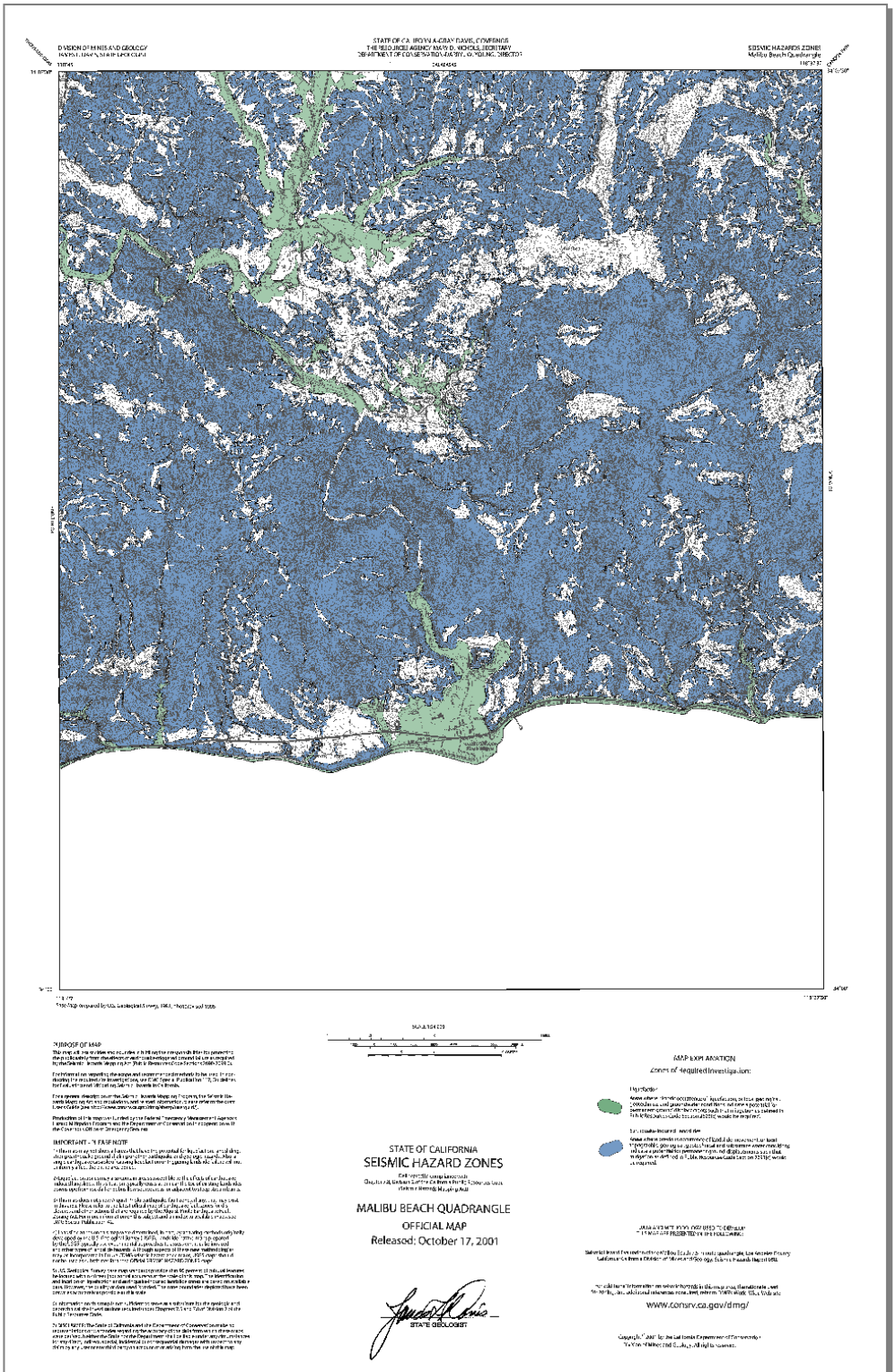
Los Angeles Quadrangle



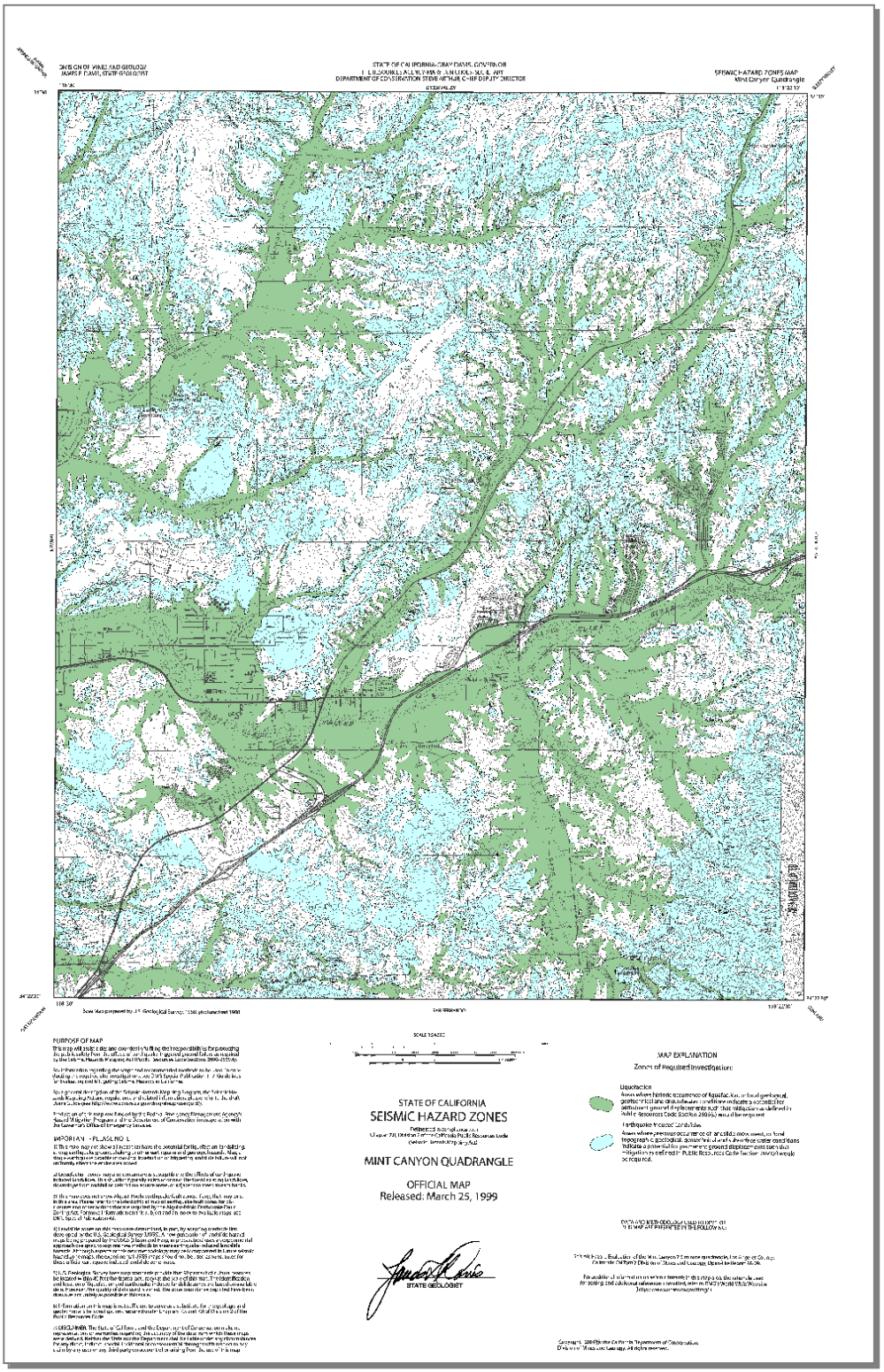
Lovejoy Buttes Quadrangle



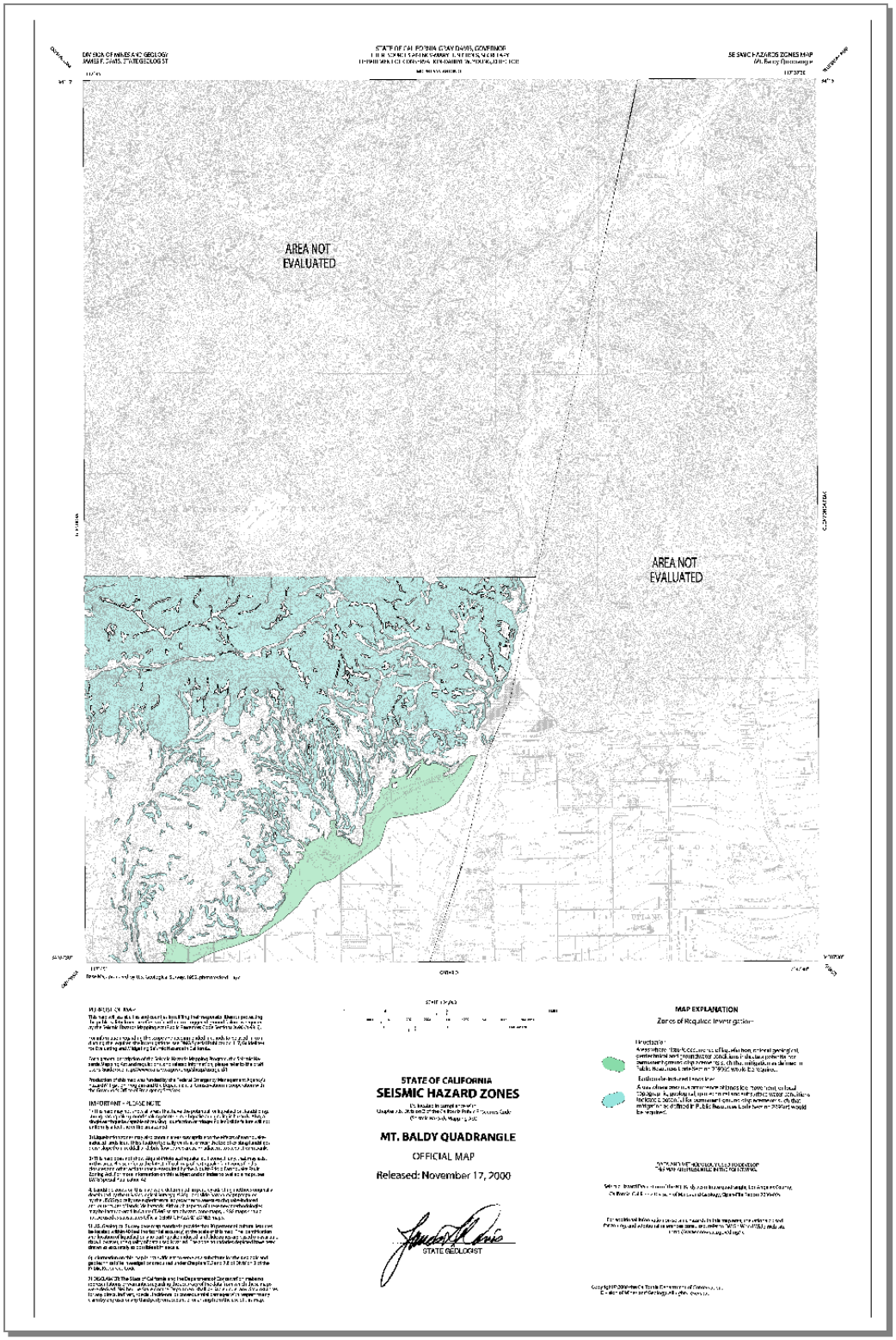
Malibu Beach Quadrangle



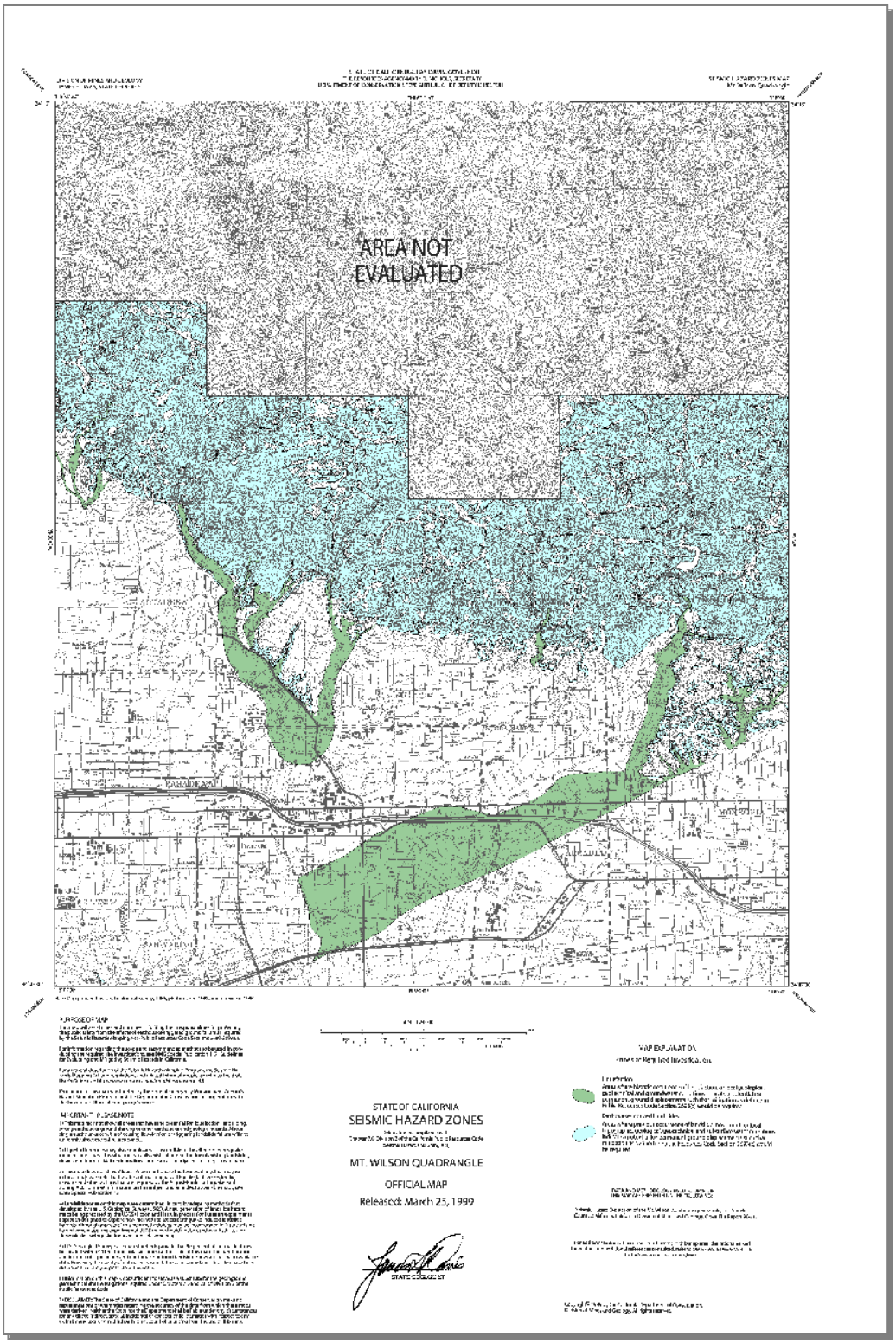
Mint Canyon Quadrangle



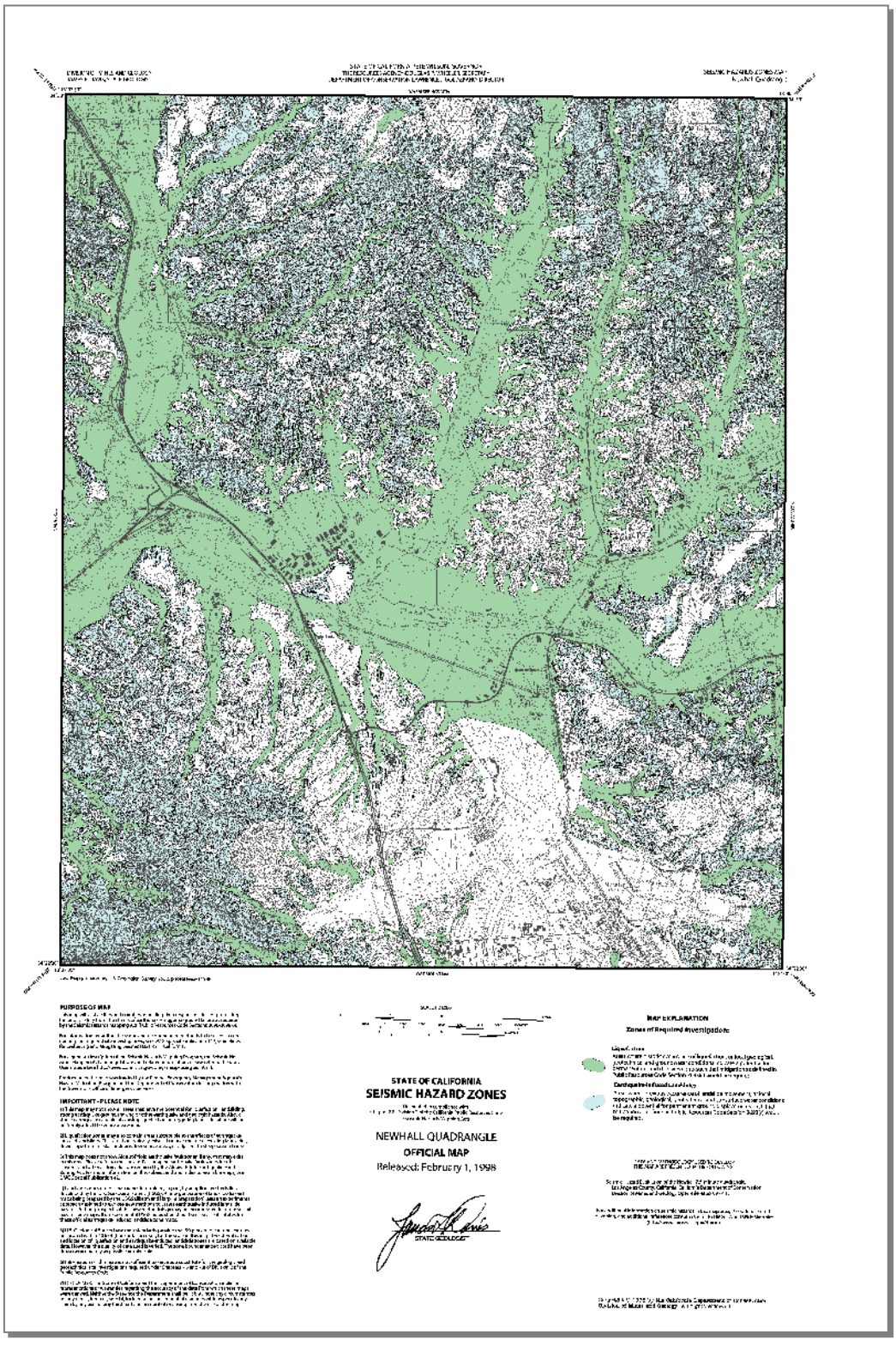
Mt. Baldy Quadrangle



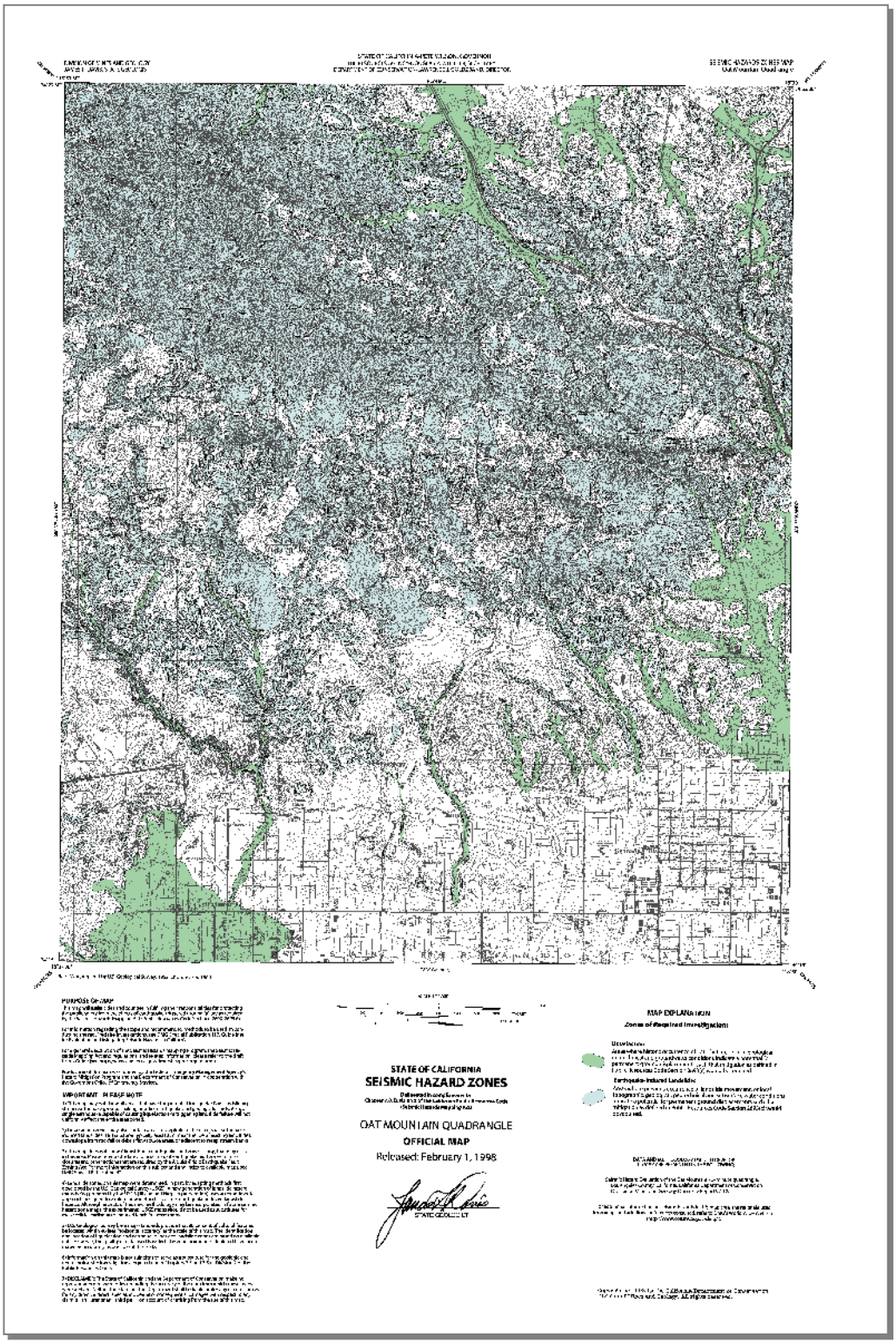
Mt. Wilson Quadrangle



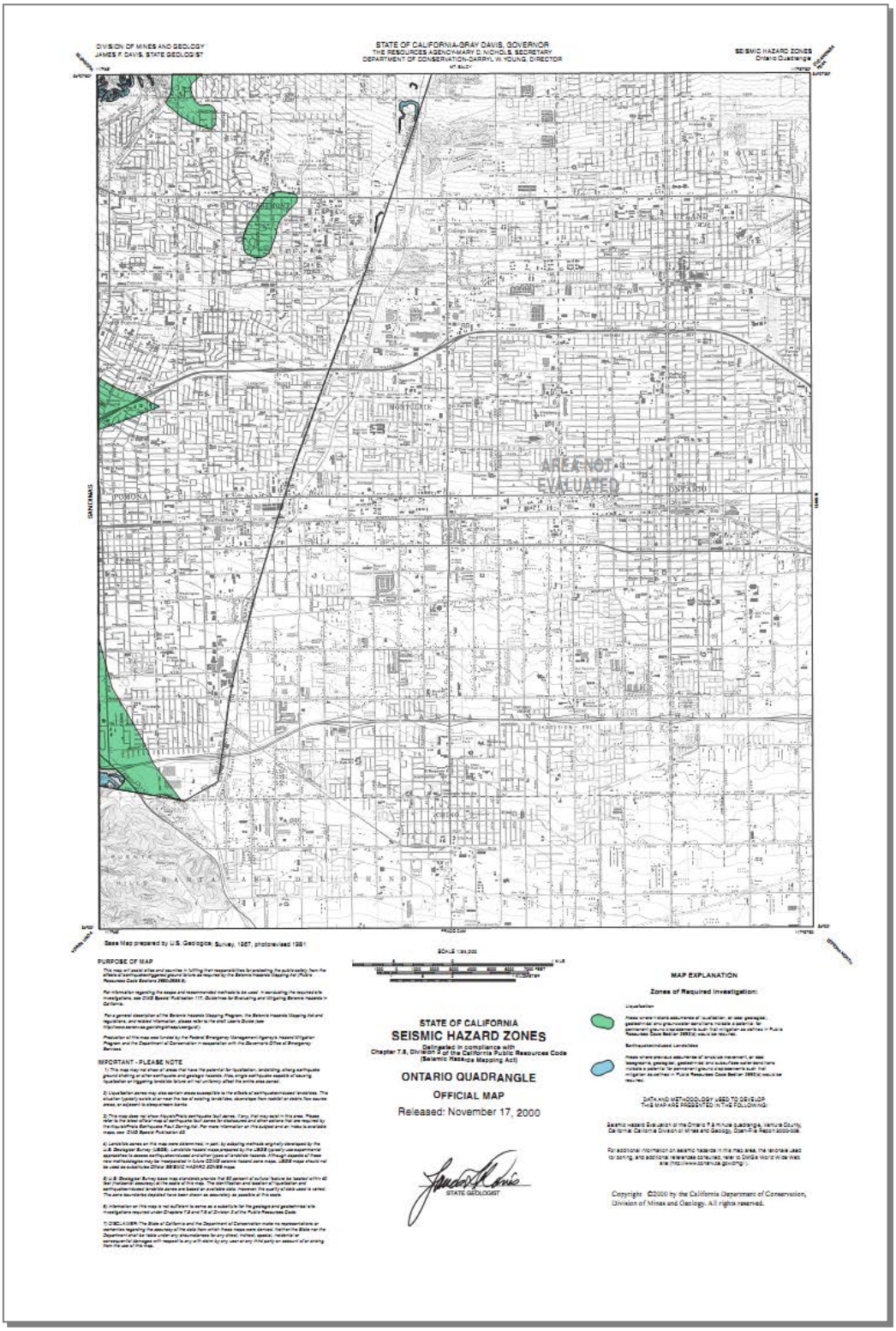
Newhall Quadrangle



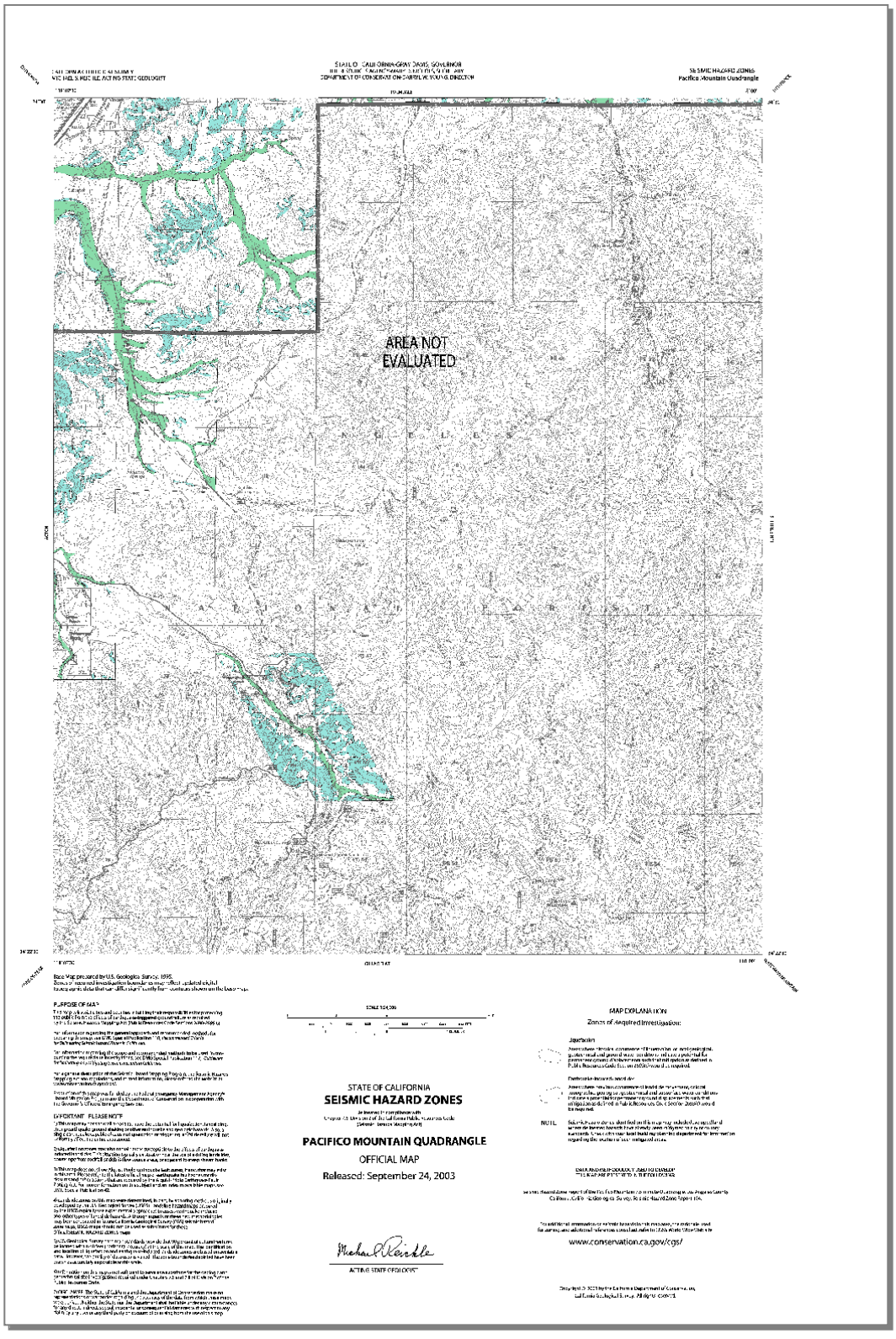
Oat Mountain Quadrangle



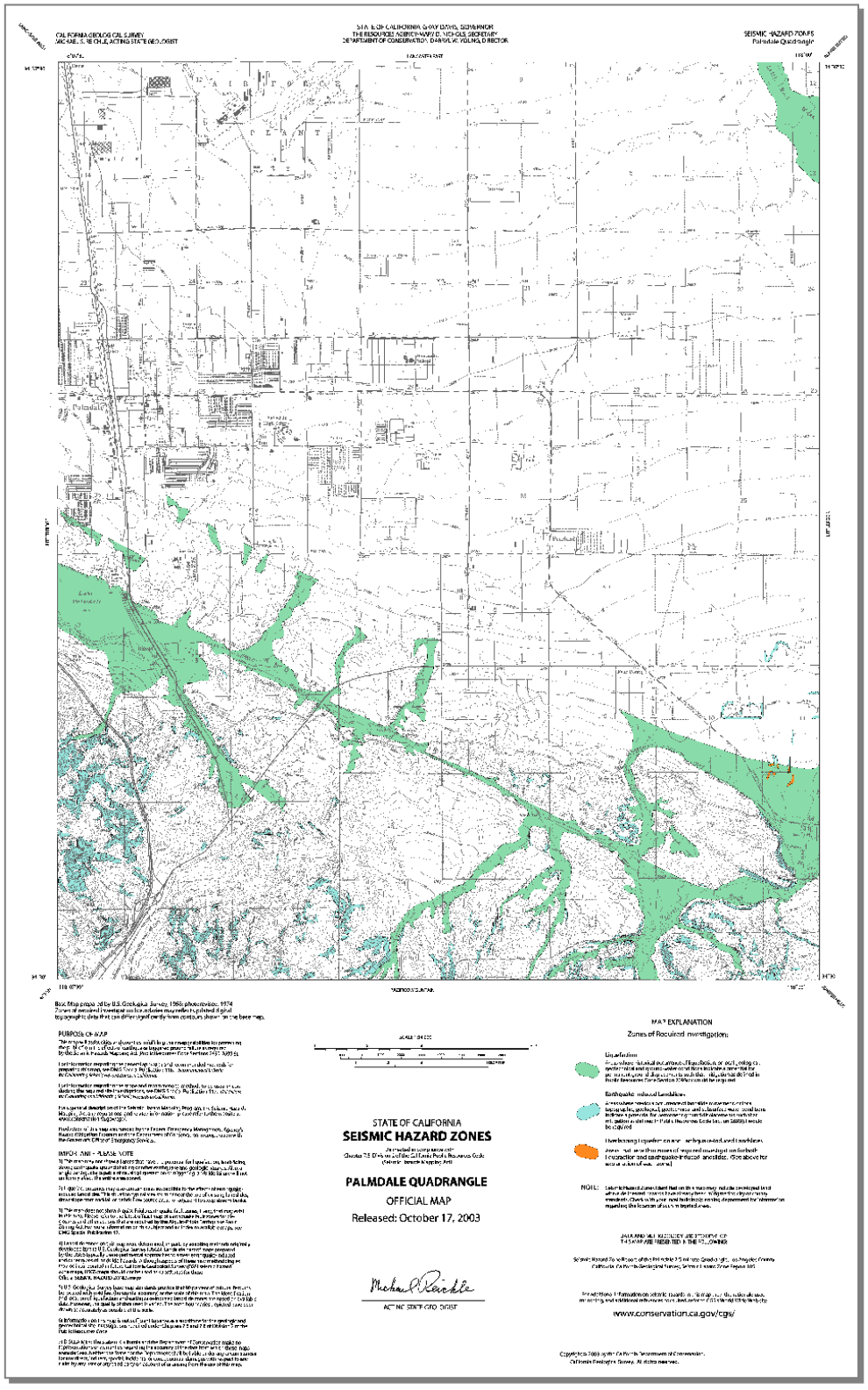
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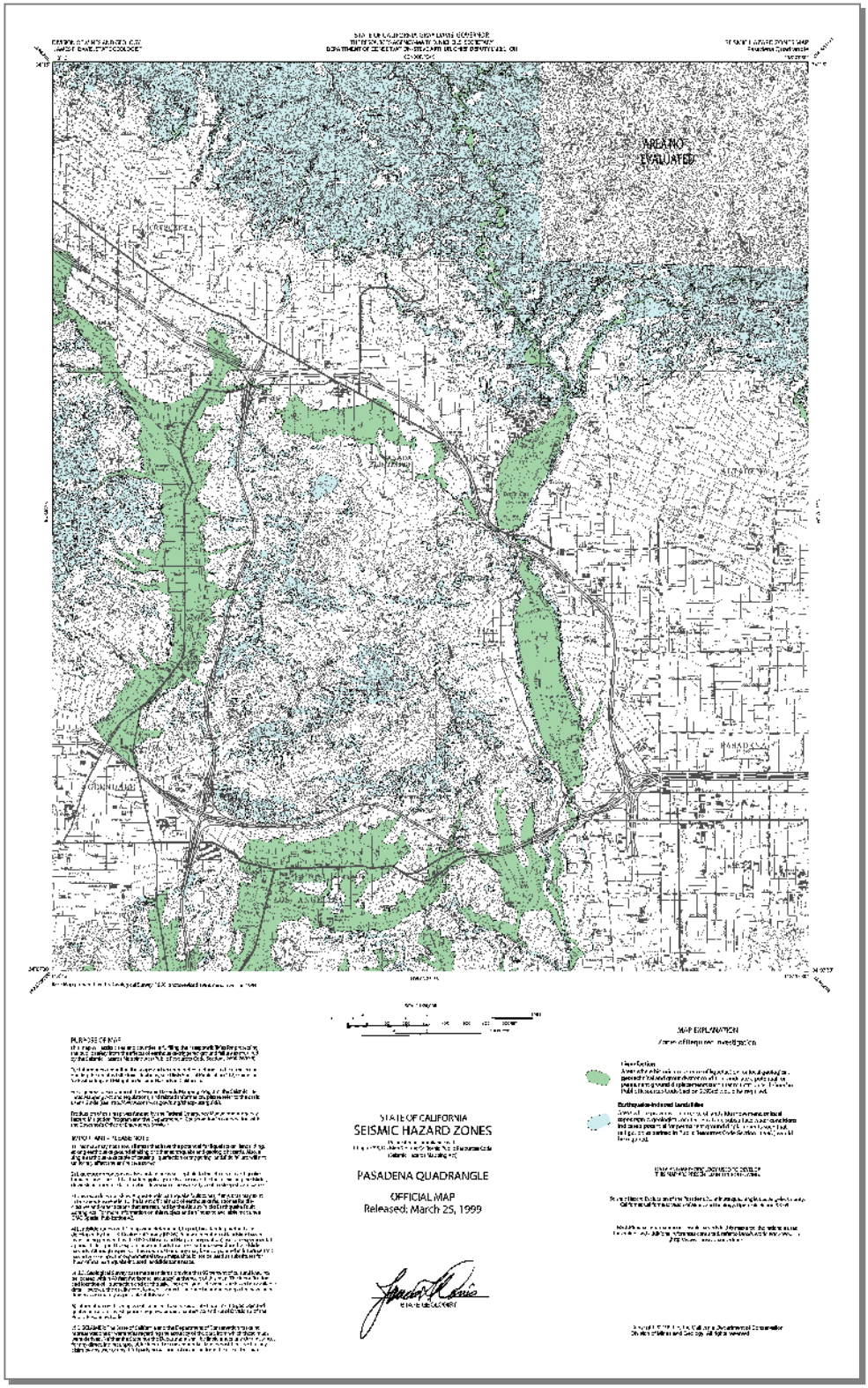
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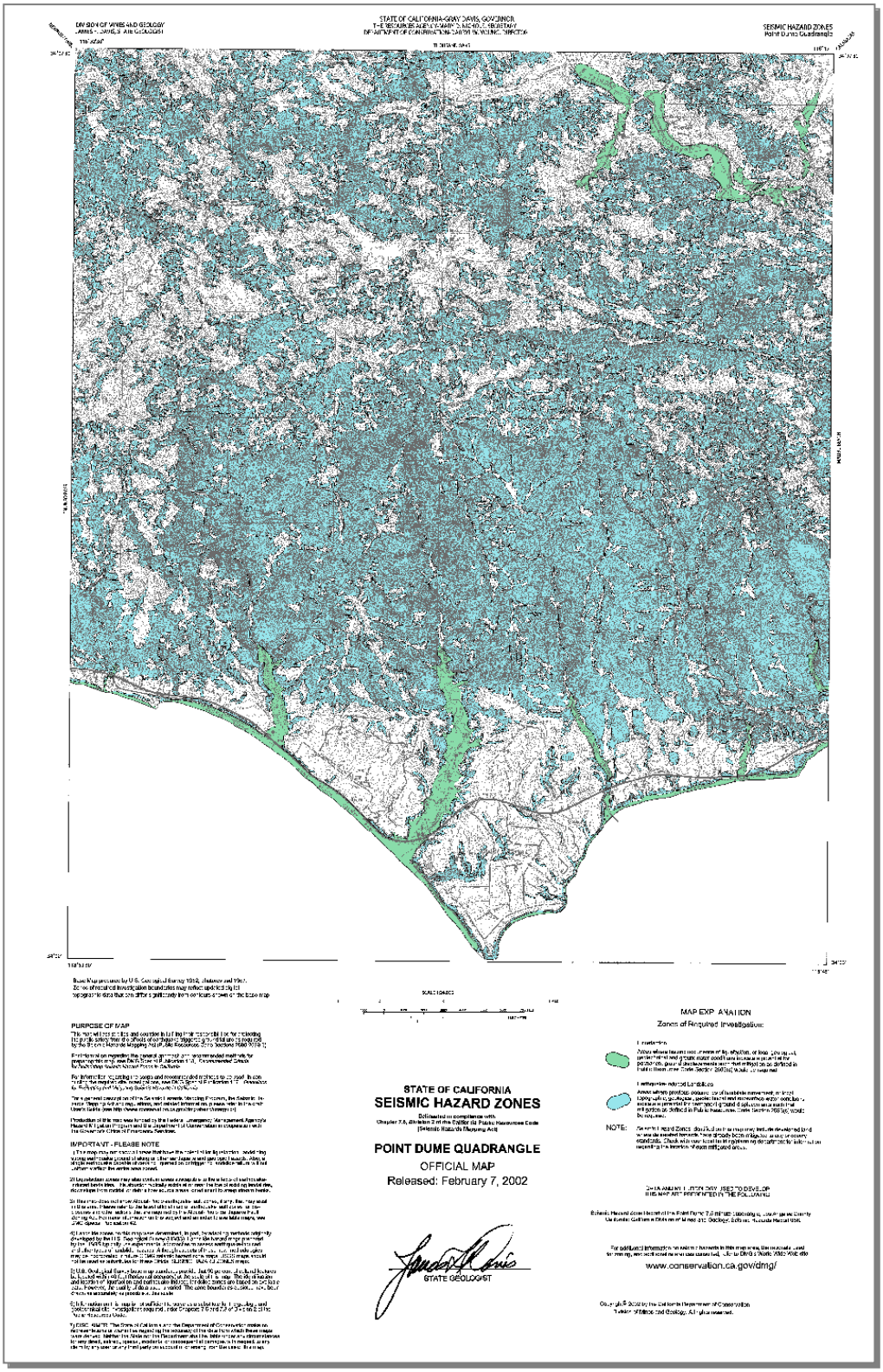
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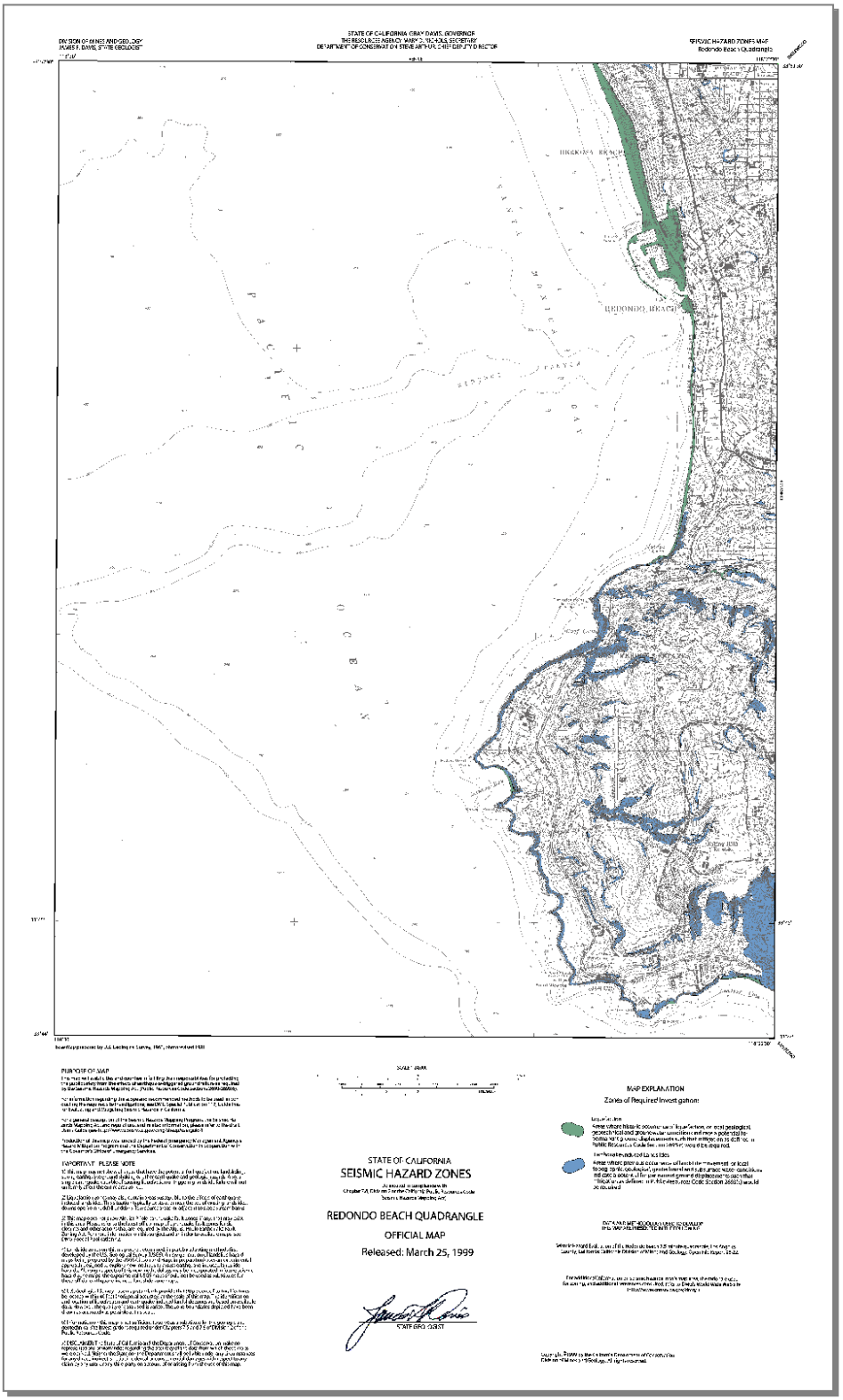
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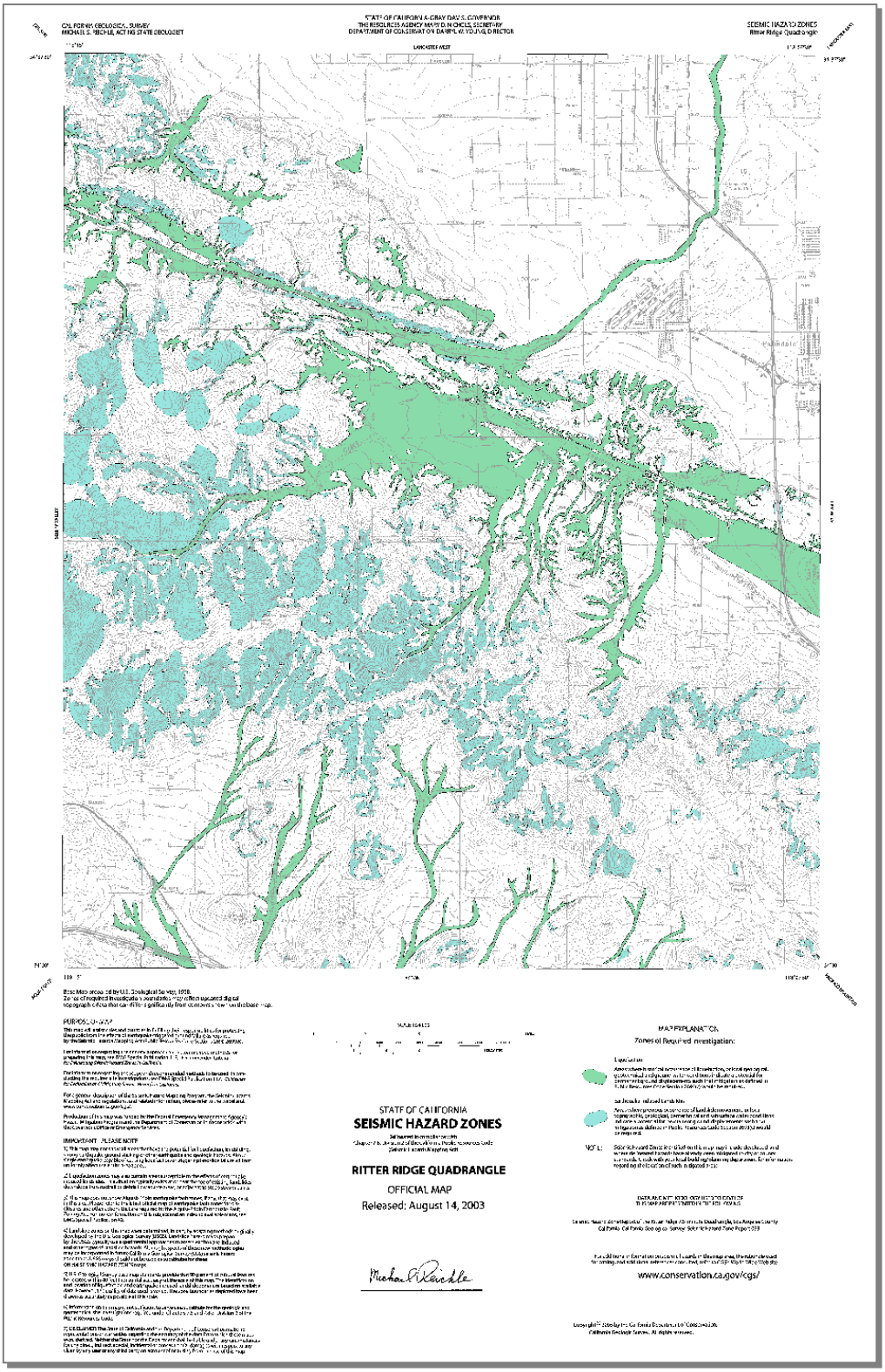
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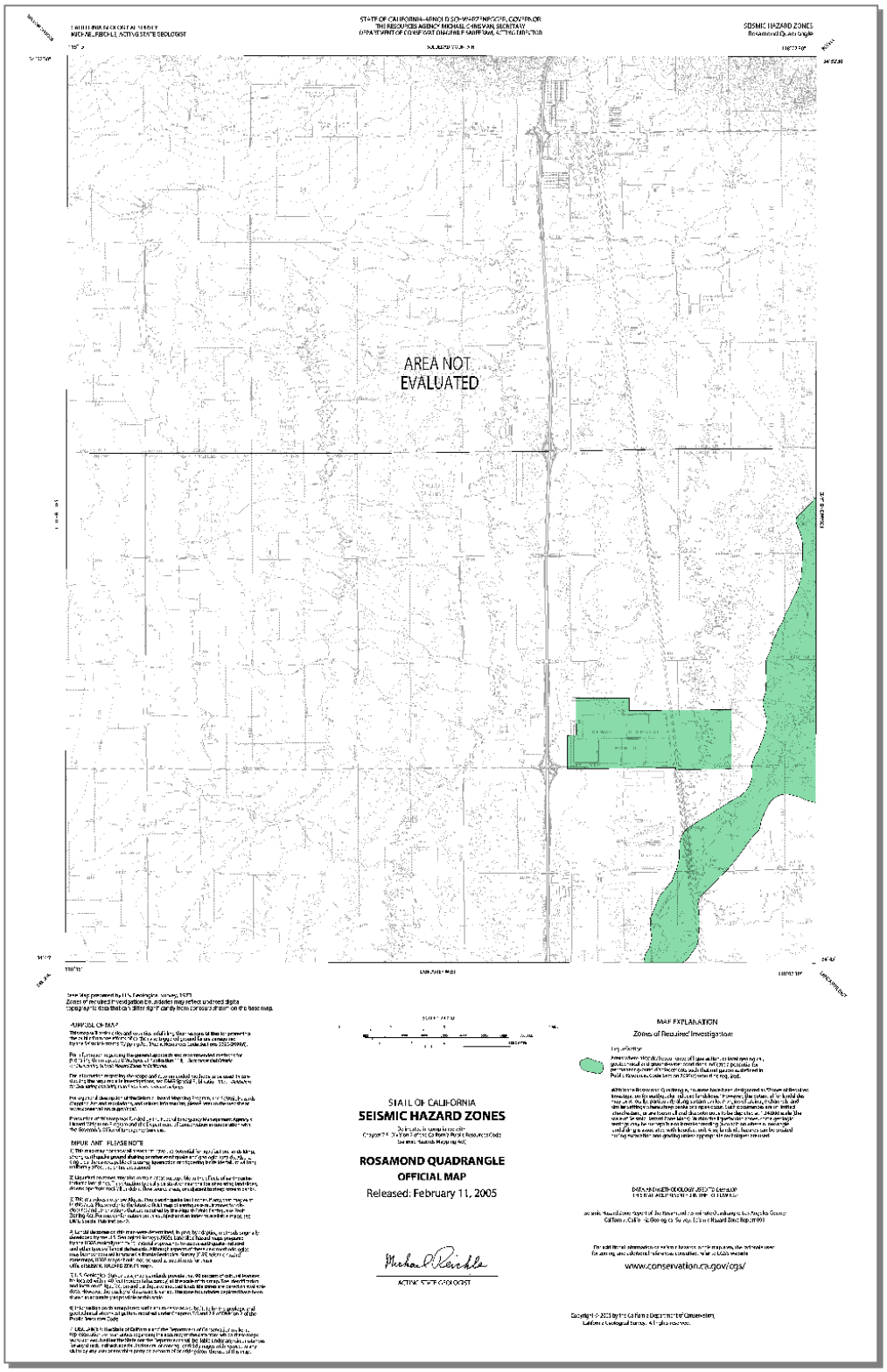
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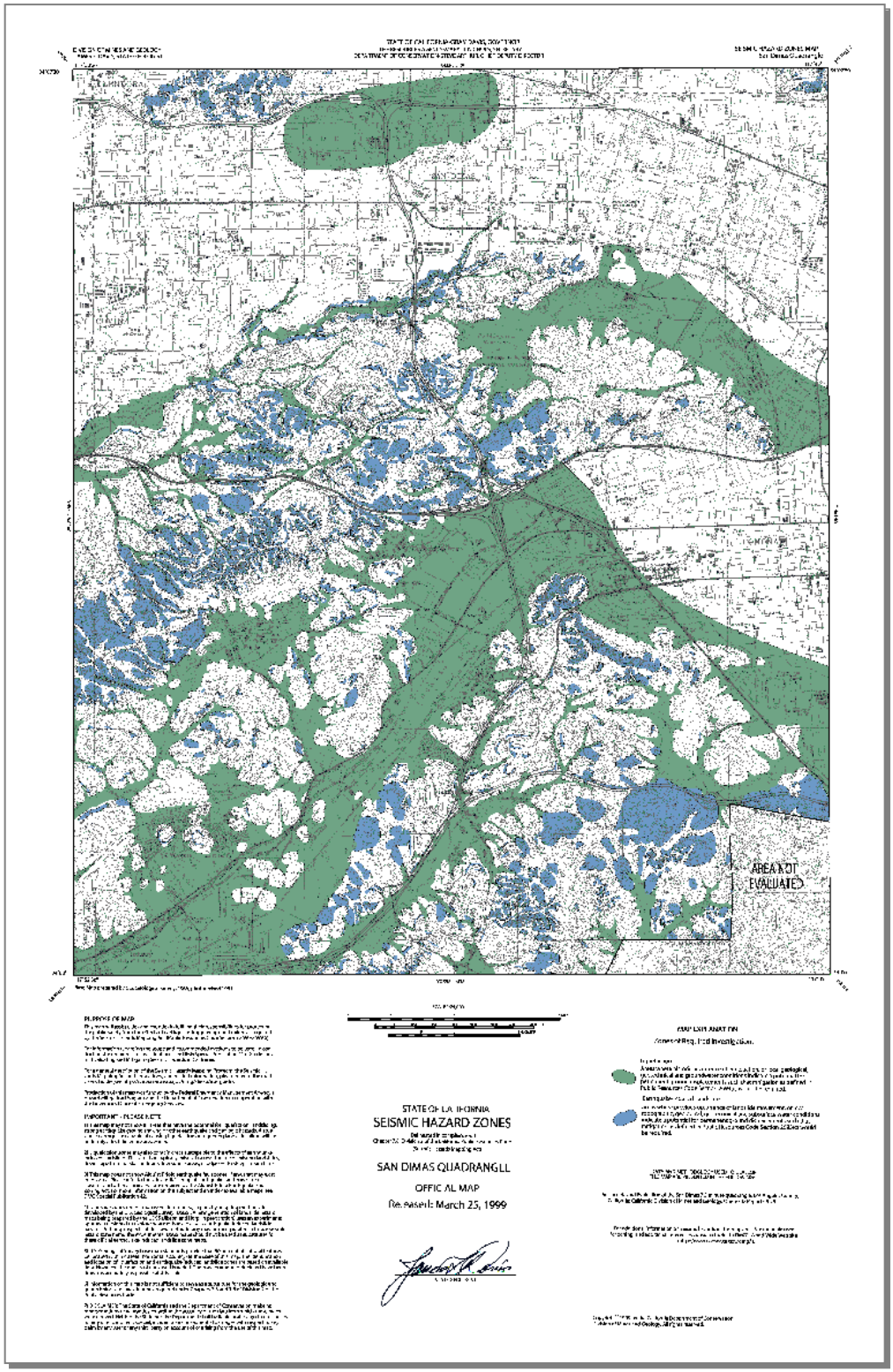
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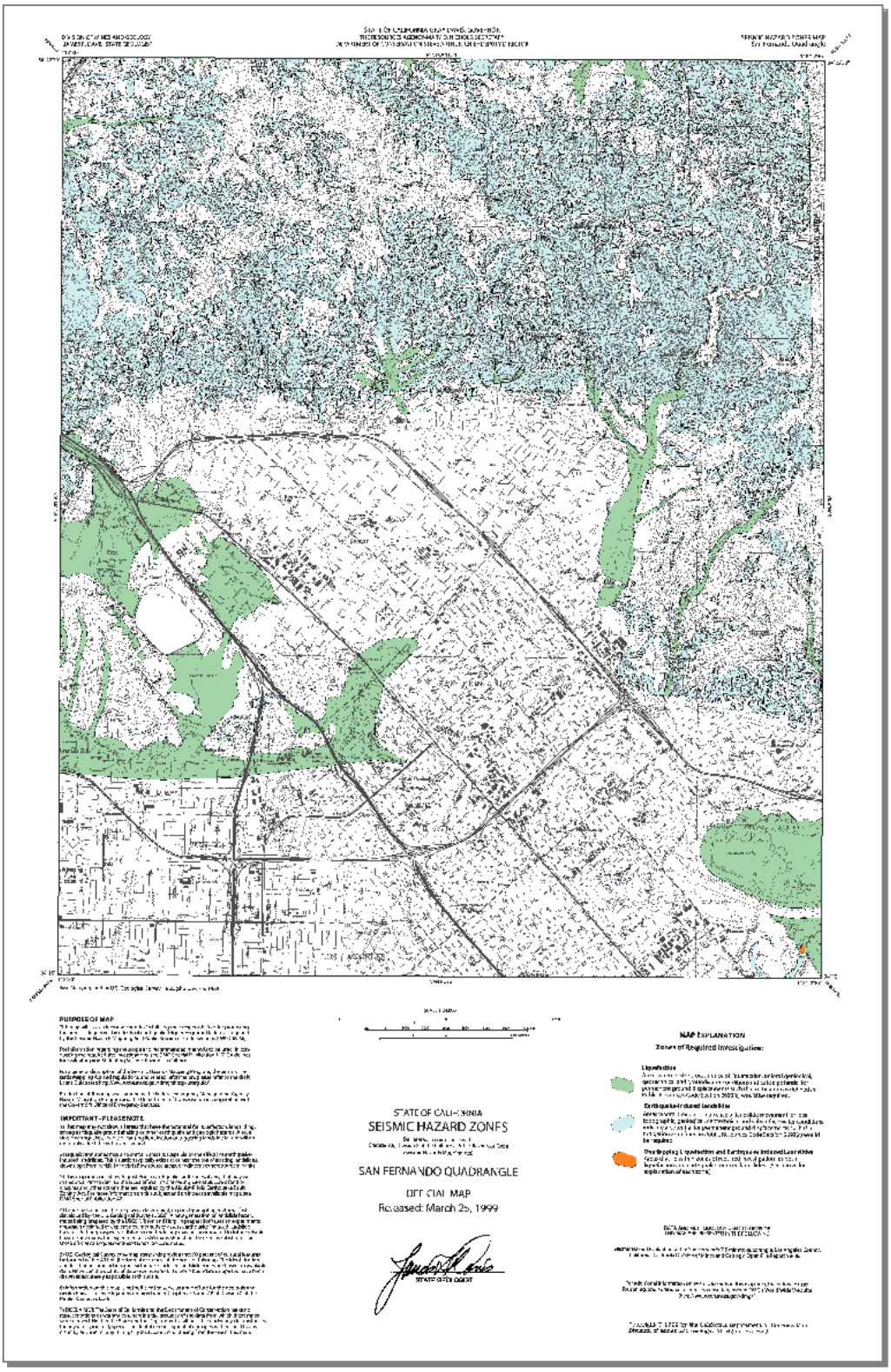
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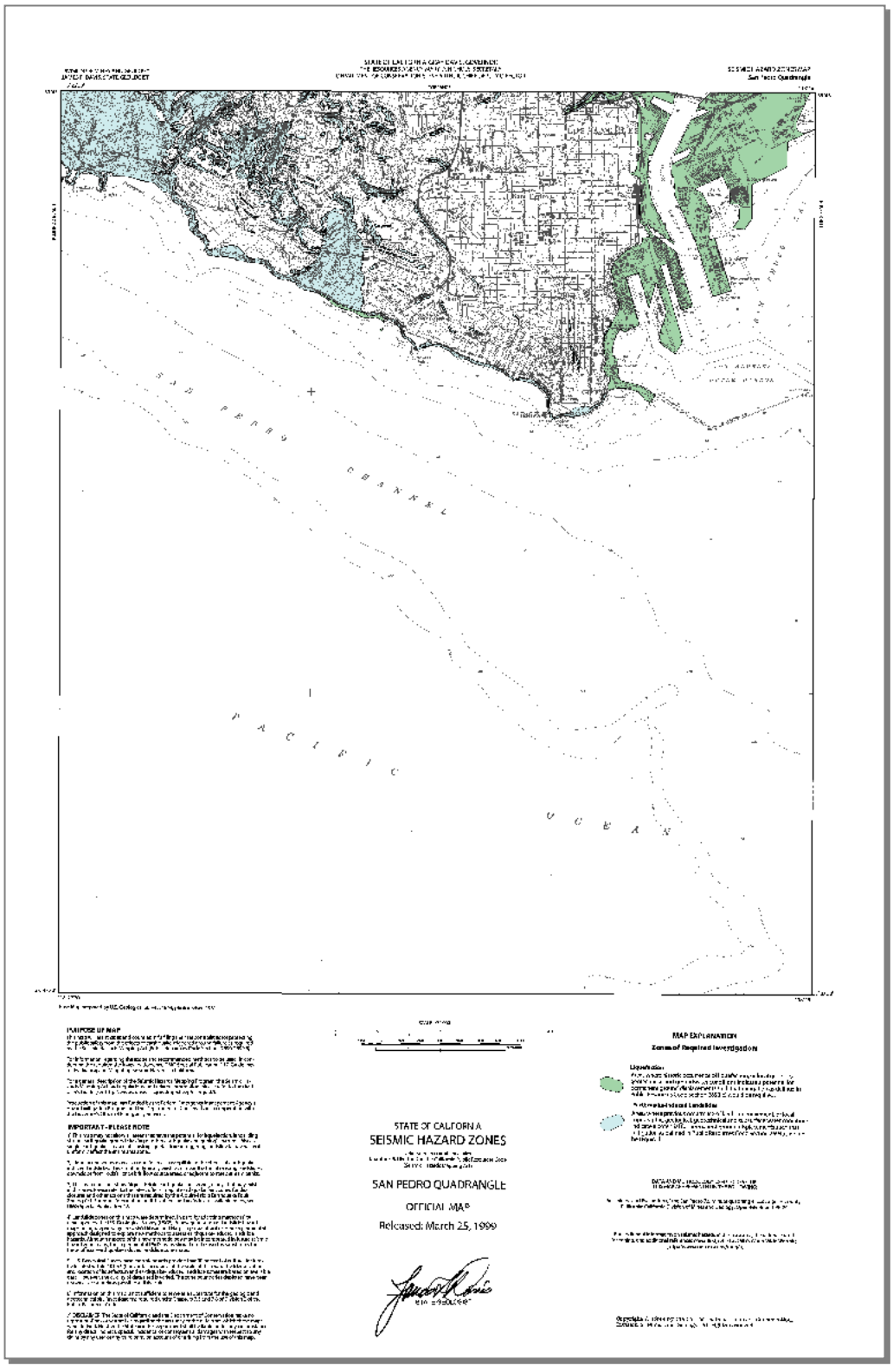
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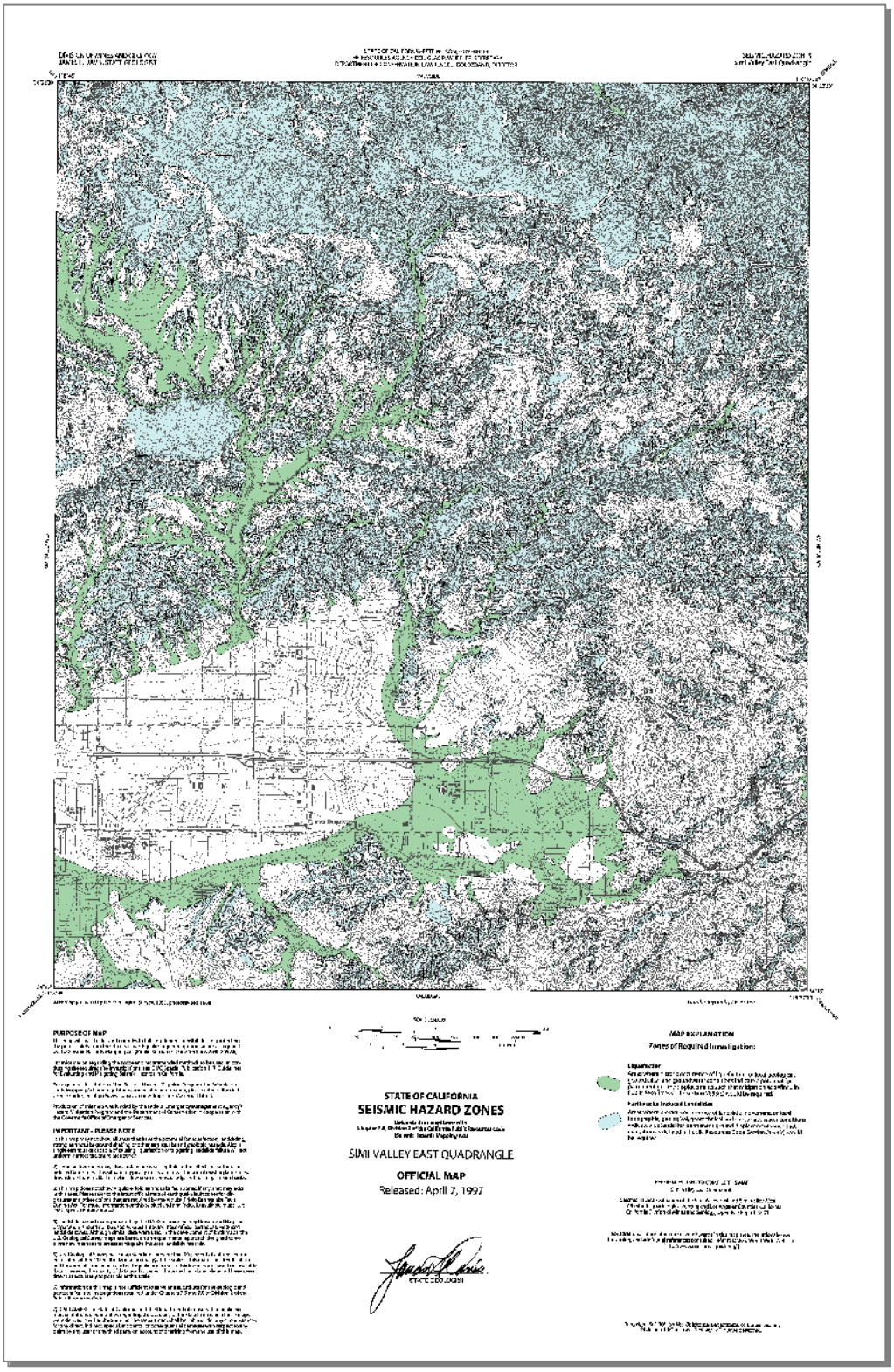
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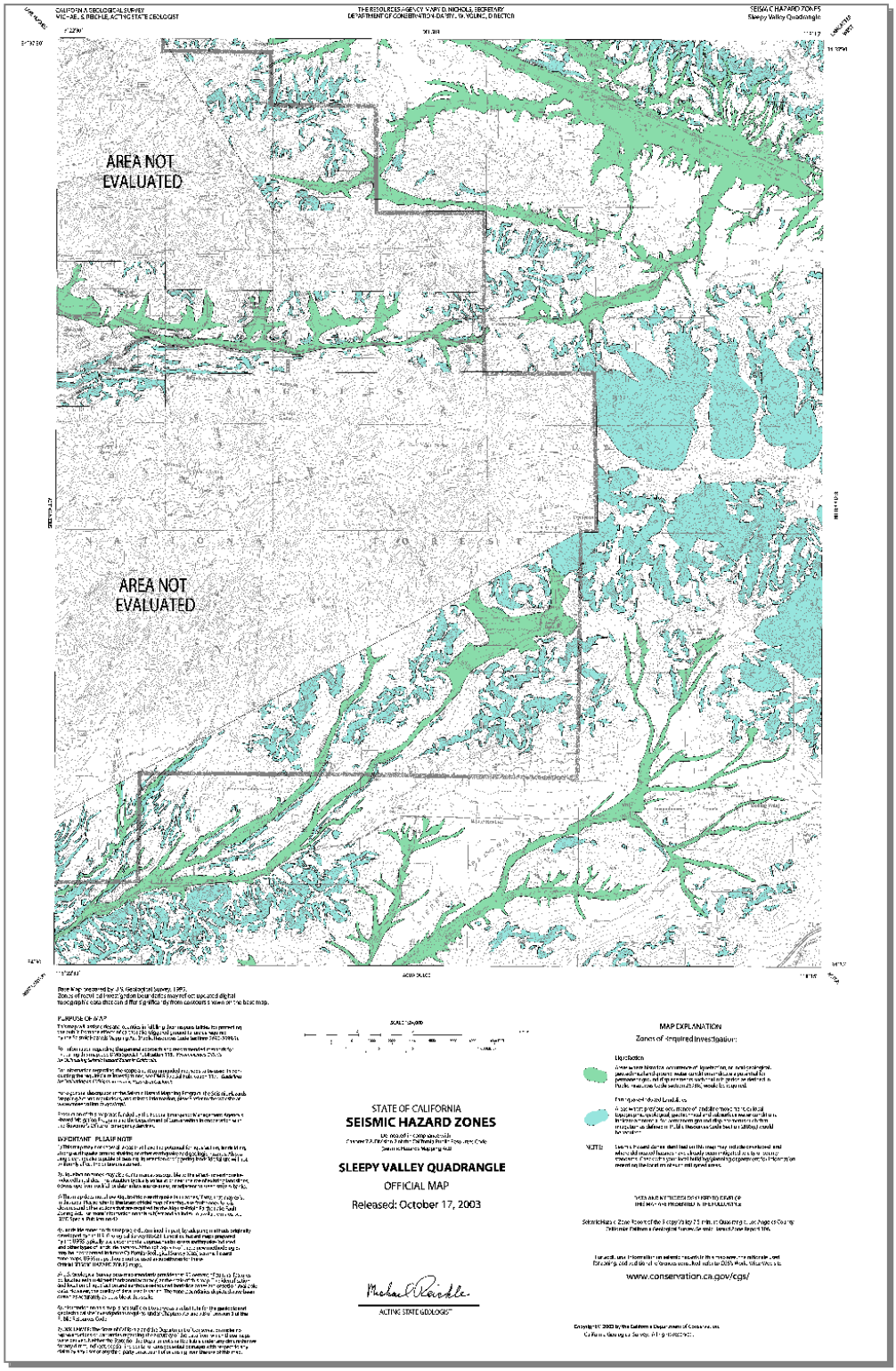
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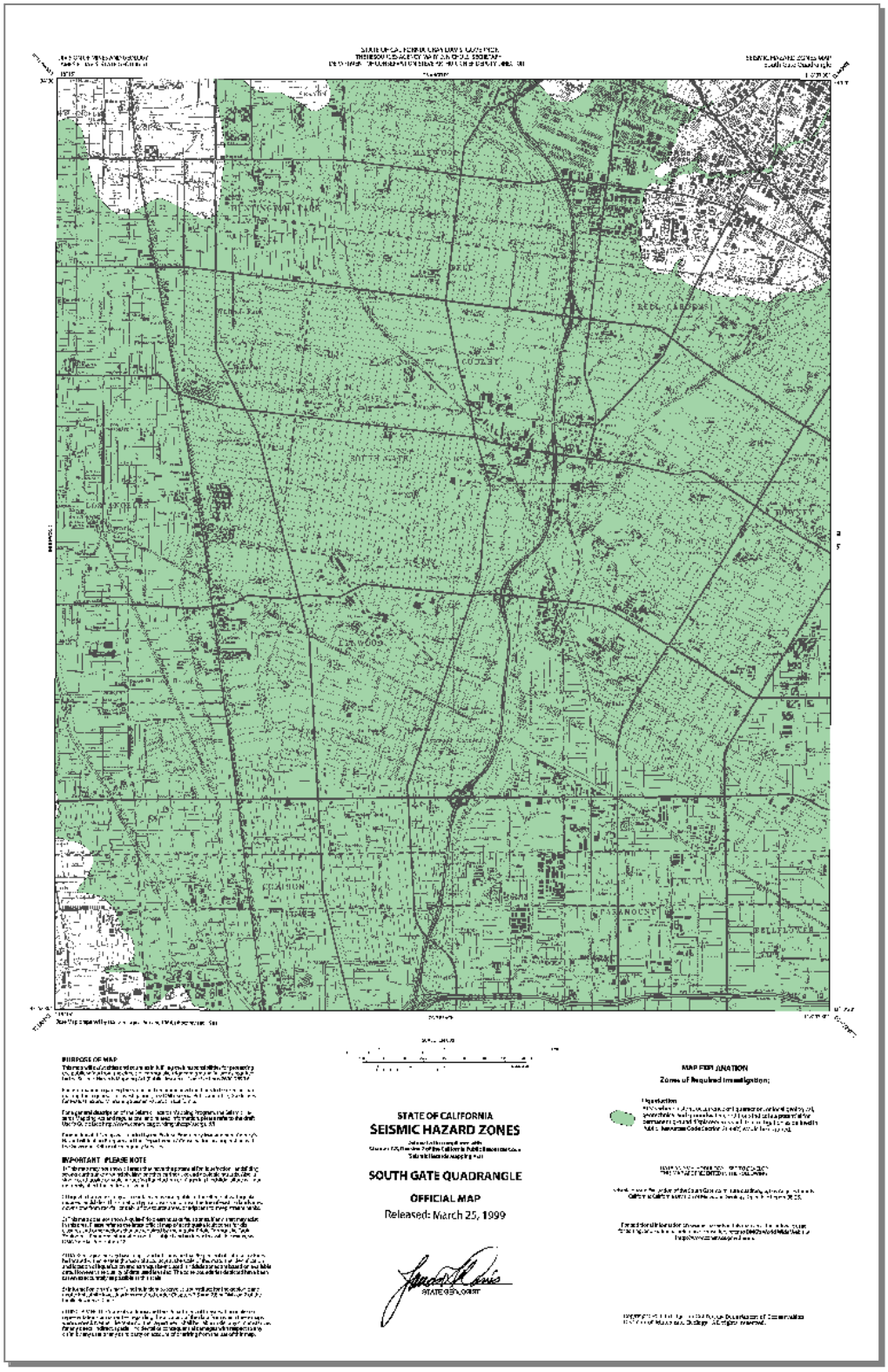
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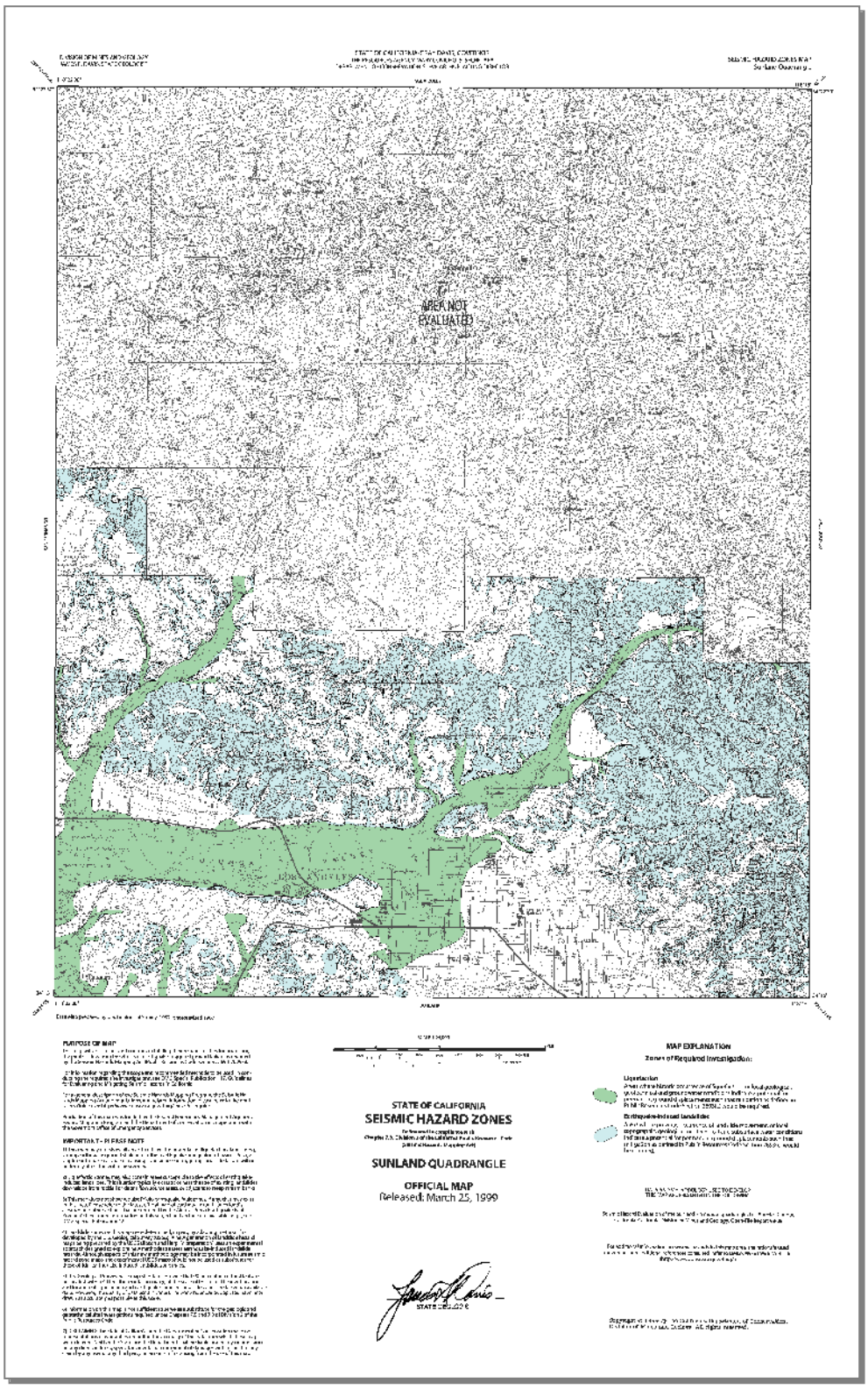
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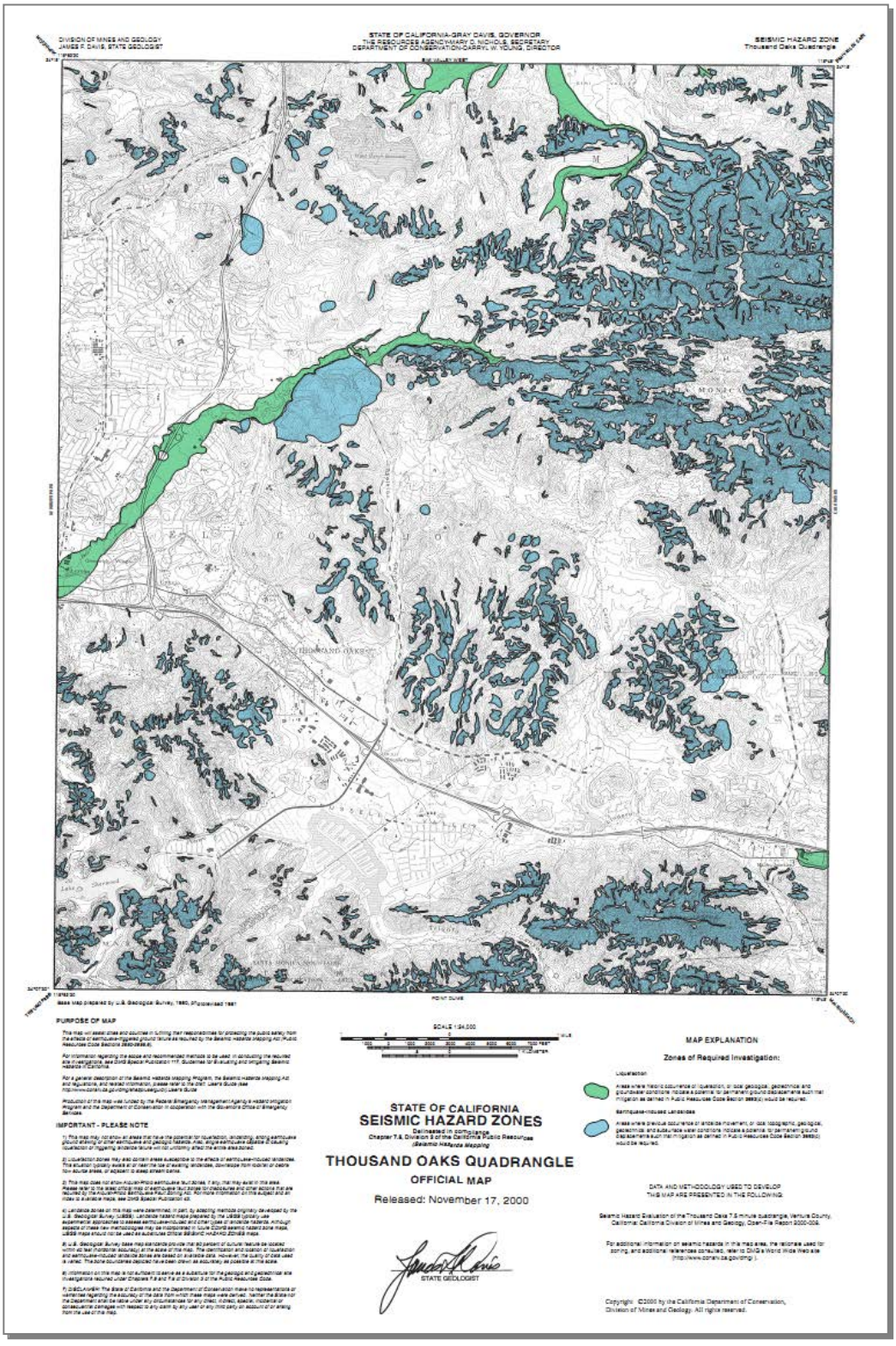
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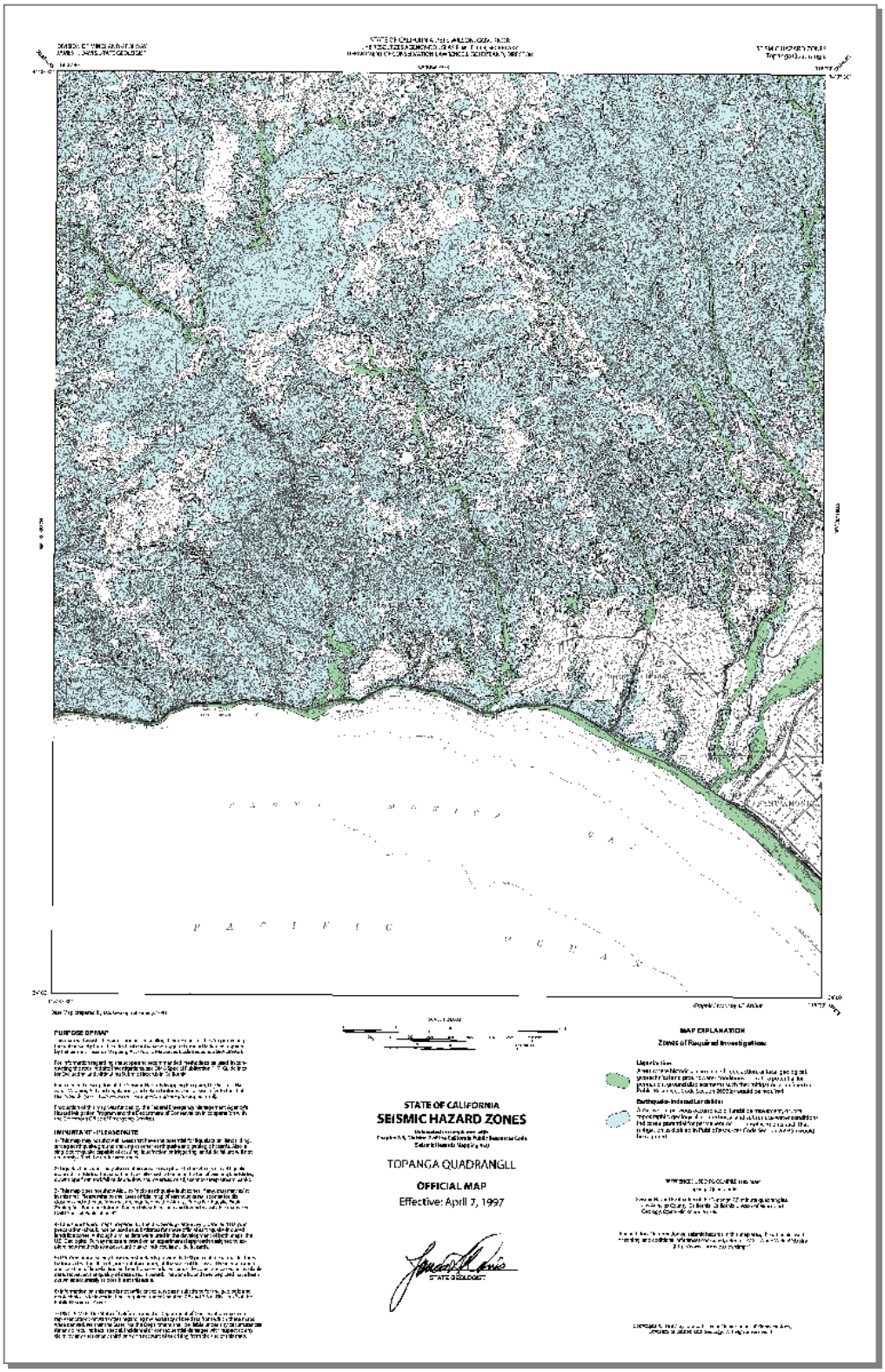
Sunland Quadrangle



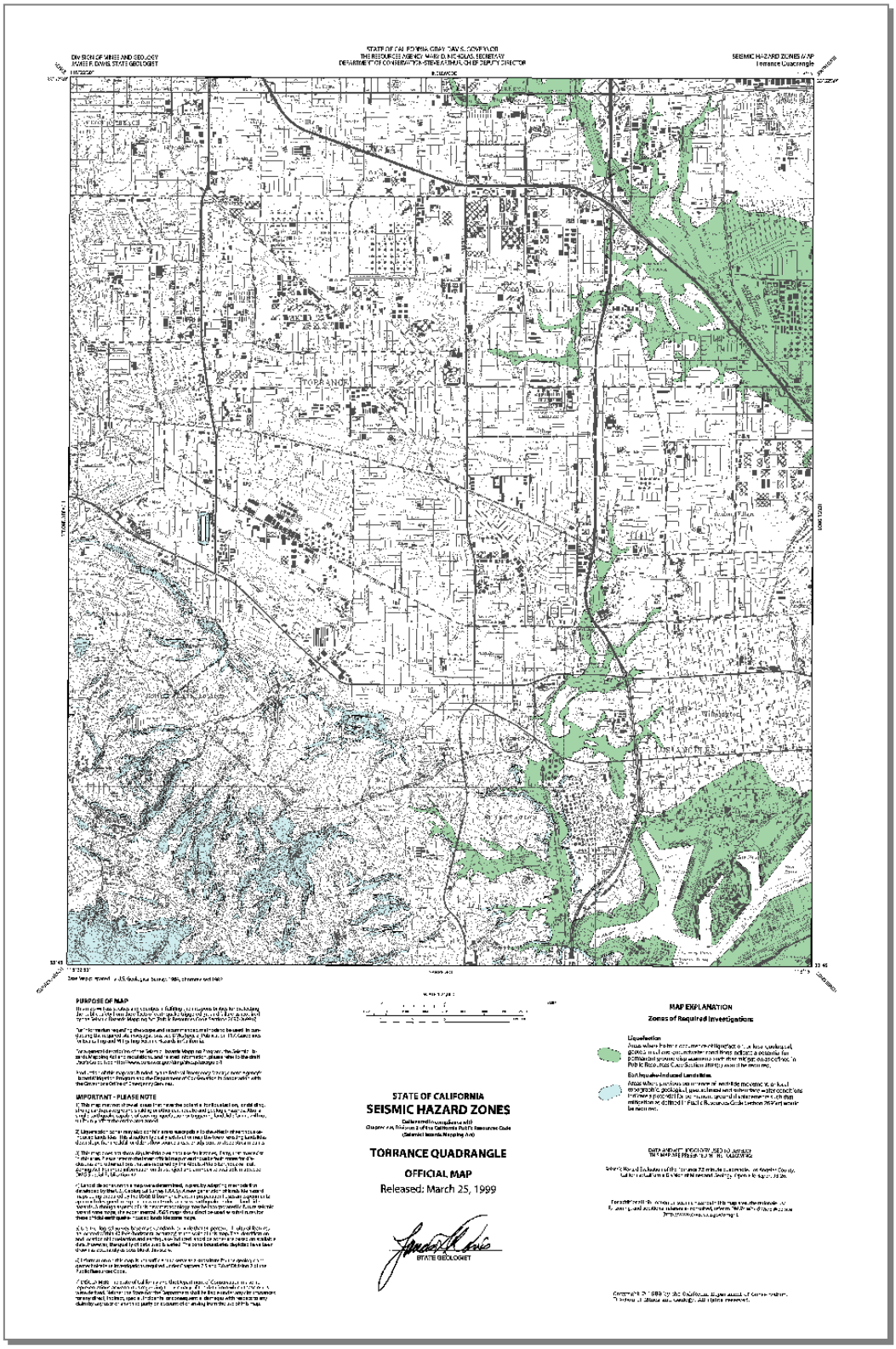
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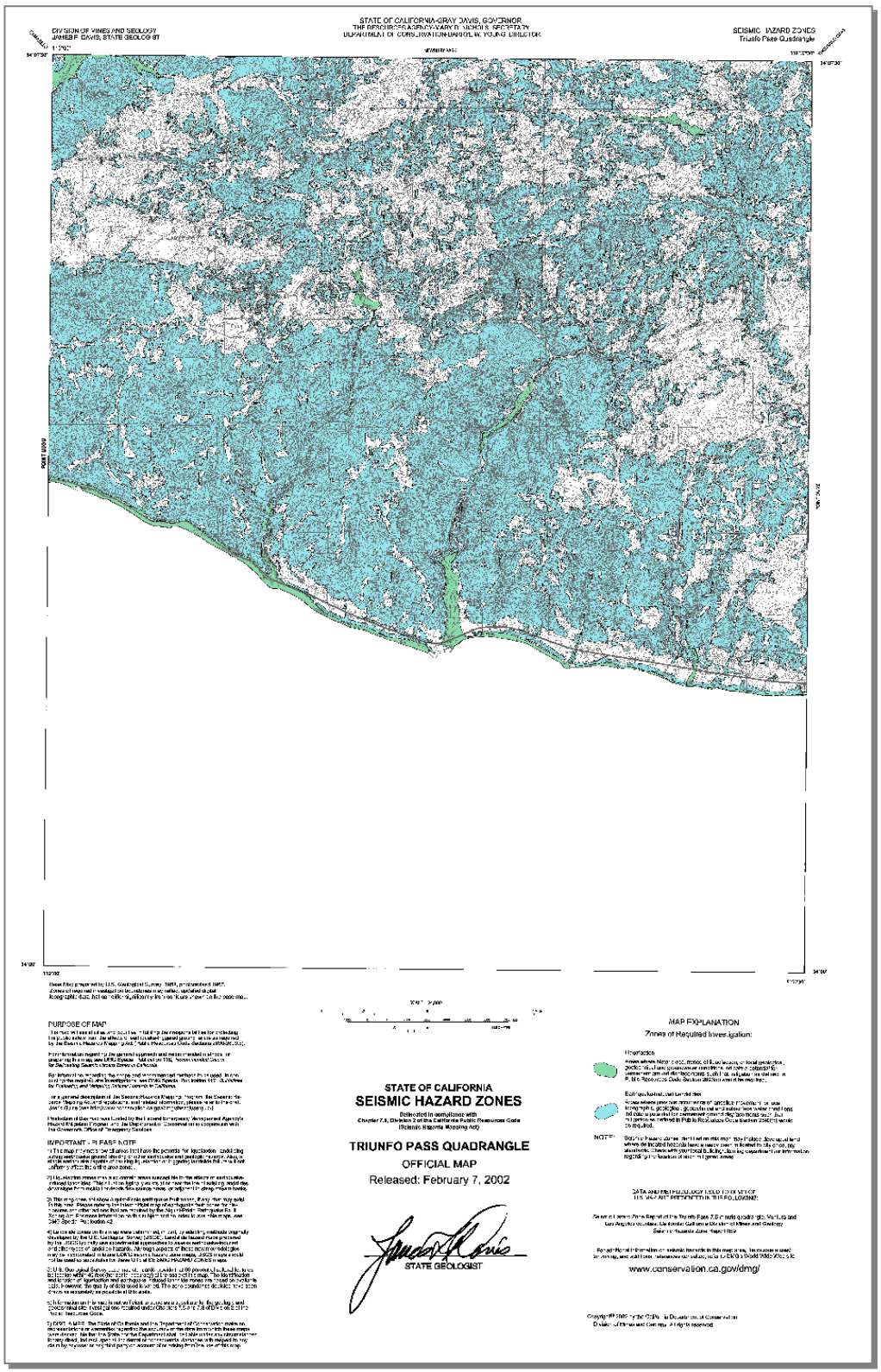
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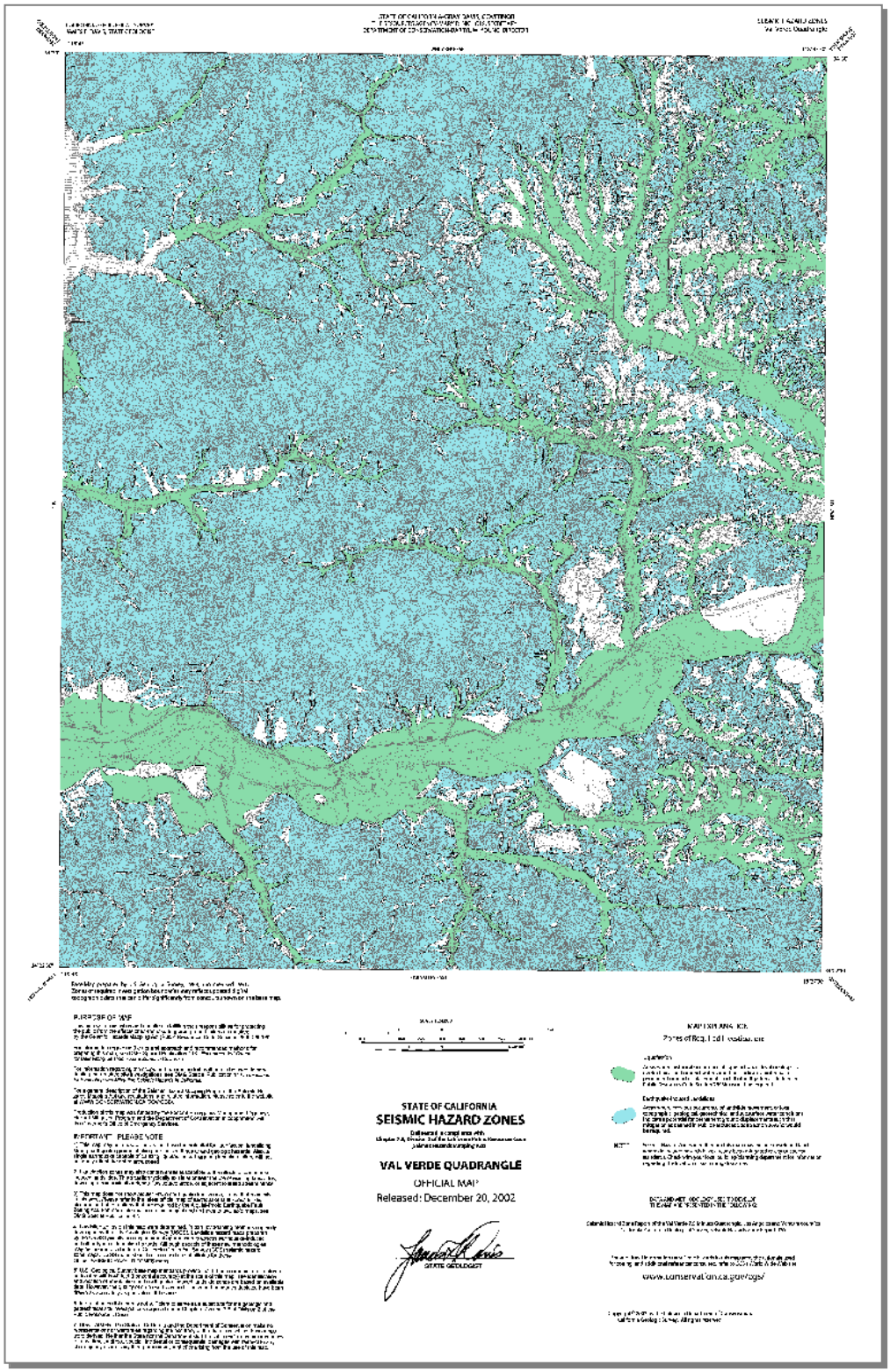
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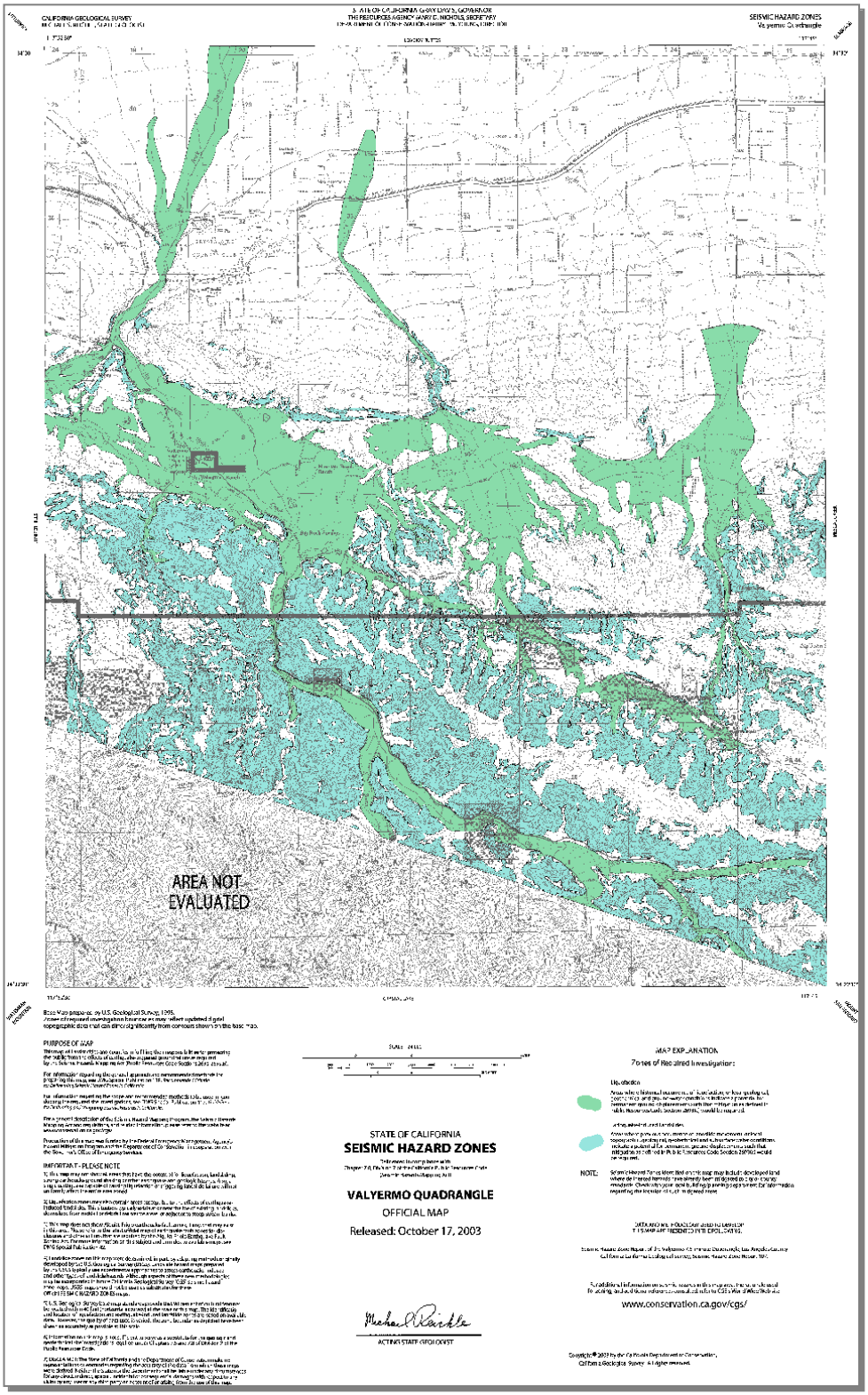
Triunfo Pass Quadrangle



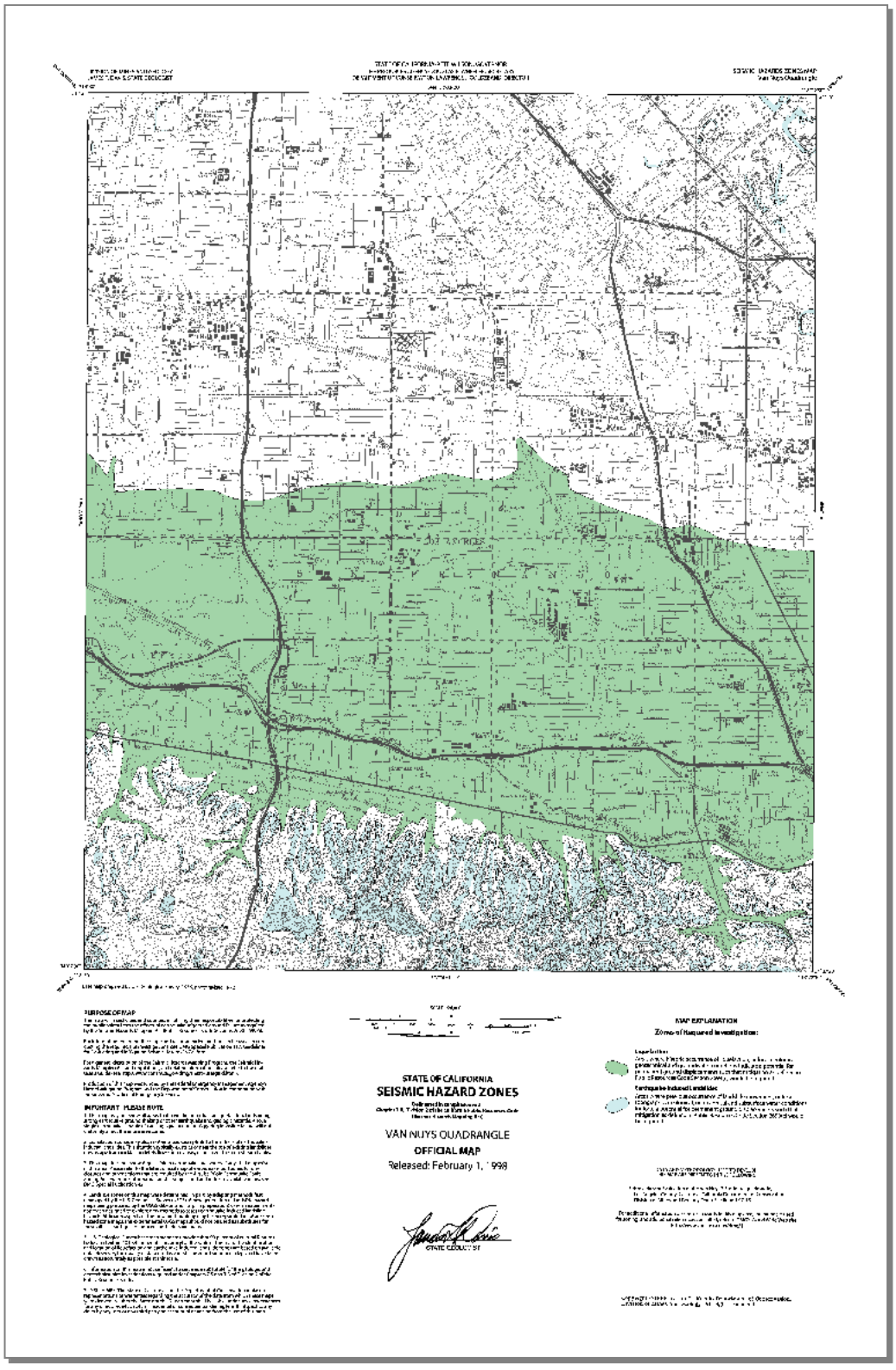
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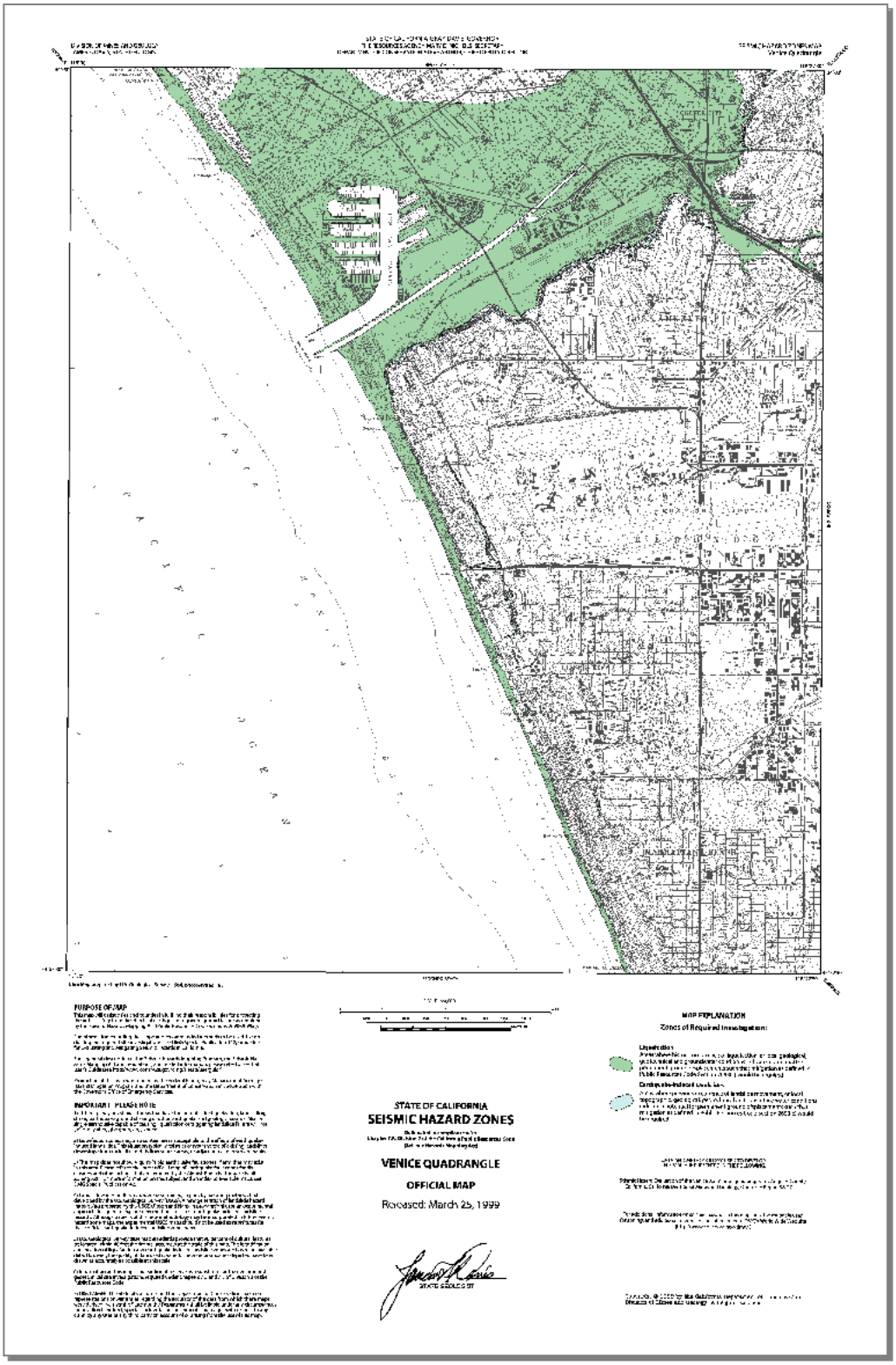
Valyermo Quadrangle



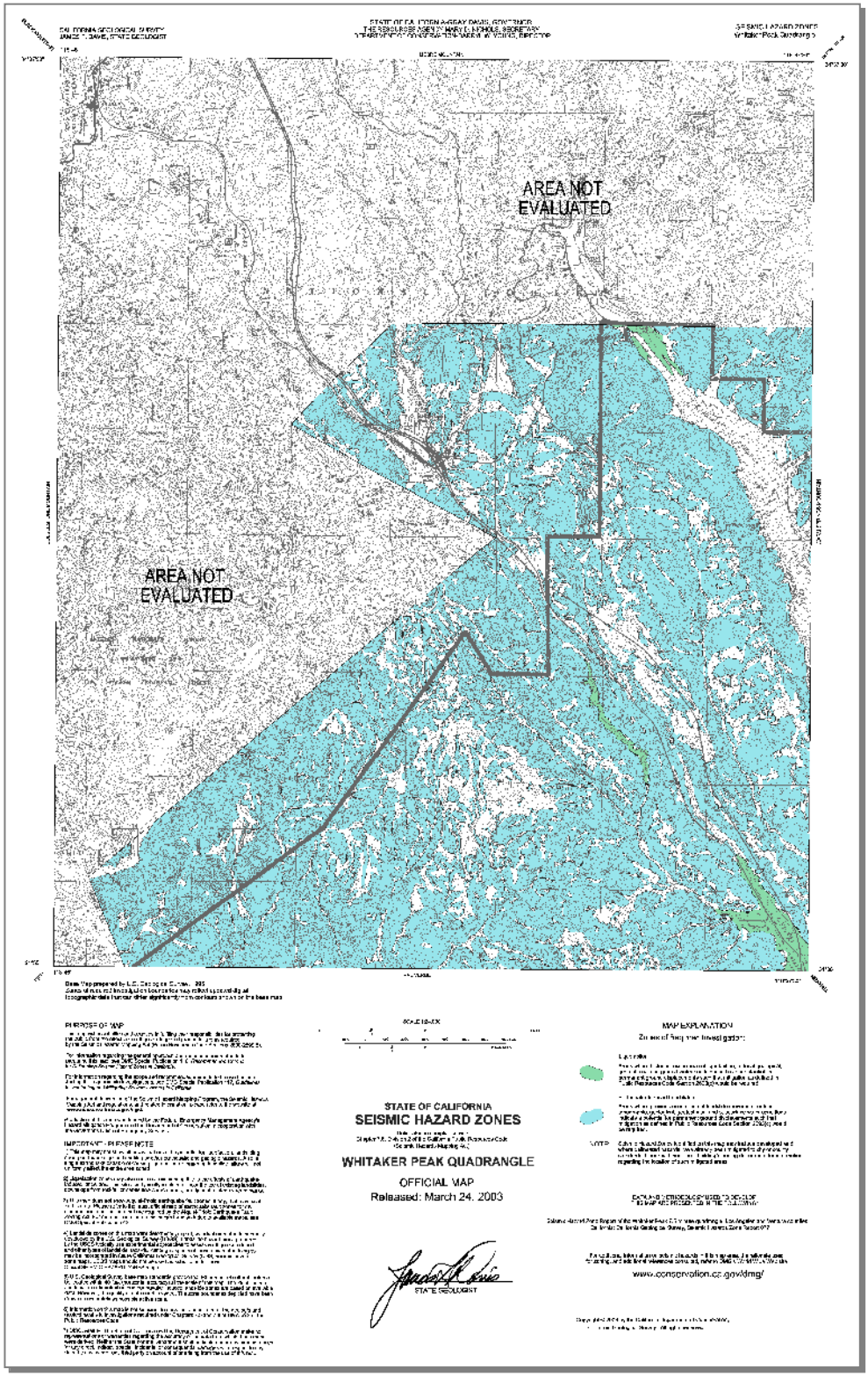
Van Nuys Quadrangle



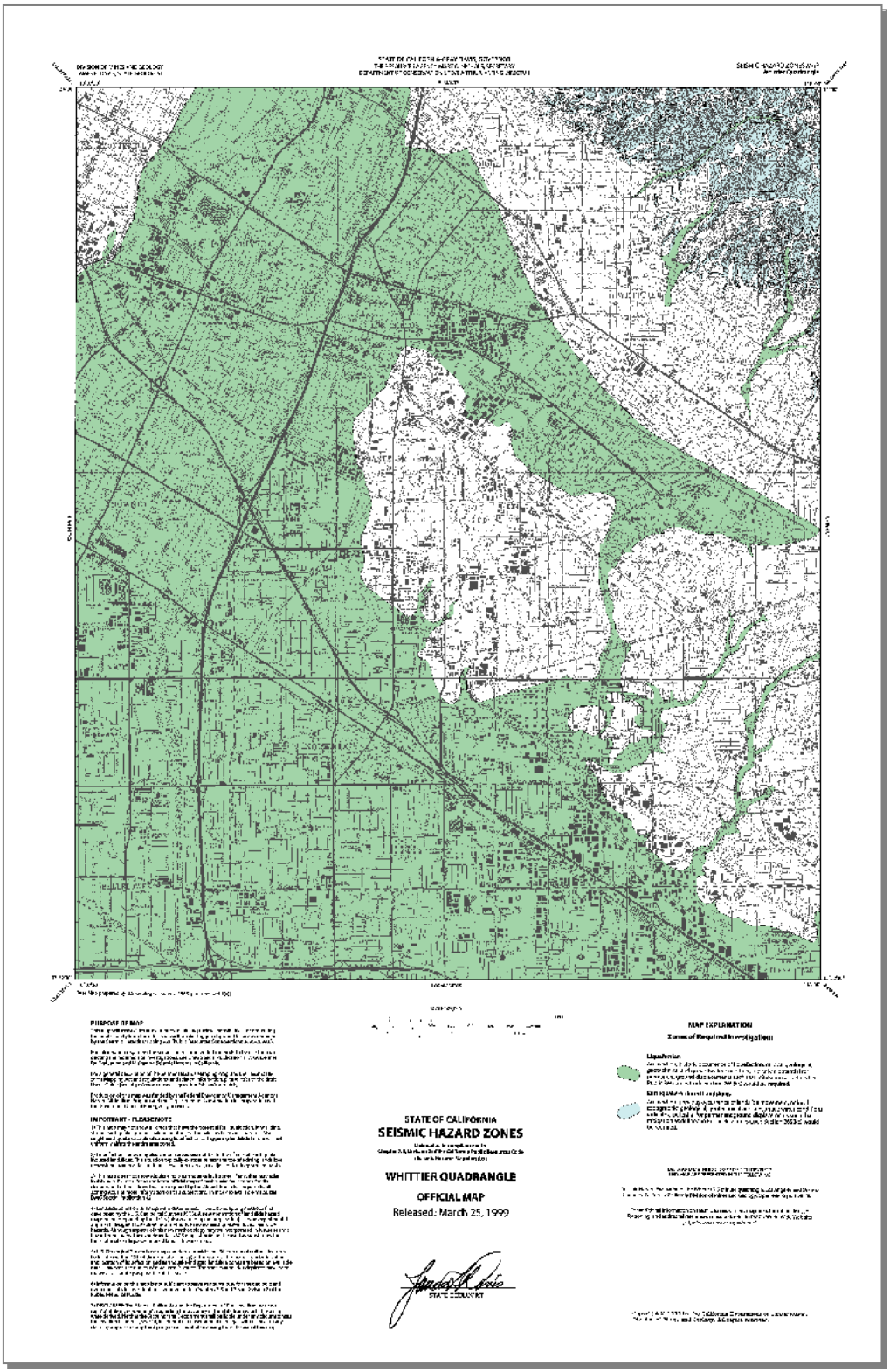
Venice Quadrangle



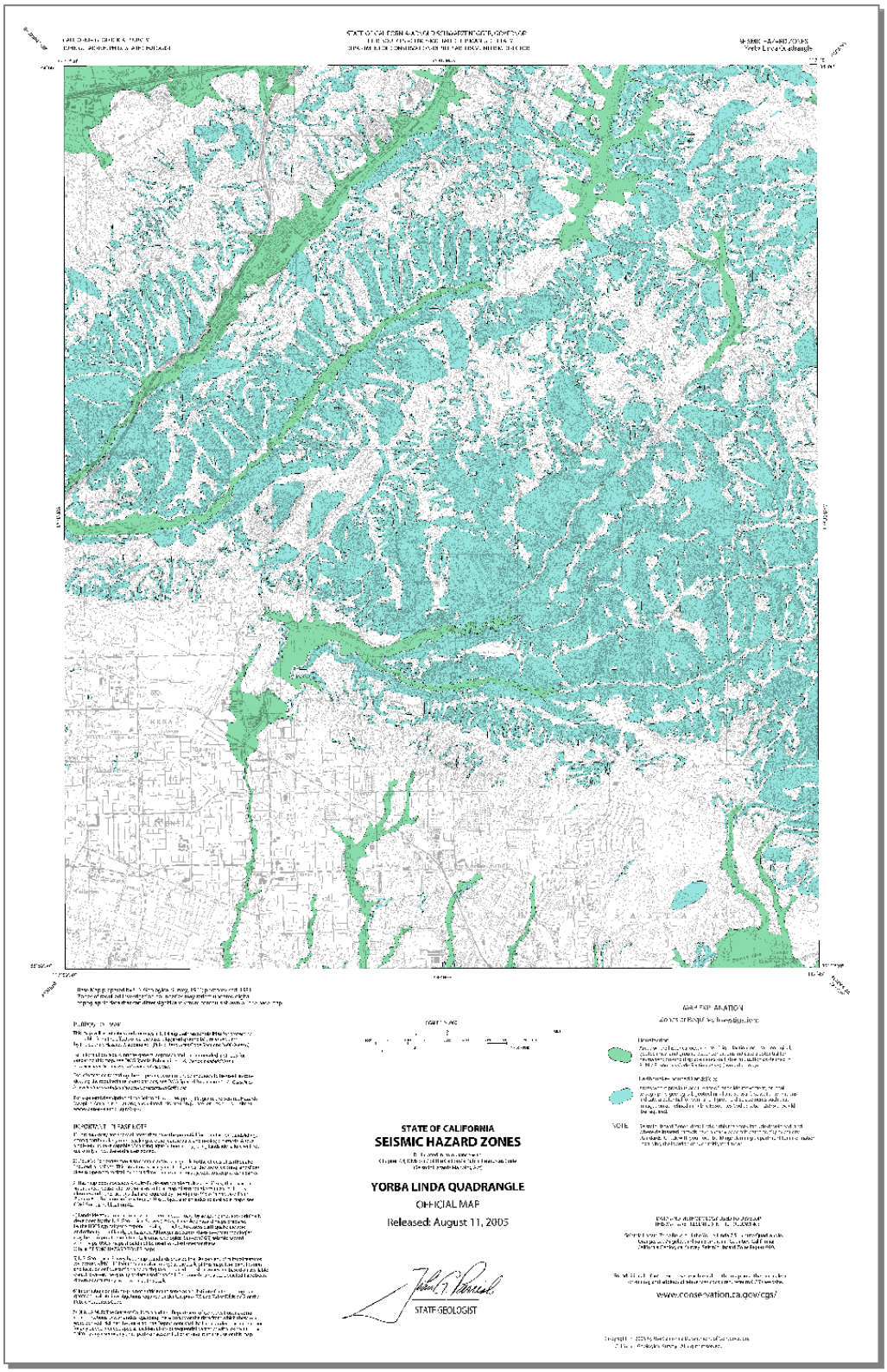
Whitaker Peak Quadrangle



Whittier Quadrangle



Yorba Linda Quadrangle



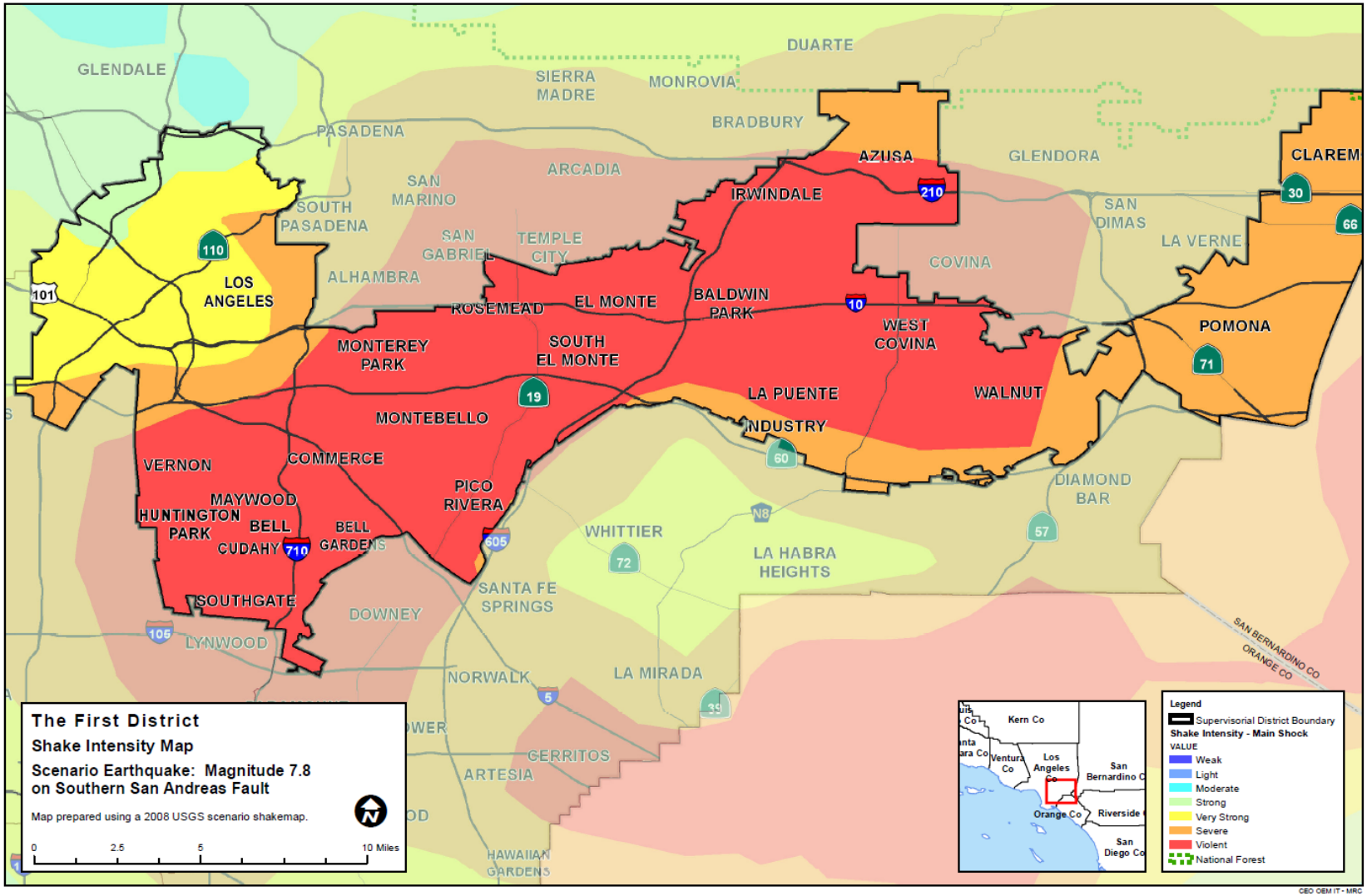
Earthquake Hazard Assessment

Hazard Identification

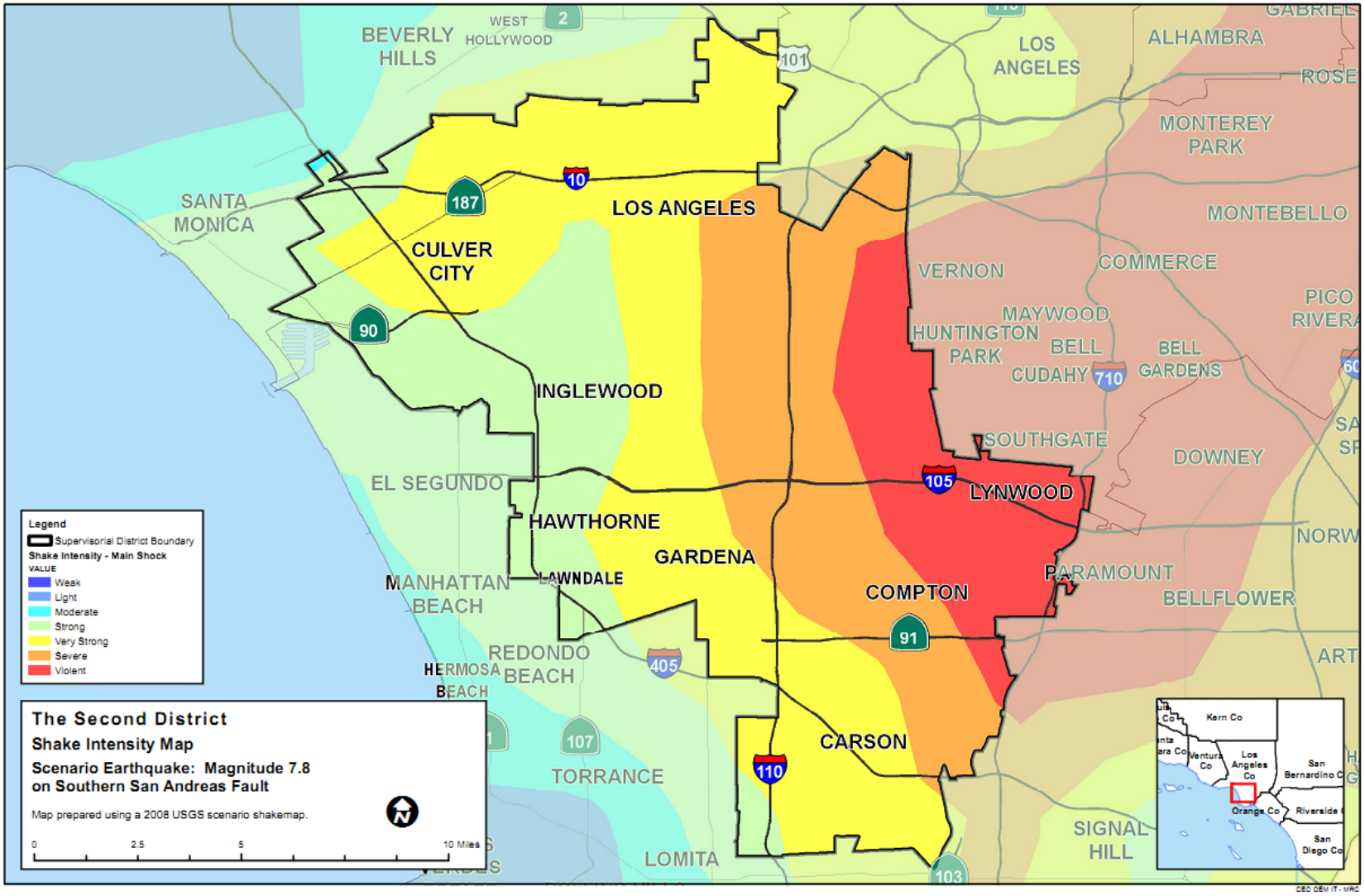
In California, many agencies are focused on seismic safety issues: the state's Seismic Safety Commission, the Applied Technology Council, the Governor's Office of Emergency Services, the United States Geological Survey, Cal Tech, and the California Geological Survey, as well as a number of universities and private foundations.

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake-induced landslides. Seismic hazard maps have been published and are available for many communities in California through the state Division of Mines and Geology. The map below illustrates seismic shaking hazard areas in Los Angeles County. The following shake intensity maps—utilizing FEMA- HAZUS software—were produced by the County of Los Angeles Chief Executive Office GIS Department.

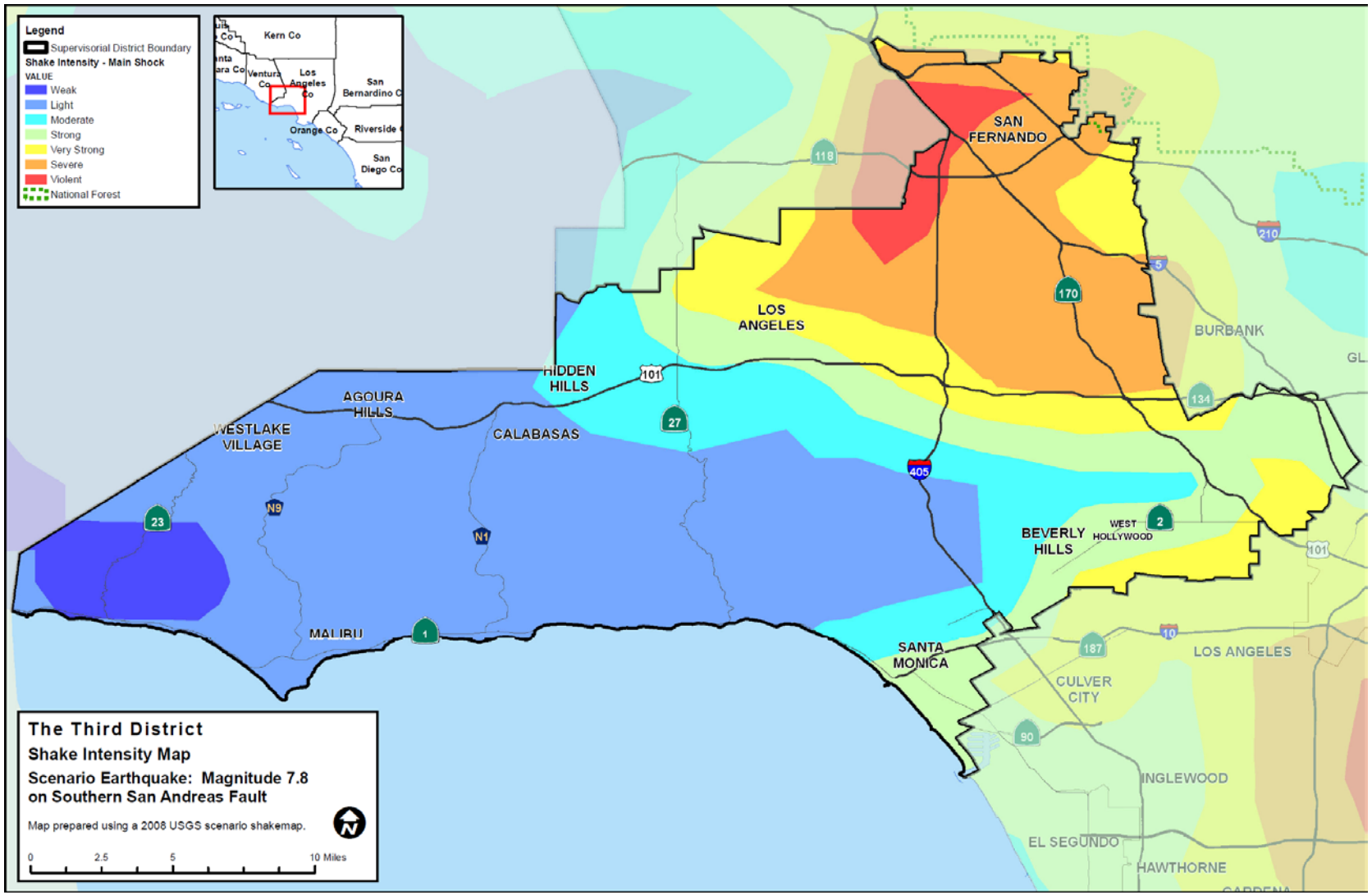
Map 5-32: Shake Intensity Map for Board of Supervisorial District 1 (M7.8 San Andreas Fault)
(Source: County of Los Angeles CEO - ITS GIS)



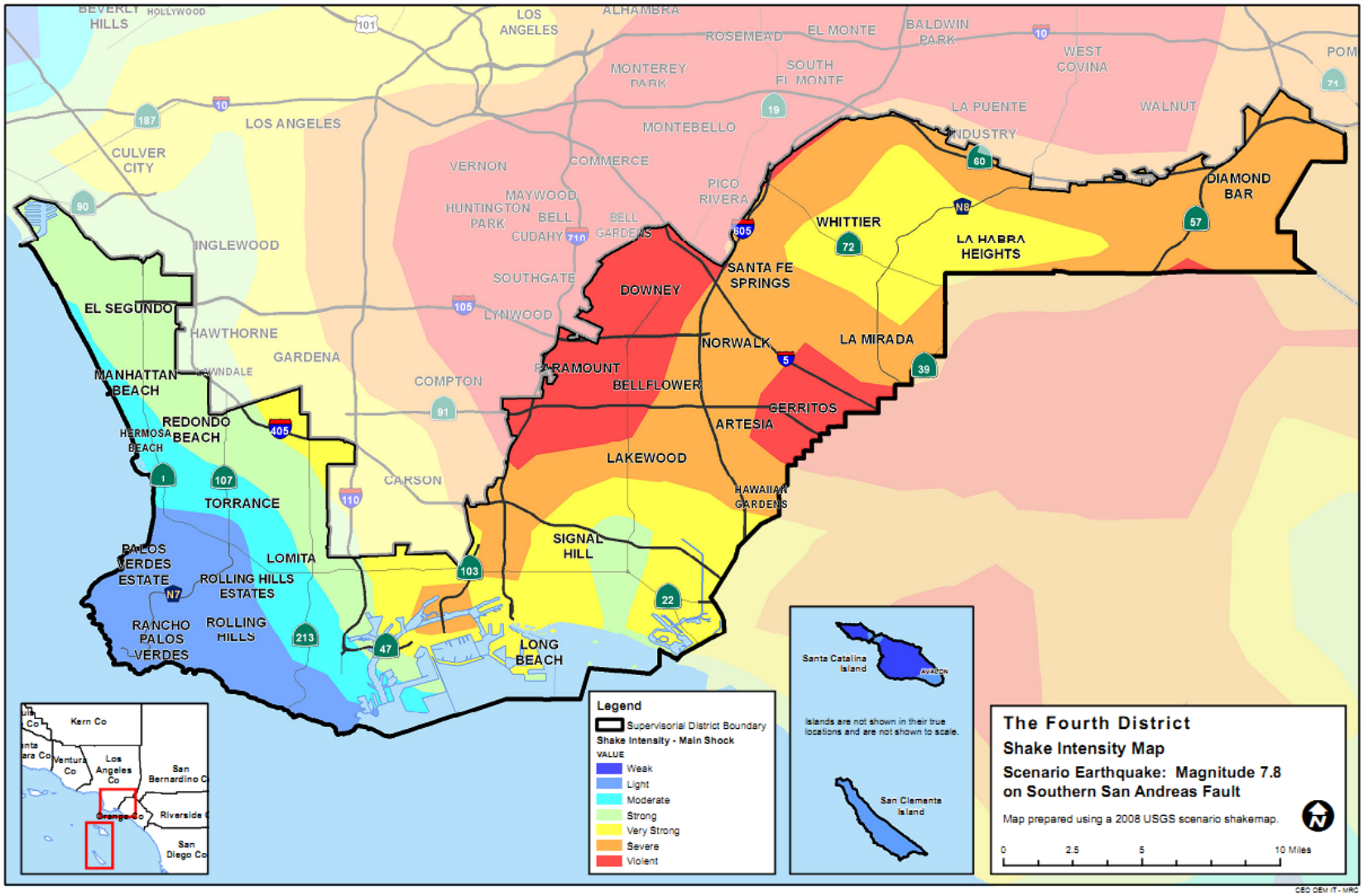
Map 5-33: Shake Intensity Map for Board of Supervisorial District 2 (M7.8 San Andreas Fault)
(Source: County of Los Angeles CEO - ITS GIS)



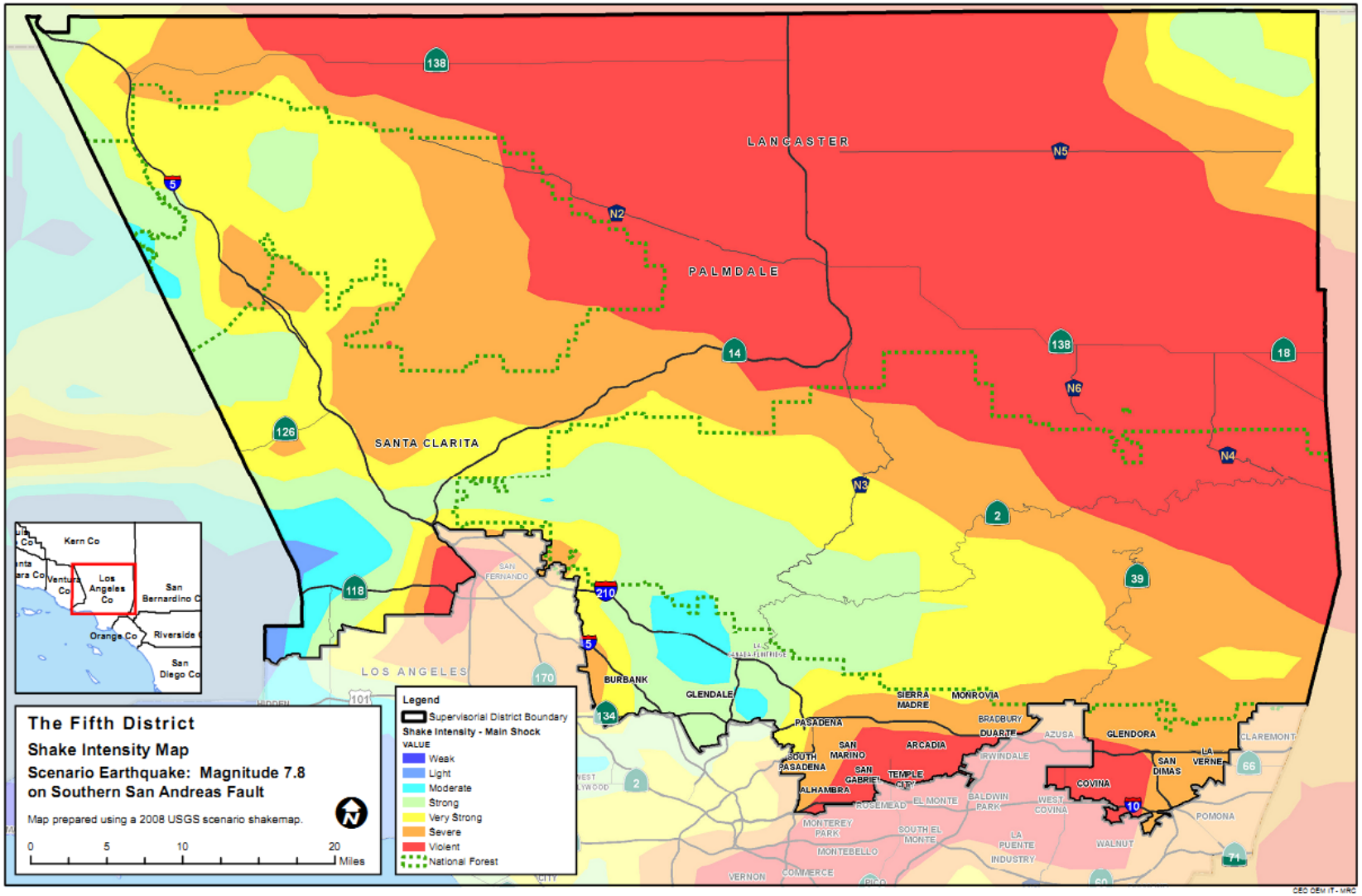
Map 5-34: Shake Intensity Map for Board of Supervisorial District 3 (M7.8 San Andreas Fault)
(Source: County of Los Angeles CEO - ITS GIS)



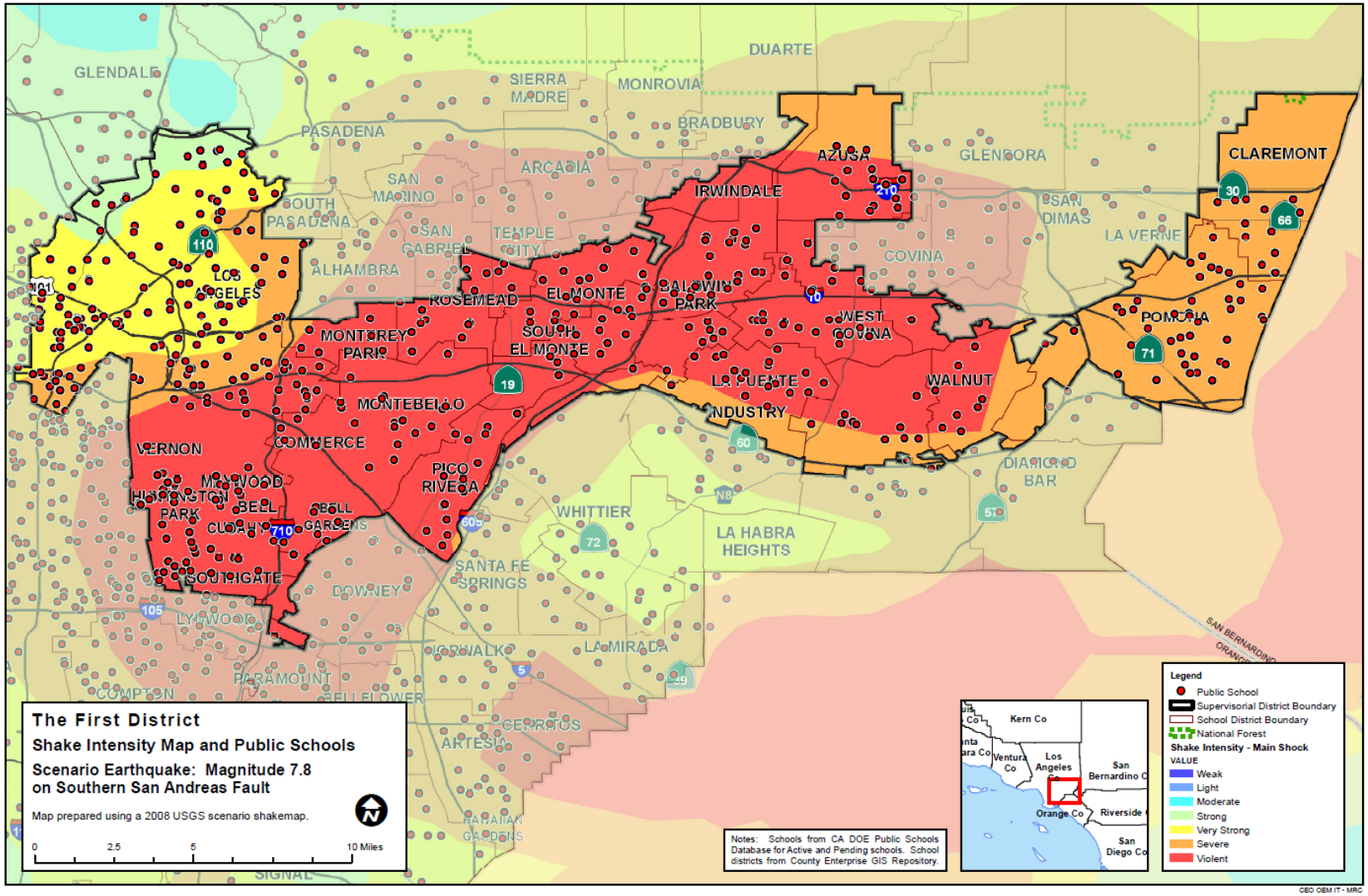
Map 5-35: Shake Intensity Map for Board of Supervisorial District 4 (M7.8 San Andreas Fault)
(Source: County of Los Angeles CEO - ITS GIS)



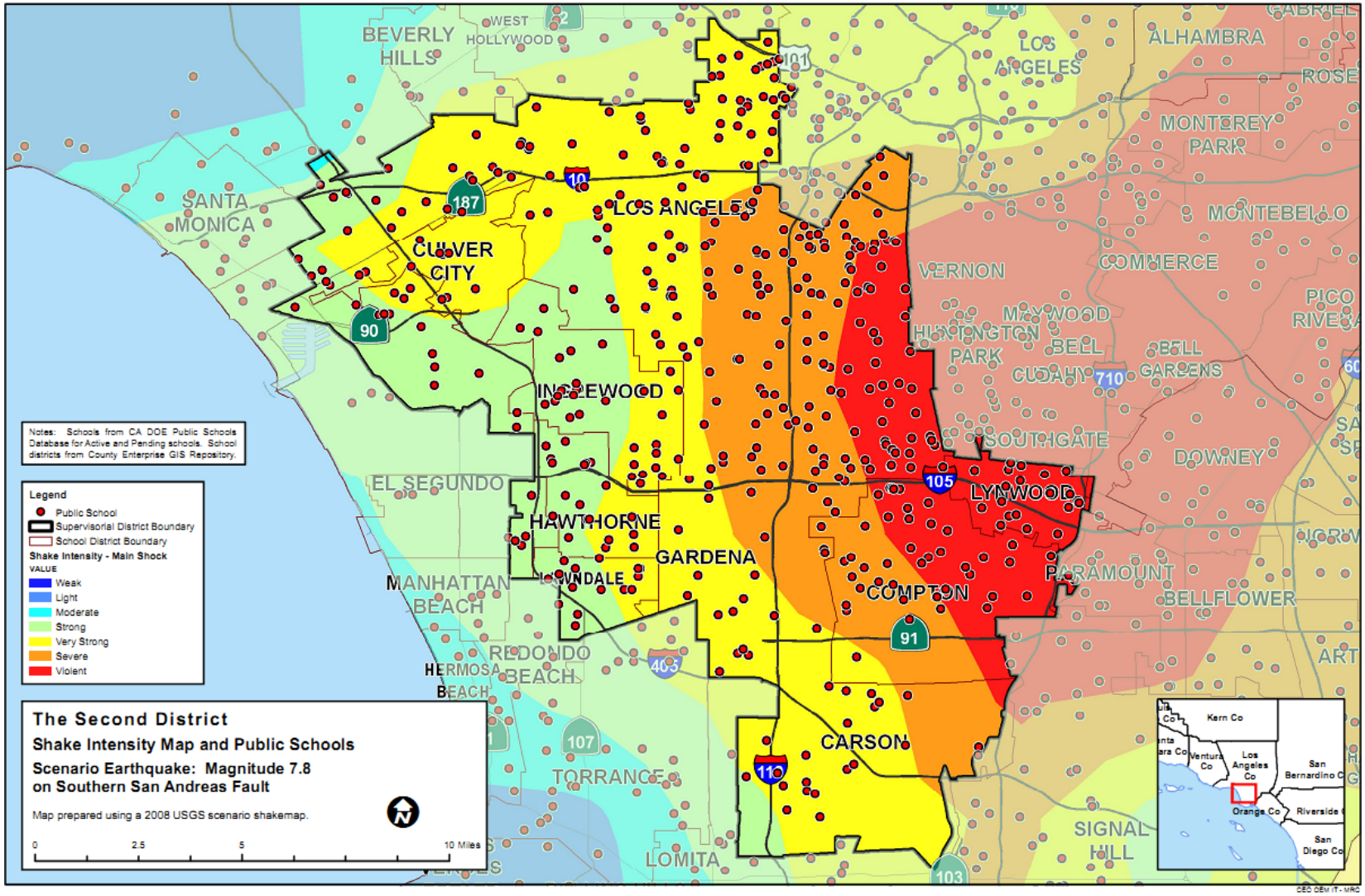
Map 5-36: Shake Intensity Map for Board of Supervisorial District 5 (M7.8 San Andreas Fault)
(Source: County of Los Angeles CEO - ITS GIS)



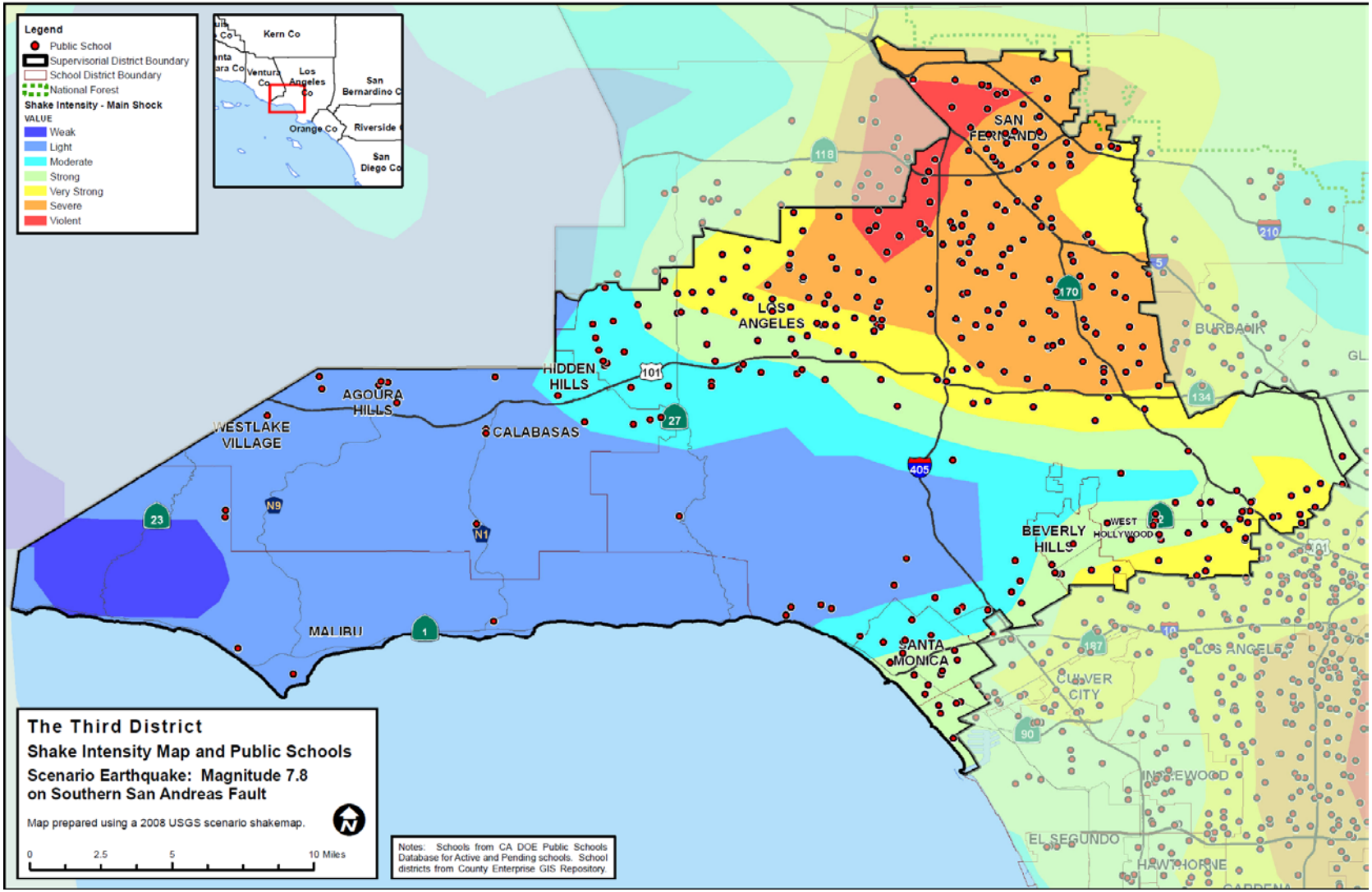
Map 5-37: Shake Intensity Map and Public Schools – Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



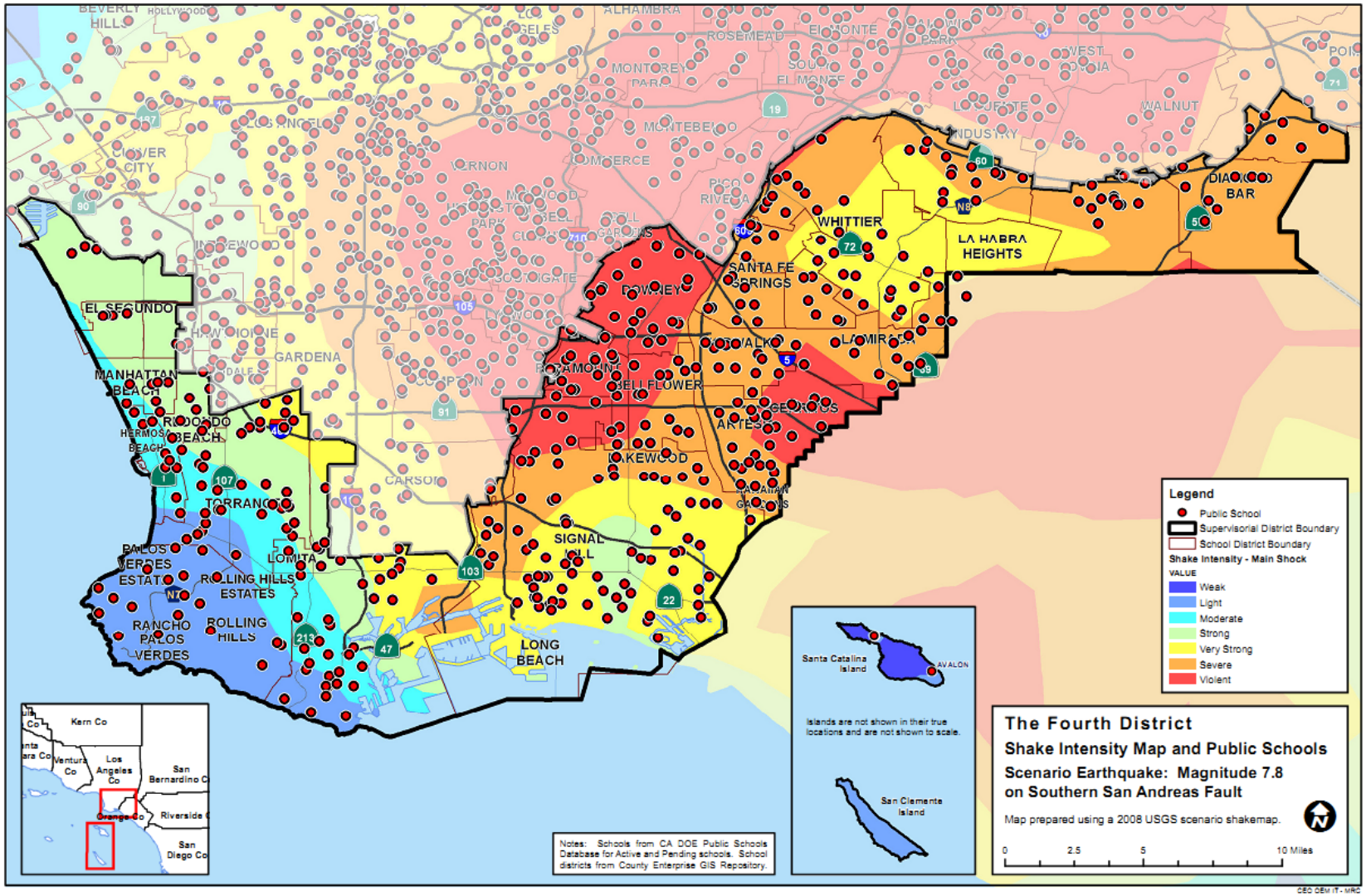
Map 5-38: Shake Intensity Map and Public Schools – Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



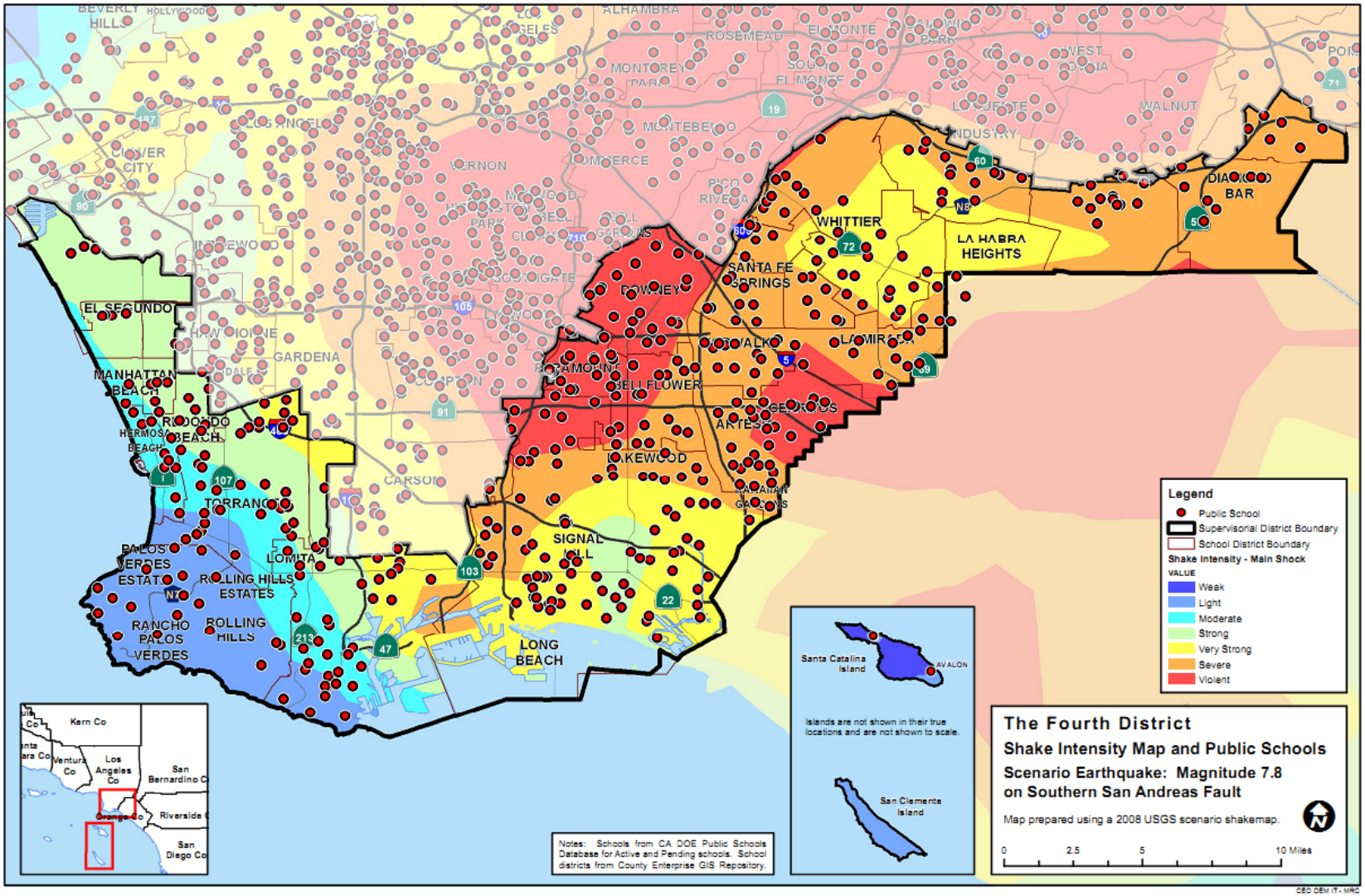
Map 5-39: Shake Intensity Map and Public Schools – Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-40: Shake Intensity Map and Public Schools – Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-41: Shake Intensity Map and Public Schools – Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



Earthquake Threats to County of Los Angeles Communities

Community Earthquake Issues

What is Susceptible to Earthquakes?

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways and utility lines) suffer damage in earthquakes, and earthquakes can cause injury or death to humans. The welfare of homes, major businesses, and public infrastructure is very important. Addressing the reliability of buildings, critical facilities, and infrastructure, and understanding the potential costs to government, businesses, and individuals as a result of an earthquake, are challenges faced by the county.

Dams

There are many dams in Los Angeles County, with the Prado and Whittier Narrows Dams the closest to the County of Los Angeles. The ownership of these dams ranges from the federal government to homeowners associations. These dams hold billions of gallons of water in reservoirs. The major reservoirs are designed to protect Southern California from floodwaters, and to store domestic water. Seismic activity can compromise the dam structures, resulting in catastrophic flooding.

Buildings

The built environment is susceptible to damage from earthquakes. Buildings that collapse can trap and bury people. Lives are at risk, and the cost to clean up the damages is great. In most California communities, including the County of Los Angeles, many buildings were built before 1993, when building codes were not as strict. In addition, retrofitting is not required except under certain conditions, and it can be expensive. Therefore, the number of buildings at risk remains high. The California Seismic Safety Commission makes annual reports on the progress of the retrofitting of unreinforced masonry buildings.

Infrastructure and Communication

Residents in the County of Los Angeles commute frequently by automobiles and by public transportation (such as buses and light rail). An earthquake can greatly damage bridges and roads, hampering emergency response efforts and the normal movement of people and goods. Damaged infrastructure strongly affects the economy of the community because it disconnects people from work, school, food, and leisure, and separates businesses from their customers and suppliers.

Bridge Damage

Even modern bridges can sustain damage during earthquakes, leaving them unsafe for use. Some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link; with even minor bridge damage, some areas can be made inaccessible. Because bridges vary in size, materials, location, and design, any given earthquake will affect them differently. Bridges built before the mid-1970s have a significantly higher risk of suffering structural damage during a moderate to large earthquake compared with those built after 1980, when design improvements were made.

Damage to Lifelines

Lifelines are the connections between communities and outside services. They include water and gas lines, transportation systems, and electricity and communication networks. Ground shaking and amplification can cause pipes to break open, power lines to fall, roads and railways to crack or move, and radio and telephone communication to cease.

Disruption to transportation makes it especially difficult to bring in supplies or services. Lifelines need to be usable after earthquake to allow for rescue, recovery, and rebuilding efforts, and to relay important information to the public.

Disruption of Critical Services

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after an earthquake event.

Businesses

Seismic activity can cause great losses to businesses, both large-scale corporations and small retail shops. When a company is forced to stop production for just a day, the economic loss can be tremendous, especially when its market is at a national or global level. Seismic activity can create economic loss that presents a burden to large and small shop owners who may have difficulty recovering from their losses.

Forty percent of businesses do not reopen after a disaster, and another 25% fail within one year, according to FEMA. Similar statistics from the United States Small Business Administration indicate that over 90% of businesses fail within two years after being struck by a disaster.

Individual Preparedness

Because the potential for earthquake occurrences and earthquake-related property damage is relatively high in Los Angeles County, increasing individual preparedness is a significant need. Strapping down heavy furniture, water heaters, and expensive personal property; anchoring buildings to foundations; and obtaining earthquake insurance are just a few steps individuals can take to prepare for an earthquake.

Death and Injury

Death and injury can occur both inside and outside of buildings due to collapsed buildings and falling equipment, furniture, debris, and structural materials. Downed power lines and broken water and gas lines can also endanger human life.

Fire

Downed power lines or broken gas mains can trigger fires. When fire stations suffer building or lifeline damage, a quick response to extinguish fires is less likely. Furthermore, major incidents demand a larger share of resources, and initially smaller fires and problems receive little or insufficient resources in the initial hours after a major earthquake event. Loss of electricity may cause a loss of water pressure in some communities, further hampering firefighting ability.

Debris

After damage occurs to a variety of structures, much time is spent cleaning up brick, glass, wood, steel or concrete building elements, office and home contents, and other materials. Developing a strong debris management strategy is essential in post-disaster recovery.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are implemented by county, regional, state, or federal agencies or organizations.

The Community Emergency Response Teams (CERT) fostered by the Los Angeles County Fire Department help educate the public and the community on how to be prepared for any type of disaster.

Identify the Applicable Code Sections that Apply to Earthquake Hazard Mitigation

Generally, these codes seek to discourage development in areas that could be prone to flooding, landslide, wildfire or seismic hazards, and—where development is permitted—to ensure that the applicable construction standards are met. Developers in hazard-prone areas may be required to retain a qualified professional engineer to evaluate the level of risk on the site and recommend appropriate mitigation measures.

Businesses/Private Sector

Natural hazards have a devastating impact on businesses. In fact, of all businesses that close following a disaster, 43% never reopen, and an additional 29% close for good within the next two years. The Institute of Business and Home Safety has developed "Open for Business," - a disaster planning toolkit that helps guide businesses in preparing for and dealing with the adverse effects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters, and helps to develop strategies to maintain business continuity before, during, and after a disaster occurs.

Hospitals

The Alfred E. Alquist Hospital Seismic Safety Act (the "Hospital Act") was enacted in 1973 in response to the moderate magnitude 6.6 Sylmar earthquake in 1971, when four major hospital campuses were severely damaged and evacuated. Two hospital buildings collapsed, killing 47 people. Three others were killed in another hospital that nearly collapsed.

In approving the act, the Legislature noted that "Hospitals, that house patients who have less than the capacity of normally healthy persons to protect themselves, and that must be reasonably capable of providing services to the public after a disaster, shall be designed and constructed to resist, insofar as practical, the forces generated by earthquakes, gravity and winds." (Health and Safety Code, Section 129680)
When the Hospital Act was passed in 1973, the state anticipated that, based on the regular and timely replacement of aging hospital facilities, the majority of hospital buildings would be in compliance with the act's standards within 25 years. However, hospital buildings were not, and are not, being replaced at that anticipated rate. In fact, the great majority of the state's urgent care facilities are now more than 40 years old.

The moderate magnitude 6.7 Northridge earthquake in 1994 caused $3 billion in hospital-related damage and evacuations. Twelve hospital buildings constructed before the act passed were cited (red-tagged) as unsafe for occupancy after the earthquake. Those hospitals that were built in accordance with the 1973 Hospital Act were very successful in resisting structural damage. However, nonstructural damage (for example, plumbing and ceiling systems) was extensive in those post-1973 buildings. Senate Bill 1953 (SB 1953), enacted in 1994 after the Northridge earthquake, expanded the scope of the 1973 Hospital Act. Under SB 1953, all hospitals are required, as of January 1, 2008, to survive earthquakes without collapsing or posing the threat of significant loss of life. The 1994 act further mandates that all existing hospitals be seismically evaluated and retrofitted (if needed) by 2030, so that they are in substantial compliance with the act (which requires that the hospital buildings be reasonably capable of providing services to the public after disasters). SB 1953 applies to all urgent care facilities (including those built prior to the 1973 Hospital Act), and affects approximately 2,500 buildings on 475 campuses.

SB 1953 directed the Office of Statewide Health Planning and Development (OSHPD), in consultation with the Hospital Building Safety Board, to develop emergency regulations, including "earthquake performance categories with sub gradations for risk to life, structural soundness, building contents, and nonstructural systems that are critical to providing basic services to hospital inpatients and the public after a disaster." (Health and Safety Code, Section 130005, HAZUS Data Sources).

Geographical information systems (GIS) street centerline data, city boundary and location mapping data for police and fire stations, schools, and hospitals was provided by the County of Los Angeles GIS Department in Environmental Systems Research Institute (ESRI) in geodatabase and shapefile format. GIS data is referenced to the California State Plane Coordinate System Zone 5 (US Feet), NAD83 datum.

Earthquake scenario shake maps were provided by the USGS. Land topography information was derived from digital elevation models (DEMs) provided by the USGS.

For greater Southern California there are multiple worst-case scenarios, depending on which fault might rupture, and which communities are in proximity to the fault. Damage will not necessarily be limited to immediately adjoining communities. Depending on the hypocenter of the earthquake, seismic waves may be transmitted through the ground to unwary communities.

In the 1994 Northridge earthquake, Santa Monica suffered extensive damage, even though there was a range of mountains between it and the origin of the earthquake. The following HAZUS was run using the San Andreas Fault with a magnitude of 7.8.

HAZUS Earthquake Scenario for Los Angeles County – San Andreas Fault M7.8
(Source: County of Los Angeles CEO – ITS GIS)

HAZUS-MH: Earthquake Event Report

Region Name: LA County (All Districts)

Earthquake Scenario: ShakeMap_SAF_south78_se

Print Date: April 01, 2011

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

Section	Page #
General Description of the Region	3
Building and Lifeline Inventory	4
Building Inventory	
Critical Facility Inventory	
Transportation and Utility Lifeline Inventory	
Earthquake Scenario Parameters	6
Direct Earthquake Damage	7
Buildings Damage	
Critical Facilities Damage	
Transportation and Utility Lifeline Damage	
Induced Earthquake Damage	11
Fire Following Earthquake	
Debris Generation	
Social Impact	12
Shelter Requirements	
Casualties	
Economic Loss	13
Building Losses	
Transportation and Utility Lifeline Losses	
Long-term Indirect Economic Impacts	
Appendix A: County Listing for the Region	
Appendix B: Regional Population and Building Value Data	

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 4,086.90 square miles and contains 2,054 census tracts. There are over 3,133 thousand households in the region with a total population of 9,519,338 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2,400 thousand buildings in the region with a total building replacement value (excluding contents) of 690,925 (millions of dollars). Approximately 91.00 % of the buildings (and 0.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 50,964 and 7,421 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 2,400 thousand buildings in the region which have an aggregate total replacement value of 690,925 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 87% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 120 hospitals in the region with a total bed capacity of 28,258 beds. There are 3,230 schools, 50 fire stations, 166 police stations and 12 emergency operation facilities. With respect to HPL facilities, there are 103 dams identified within the region. Of these, 73 of the dams are classified as 'high hazard'. The inventory also includes 1,735 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 58,385.00 (millions of dollars). This inventory includes over 4,806 kilometers of highways, 3,128 bridges, 86,253 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	3,128	10,915.00
	Segments	4,366	36,692.90
	Tunnels	17	34.30
		Subtotal	**47,642.10**
Railways	Bridges	144	28.40
	Facilities	47	125.20
	Segments	594	885.40
	Tunnels	0	0.00
		Subtotal	**1,038.90**
Light Rail	Bridges	28	6.20
	Facilities	92	245.00
	Segments	99	376.50
	Tunnels	0	0.00
		Subtotal	**627.70**
Bus	Facilities	42	54.00
		Subtotal	**54.00**
Ferry	Facilities	10	13.30
		Subtotal	**13.30**
Port	Facilities	159	317.50
		Subtotal	**317.50**
Airport	Facilities	16	170.40
	Runways	29	1,101.00
		Subtotal	**1,271.40**
		Total	**50,965.00**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	862.50
	Facilities	15	589.40
	Pipelines	0	0.00
		Subtotal	**1,451.90**
Waste Water	Distribution Lines	NA	517.50
	Facilities	19	1,493.20
	Pipelines	0	0.00
		Subtotal	**2,010.70**
Natural Gas	Distribution Lines	NA	345.00
	Facilities	1	1.30
	Pipelines	0	0.00
		Subtotal	**346.30**
Oil Systems	Facilities	44	5.20
	Pipelines	0	0.00
		Subtotal	**5.20**
Electrical Power	Facilities	41	5,321.80
		Subtotal	**5,321.80**
Communication	Facilities	94	11.10
		Subtotal	**11.10**
		Total	**9,147.00**

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	ShakeMap_SAF_south78_se
Type of Earthquake	User-defined
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	7.80
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Building Damage

HAZUS estimates that about 38,880 buildings will be at least moderately damaged. This is over 2.00 % of the total number of buildings in the region. There are an estimated 4,418 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3,546	0.16	361	0.24	167	0.61	75	1.04	40	0.91
Commercial	135,569	6.13	11,912	7.92	4,449	16.34	1,384	19.15	818	18.51
Education	4,932	0.22	313	0.21	94	0.34	23	0.32	16	0.35
Government	2,159	0.10	194	0.13	98	0.36	32	0.44	12	0.27
Industrial	32,428	1.47	3,770	2.51	1,864	6.84	652	9.02	286	6.48
Other Residential	304,224	13.76	25,573	17.00	9,880	36.28	4,645	64.25	3,144	71.14
Religion	9,734	0.44	761	0.51	316	1.16	110	1.53	58	1.30
Single Family	1,718,758	77.72	107,545	71.49	10,364	38.06	308	4.26	46	1.03
Total	**2,211,351**		**150,428**		**27,232**		**7,229**		**4,419**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,959,076	88.59	120896	80.37	11,572	42.49	372	5.14	149	3.36
Steel	45,376	2.05	5463	3.63	3,296	12.10	1,259	17.42	516	11.68
Concrete	49,136	2.22	4392	2.92	1,612	5.92	492	6.80	341	7.72
Precast	37,603	1.70	3603	2.39	1,216	4.47	296	4.09	184	4.17
RM	77,355	3.50	2877	1.91	1,107	4.07	444	6.15	261	5.90
URM	15,516	0.70	1861	1.24	394	1.45	91	1.26	130	2.94
MH	27,288	1.23	11335	7.54	8,034	29.50	4,275	59.14	2,838	64.23
Total	**2,211,351**		**150,428**		**27,232**		**7,229**		**4,419**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 28,258 hospital beds available for use. On the day of the earthquake, the model estimates that only 27,911 hospital beds (99.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	120	0	0	120
Schools	3,230	0	0	3,163
EOCs	12	0	0	11
PoliceStations	166	0	0	164
FireStations	50	0	0	48

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	4,366	0	0	4,366	4,366
	Bridges	3,128	48	3	3,078	3,100
	Tunnels	17	0	0	17	17
Railways	Segments	594	0	0	594	594
	Bridges	144	3	0	141	143
	Tunnels	0	0	0	0	0
	Facilities	47	0	0	47	47
Light Rail	Segments	99	0	0	99	99
	Bridges	28	0	0	28	28
	Tunnels	0	0	0	0	0
	Facilities	92	0	0	92	92
Bus	Facilities	42	1	0	42	42
Ferry	Facilities	10	0	0	10	10
Port	Facilities	159	0	0	159	159
Airport	Facilities	16	0	0	16	16
	Runways	29	0	0	29	29

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	15	0	0	15	15
Waste Water	19	0	0	17	19
Natural Gas	1	0	0	1	1
Oil Systems	44	0	0	44	44
Electrical Power	41	0	0	41	41
Communication	94	1	0	94	94

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	43,127	8647	2162
Waste Water	25,876	4344	1086
Natural Gas	17,251	1488	372
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,133,774	640,614	616,149	567,247	296,313	0
Electric Power		28,768	16,895	6,399	1,131	42

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 132 ignitions that will burn about 0.95 sq. mi 0.02 % of the region's total area.) The model also estimates that the fires will displace about 13,672 people and burn about 809 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1.550 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 32.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 62,160 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1,504 households to be displaced due to the earthquake. Of these, 1,387 people (out of a total population of 9,519,338) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	19	5	1	1
	Commuting	0	0	1	0
	Educational	0	0	0	0
	Hotels	9	2	0	1
	Industrial	37	9	1	2
	Other-Residential	831	181	18	33
	Single Family	291	20	2	4
	Total	**1,188**	**217**	**23**	**42**
2 PM	Commercial	1,399	350	54	105
	Commuting	2	3	5	1
	Educational	724	202	33	65
	Hotels	2	0	0	0
	Industrial	270	62	9	17
	Other-Residential	183	41	4	8
	Single Family	57	4	0	1
	Total	**2,637**	**663**	**106**	**197**
5 PM	Commercial	1,313	339	54	100
	Commuting	67	91	152	30
	Educational	70	18	3	6
	Hotels	3	1	0	0
	Industrial	169	39	5	10
	Other-Residential	303	66	7	12
	Single Family	107	8	1	1
	Total	**2,032**	**562**	**222**	**160**

Economic Loss

The total economic loss estimated for the earthquake is 7,732.12 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 7,183.68 (millions of dollars); 15 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 46 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	7.76	257.23	18.80	12.01	295.80
	Capital-Related	0.00	3.32	224.01	11.72	2.81	241.86
	Rental	16.21	39.21	117.18	7.95	5.82	186.37
	Relocation	49.94	53.60	161.02	34.04	39.77	338.37
	Subtotal	**66.15**	**103.90**	**759.44**	**72.51**	**60.41**	**1,062.39**
Capital Stock Losses							
	Structural	159.79	110.19	243.45	99.12	46.70	659.25
	Non_Structural	1,263.96	785.92	1,066.05	375.43	181.99	3,673.35
	Content	559.97	232.88	584.37	245.32	99.82	1,722.36
	Inventory	0.00	0.00	17.47	47.79	1.06	66.32
	Subtotal	**1,983.72**	**1,129.00**	**1,911.34**	**767.66**	**329.56**	**6,121.28**
	Total	**2,049.86**	**1,232.89**	**2,670.78**	**840.17**	**389.97**	**7,183.68**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	36,692.89	$0.00	0.00
	Bridges	10,914.99	$108.43	0.99
	Tunnels	34.27	$0.25	0.72
	Subtotal	**47642.10**	**108.70**	
Railways	Segments	885.42	$0.00	0.00
	Bridges	28.36	$0.31	1.09
	Tunnels	0.00	$0.00	0.00
	Facilities	125.16	$12.09	9.66
	Subtotal	**1038.90**	**12.40**	
Light Rail	Segments	376.51	$0.00	0.00
	Bridges	6.17	$0.01	0.19
	Tunnels	0.00	$0.00	0.00
	Facilities	245.00	$25.85	10.55
	Subtotal	**627.70**	**25.90**	
Bus	Facilities	54.02	$6.03	11.17
	Subtotal	**54.00**	**6.00**	
Ferry	Facilities	13.31	$0.57	4.30
	Subtotal	**13.30**	**0.60**	
Port	Facilities	317.52	$15.12	4.76
	Subtotal	**317.50**	**15.10**	
Airport	Facilities	170.42	$19.35	11.36
	Runways	1,100.96	$0.00	0.00
	Subtotal	**1271.40**	**19.40**	
	Total	**50965.00**	**188.00**	

Table 14. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of $)

LOSS		Total	%
First Year			
	Employment Impact	2,053,169	64.19
	Income Impact	5,443	3.61
Second Year			
	Employment Impact	886,723	27.72
	Income Impact	3,263	2.17
Third Year			
	Employment Impact	21,528	0.67
	Income Impact	793	0.53
Fourth Year			
	Employment Impact	1,214	0.04
	Income Impact	(148)	-0.10
Fifth Year			
	Employment Impact	70	0.00
	Income Impact	(201)	-0.13
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(204)	-0.14

Appendix A: County Listing for the Region

Los Angeles,CA

Appendix B: Regional Population and Building Value Data

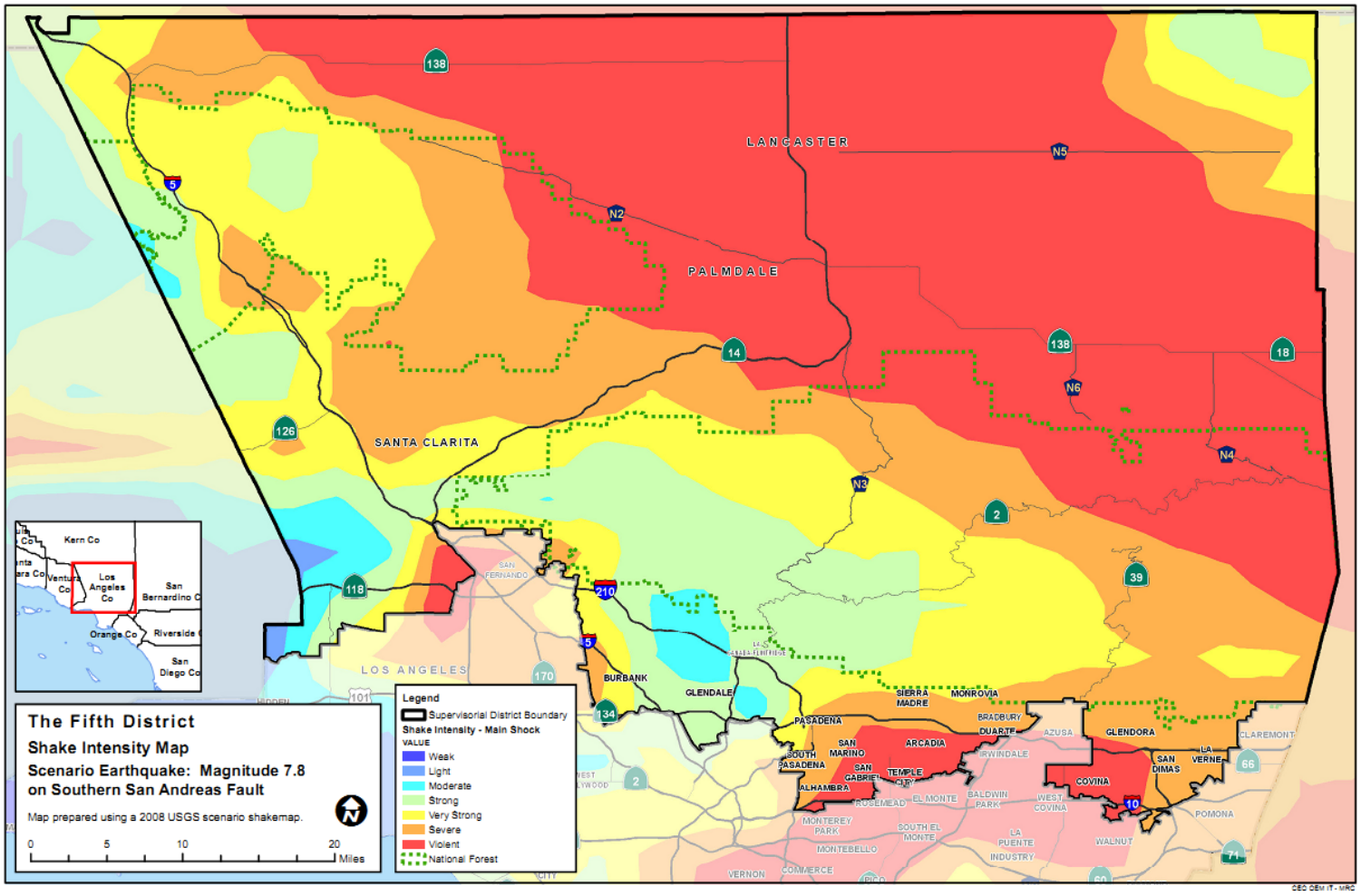
State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California	Los Angeles	9,519,338	522,619	168,306	690,925
Total State		**9,519,338**	**522,619**	**168,306**	**690,925**
Total Region		**9,519,338**	**522,619**	**168,306**	**690,925**

Table 13: Utility System Economic Losses

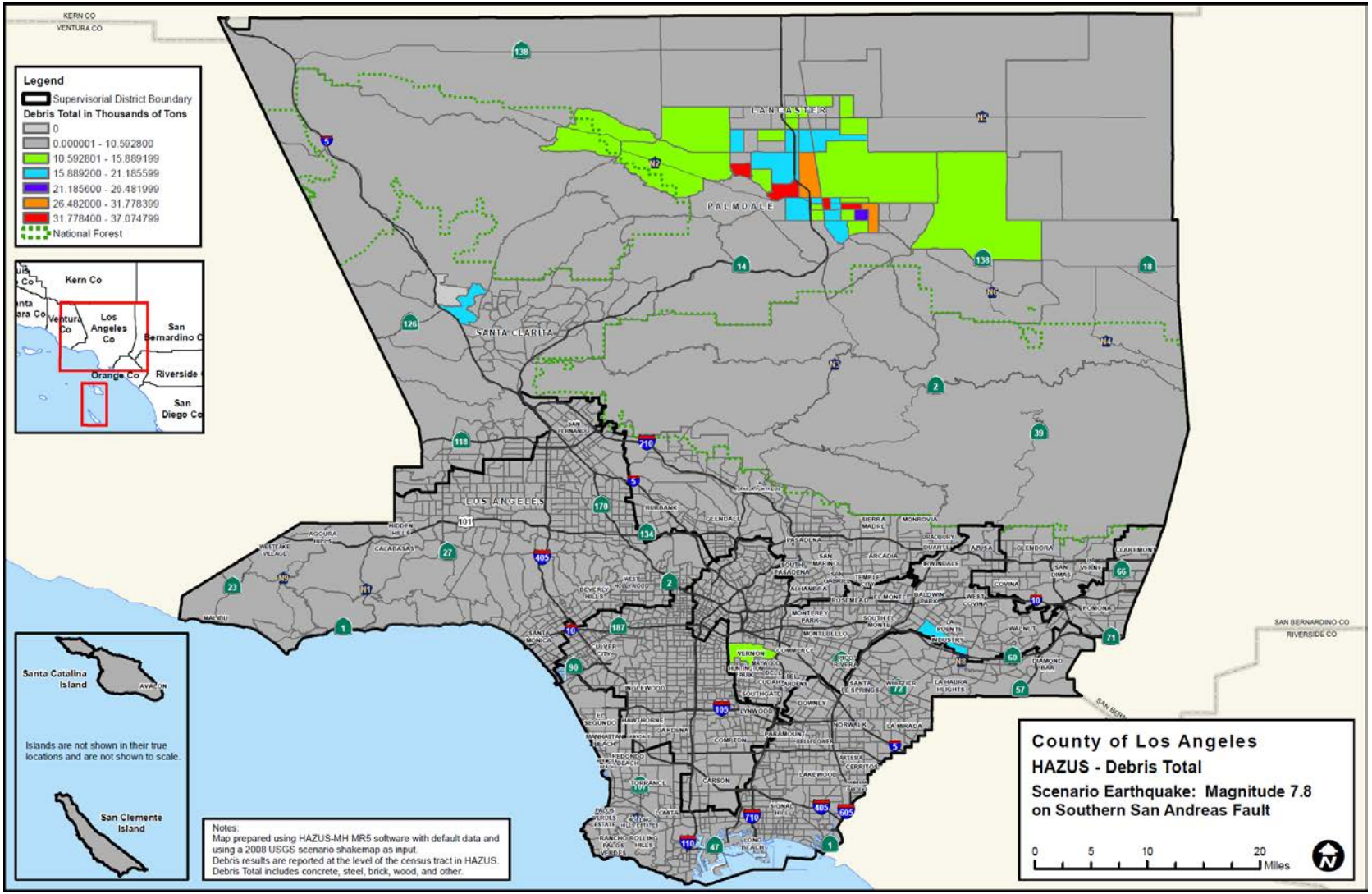
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	589.40	$33.67	5.71
	Distribution Lines	862.50	$38.91	4.51
	Subtotal	**1,451.94**	**$72.58**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	1,493.20	$52.70	3.53
	Distribution Lines	517.50	$19.55	3.78
	Subtotal	**2,010.69**	**$72.25**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	1.30	$0.03	2.57
	Distribution Lines	345.00	$6.70	1.94
	Subtotal	**346.30**	**$6.73**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	5.20	$0.18	3.43
	Subtotal	**5.19**	**$0.18**	
Electrical Power	Facilities	5,321.80	$208.13	3.91
	Subtotal	**5,321.80**	**$208.13**	
Communication	Facilities	11.10	$0.55	5.00
	Subtotal	**11.09**	**$0.55**	
	Total	**9,147.01**	**$360.42**	

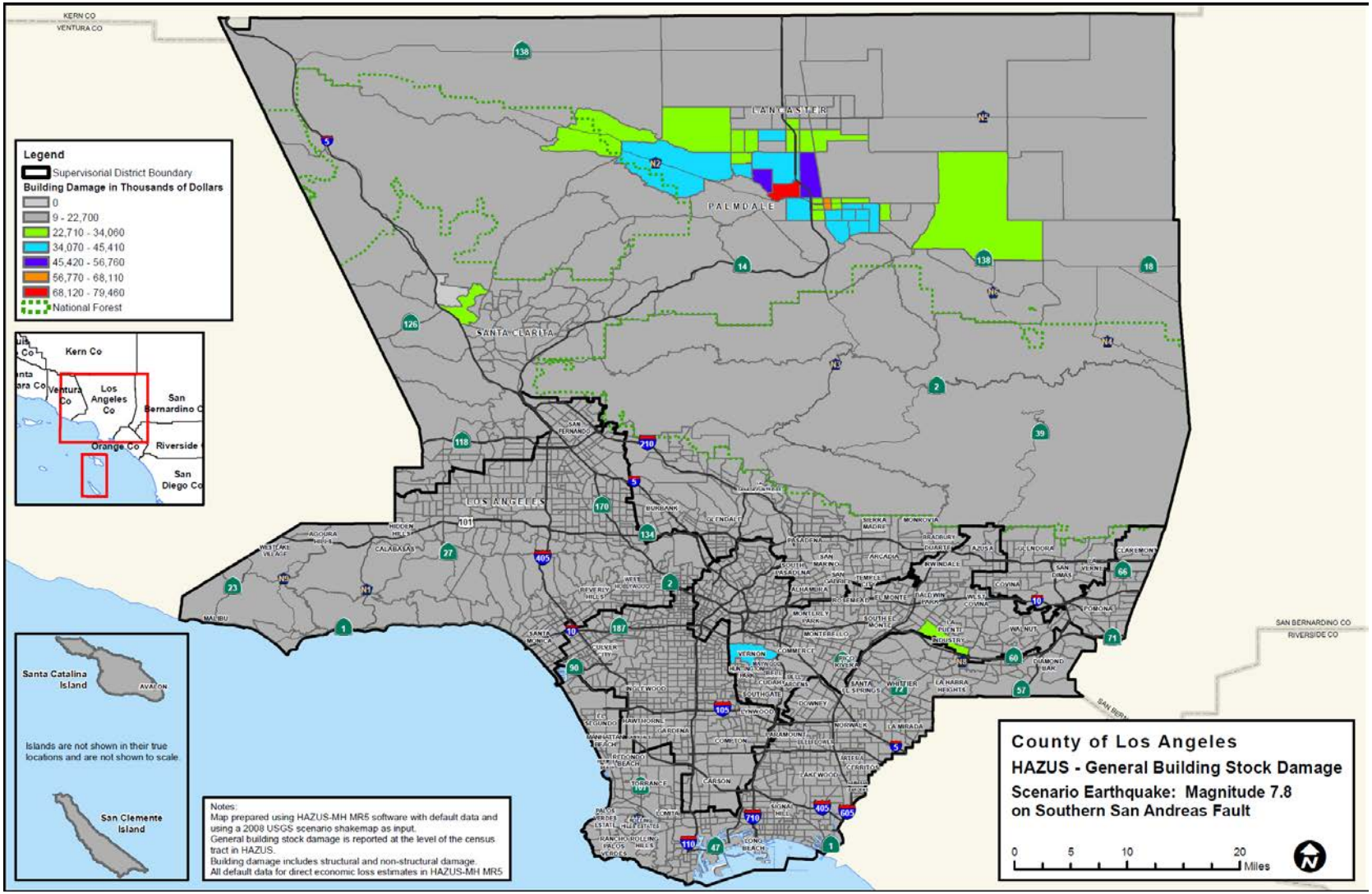
Map 5-42: Shake Intensity Map for the Los Angeles County
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-43: HAZUS – Debris Total for Los Angeles County, M7.8 San Andreas Fault
(Source: County of Los Angeles CEO - ITS GIS)



Map 5-44: HAZUS – General Building Stock Damage for Los Angeles County, M7.8 San Andreas Fault
(Source: County of Los Angeles CEO - ITS GIS)



Vulnerability

Studies (HAZUS and historical data) indicate that a major earthquake in the Los Angeles County area could be devastating. With a highly concentrated population of over 10 million and the heavy use of the transportation infrastructure (over 92 million vehicles per day use Los Angeles County highways and roads, with over 3.9 million commuters per day), a major earthquake could virtually shut down the county. Government services could be paralyzed for up to 72 hours. Business and industry would essentially cease, at least through the initial response stages.

Section 6:

Flooding

Table of Contents

Section 6: Flooding **1**

Why Are Floods a Threat to the County of Los Angeles? **1**

General Situation **2**

Historic Flooding in Los Angeles County 2

Impact of Flooding on the County of Los Angeles 3

Winter Rainfall 3

Monsoons 4

El Niño 4

Overview of FEMA-1203-DR-CA **6**

Disaster Declaration 6

El Niño '98 6

Description of Damage and Impact 7

Impacts to Individuals 7

Shelters 7

Levees 7

Landslides 8

Vulnerability 8

Geography and Geology 9

Flood Terminology **12**

Floodplain 12

100-Year Flood 12

Floodway 12

Flood Fringe 13

Base Flood Elevation (BFE) 13

Development and Flooding *13*

Hazard Assessment **13**

Hazard Identification *13*

Vulnerability Assessment *14*

Risk Analysis *14*

Flood-Prone Area Identification *14*

NFIP Participation *14*

How to Obtain Flood Insurance Rate Maps *15*

Severity *19*

County Flood Issues **19**

What Is Susceptible to Floods? *19*

Business/Industry *19*

Public Infrastructure *19*

Roads *20*

Storm Water Systems *20*

Debris in the Storm Drains *20*

Water Quality *20*

Definitions of FEMA Flood Zone Designations **21**

Moderate to Low-Risk Areas *21*

High-Risk Areas *22*

High-Risk – Coastal Areas *22*

Undetermined Risk Areas *22*

Characteristics of Flooding **23**

Floodplain Management Plan for Repetitive-Loss Properties *24*

National Flood Insurance Program (NFIP) and the Community Ratings System (CRS) *25*

CRS Application and Certification *25*

FMP Procedure and Process *25*

FMP Committee *26*

RLPs in Los Angeles County *26*

Current Mitigation **28**

Dam Failure Flooding *40*

Section 6: Flooding

Why Are Floods a Threat to the County of Los Angeles?

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

The nearest major waterways are the Los Angeles River, the Santa Clara River, the Rio Hondo River, the San Gabriel River, and Coyote Creek. The San Gabriel River is 1 mile to the west, and it does create a potential for flooding for the County of Los Angeles. As stated in the *County of Los Angeles Emergency Operations Plan*, the county has been identified as a "Zone B" area by the National Flood Insurance Program (NFIP), which means the county has minimal flood risk. The most recent flood event to impact the County was the 2007 flash flood that caused $300 thousand in damages. According to NOAA, strong thunderstorms dumped heavy rain over the Barham burn area. The heavy load generated a significant mud and debris flow below the burn area. Nearly two feet of mud covered a hundred yard stretch of Forest Lawn Drive. A dozen parked cars were buried by the mud and debris. No injuries were reported. (Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~ShowEvent~649537)

Board of Supervisorial District	Flood
Board of Supervisorial District 1	2.55
Board of Supervisorial District 2	2.55
Board of Supervisorial District 3	2.55
Board of Supervisorial District 4	3
Board of Supervisorial District 5	3

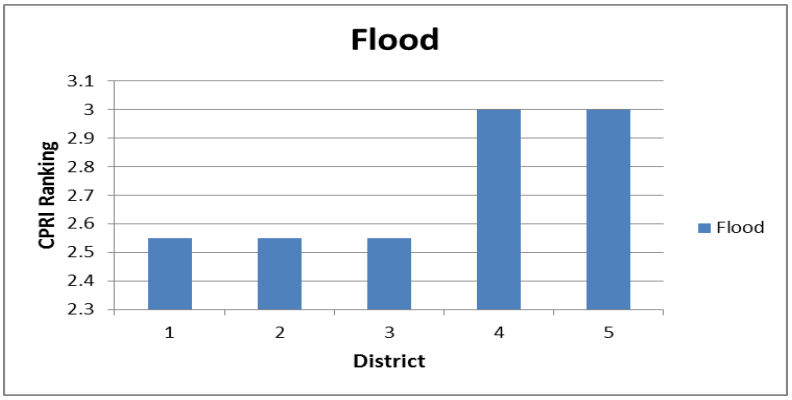


Table 6-1: Major Rivers in the County of Los Angeles (updated 2011)
(Source: U.S. Geological Survey)

River	Stream Miles (main stem)	Drainage Area (square miles)
Los Angeles River	97	830
Rio Hondo River	20	125
San Gabriel River	59	350
Santa Clara River	75	1,616

General Situation

Historic Flooding in Los Angeles County

Records show that since 1811, the Los Angeles River has flooded 30 times, on average once every 6.1 years. But averages are deceiving, for the Los Angeles basin goes through periods of drought and then periods of above-average rainfall. Between 1889 and 1891 the river flooded every year, and from 1941 to 1945, the river flooded five times. Conversely, from 1896 to 1914, a period of 18 years, and again from 1944 to 1969, a period of 25 years, the river did not have serious floods.

The towering mountains that give the Los Angeles region its spectacular views also wring a great deal of rain out of the storm clouds that pass through. Because the mountains are so steep, the rainwater moves rapidly down the slopes and across the coastal plains on its way to the ocean.

The Santa Monica, Santa Susana, and Verdugo Mountains, which surround three sides of the valley, seldom reach heights above 3,000 feet. The western San Gabriel Mountains, in contrast, have elevations of more than 7,000 feet. These higher ridges often trap eastern-moving winter storms. Although downtown Los Angeles averages just 15 inches of rain a year, some mountain peaks in the San Gabriel Mountains receive more than 40 inches of precipitation annually.

Naturally, this rainfall moves rapidly downstream, often with severe consequences for anything in its path. In extreme cases, flood-generated debris flows will roar down a canyon at speeds near 40 miles per hour, with a wall of mud, debris, and water tens of feet high. Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course.

Table 6-2: Historical Records of Large Floods in Los Angeles County as of 2/28/2011
(Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms)

Date	Loss Estimation	Source of Estimate	Comments
1995	$50 million	National Oceanic and Atmospheric Association	Flash flood
1995	$50 thousand	National Oceanic and Atmospheric Association	Flood/flash flood
2005	$1 million	National Oceanic and Atmospheric Association	Flash flood
2007	$300 thousand	National Oceanic and Atmospheric Association	Flash flood

Impact of Flooding on the County of Los Angeles

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Floods and their impacts vary with the location and severity of any given flood event, and generally only affect certain areas of the county during specific times. However, based on the risk assessment, it is evident that floods will continue to have devastating economic impacts on certain areas of the county.

Potential impacts that are not quantified, but that are anticipated and likely in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in a loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers (as temporary facilities and relocations would likely be needed)

Winter Rainfall

Average annual precipitation in Los Angeles County ranges from 13 inches on the coast to approximately 40 inches on the highest point of the Peninsular Mountain Range that transects the county. Several factors determine the severity of floods, including rainfall intensity and duration. A large amount of rainfall over a short time span can result in flash flood conditions. A sudden thunderstorm or heavy rain, dam failure, or sudden spills can cause flash flooding.

The National Weather Service's definition of a flash flood is a flood occurring in a watershed where the time of travel of the peak of flow from one end of the watershed to the other is less than six hours.

Monsoons

Another relatively regular source of heavy rainfall, particularly in the mountains and adjoining cities, is from summer tropical storms. Table 6-3 lists tropical storms that have had significant rainfall in the past century, and the general areas affected by these storms. These tropical storms usually coincide with El Niño years.

El Niño

El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific, one having important consequences. Among these consequences is increased rainfall across the southern tier of the United States and in Peru, which has caused destructive flooding, and drought in the West Pacific, sometimes associated with devastating brush fires in Australia. Observations of conditions in the tropical Pacific are considered essential for the prediction of short-term (a few months to one year) climate variations.

El Niño (the Spanish name for a male child) initially referred to a weak, warm current appearing annually around Christmastime along the coast of Ecuador and Peru, and lasting from a few weeks to a month or more. Every three to seven years, an El Niño event can last for many months, having significant economic and atmospheric consequences worldwide. During the past 45 years, 10 of these major El Niño events have been recorded, the worst of which occurred in 1997–1998. Previous to this, the El Niño event in 1982–1983 was the strongest on record. Some of the El Niño events have persisted for more than a year.

Table 6-3: Tropical Cyclones of Southern California
(Source: www.FEMA.gov)

Month-Year	Date(s)	Area(s) Affected	Rainfall
July 1902	20 and 21	Deserts and southern mountains	up to 2"
August 1906	18 and 19	Deserts and southern mountains	up to 5"
September 1910	15	Mountains of Santa Barbara County	2"
August 1921	20 and 21	Deserts and southern mountains	up to 2"
September 1921	30	Deserts	up to 4"
September 1929	18	Southern mountains and deserts	up to 4"
September 1932	28–Oct. 1	Mountains and deserts, 15 fatalities	up to 7"
August 1935	25	Southern valleys, mountains, and deserts	up to 2"
September 1939	4–7	Southern mountains, southern and eastern deserts	up to 7"
	11 and 12	Deserts, central and southern mountains	up to 4"
	19–21	Deserts, central and southern mountains	up to 3"
	25	Long Beach, with sustained winds of 50 mph	5"
		Surrounding mountains	6" to 12"
September 1945	9 and 10	Central and southern mountains	up to 2"
September 1946	30–Oct. 1	Southern mountains	up to 4"

Month-Year	Date(s)	Area(s) Affected	Rainfall
August 1951	27 – 29	Southern mountains and deserts	2" to 5"
September 1952	19 – 21	Central and southern mountains	up to 2"
July 1954	17–19	Deserts and southern mountains	up to 2"
July 1958	28 and 29	Deserts and southern mountains	up to 2"
September 1960	9 and 10	Julian	3.4"
September 1963	17–19	Central and southern mountains	up to 7"
September 1967	1–3	Southern mountains and deserts	2"
October 1972	6	Southeast deserts	up to 2"
September 1976	10 and 11	Central and southern mountains; Ocotillo, CA, was destroyed, and there were 3 fatalities	6" to 12"
August 1977	n/a	Los Angeles	2"
		Mountains	up to 8"
October 1977	6 and 7	Southern mountains and deserts	up to 2"
September 1978	5 and 6	Mountains	3"
September 1982	24–26	Mountains	up to 4"
September 1983	20 and 21	Southern mountains and deserts	up to 3"

On February 9, 1998, in response to a request from Governor Wilson, President Clinton declared a major disaster for 27 counties in the state of California. The disaster was designated as FEMA-1203-DR-CA. On February 13, 1998, 4 additional counties were added; on February 26, 4 more counties were added; and on March 6, 1998, 6 additional counties were designated, bringing the total to 41.

The County of Los Angeles established a special task force composed of county department members to distribute sandbags and clear flood channels. In Monterey County, farmers and landowners along the Salinas River banded together to reduce potential flooding—which had caused $240 million in damages in 1995. They formed a coalition and spent $2 million to clean out vegetation, sandbars, and other flow impediments along 40 miles of the river, and increased water flow capacity by 33 percent. As a result, the Salinas River did not flood during the El Niño storms of 1998. In anticipation of El Niño-driven pounding surf and high tides, city and Orange County crews built, along the beach, a 10-foot-high berm several hundred yards long to protect scores of beachfront homes in the City of Seal Beach.

The National Flood Insurance Program reported a surge in Californians purchasing flood insurance following the El Niño Community Preparedness Summit held in October 1997. The number of policies went from a pre-summit total of 264,914 to 333,753 by the end of November. According to FEMA, this number climbed to 365,000 by the end of December.

Disasters have unique and defining characteristics. The El Niño storms of 1998 are no exception. The most distinct characteristics of FEMA-1203-DR-CA have been the landslides, coastal erosion, and related earth movement problems brought on by rapidly recurring storms that produce heavy rains, high winds, and large waves.

Overview of FEMA-1203-DR-CA

Disaster Declaration

On February 9, 1998, President Clinton signed a major disaster declaration that designated "El Niño '98, FEMA-1203-DR-CA." As a result of the presidential declaration, pertinent sections of the Robert T. Stafford Disaster Relief and Emergency Assistance Act were implemented, providing individual assistance and public assistance to the designated counties. The declaration also activated the Hazard Mitigation Grant Program (HMGP), which is applicable to all counties in the state. After the initial declaration by President Clinton, 14 additional counties asked to receive a federal declaration, bringing the total number of designated counties to 41.

The 41 designated counties were as follows: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, Fresno, Glenn, Humboldt, Kern, Lake, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Orange, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Yolo, and Yuba.

El Niño '98

In the spring of 1997, Pacific Ocean temperatures along the equator from South America to Australia were rising above normal, changing wind patterns in the area. This is a phenomenon known as El Niño. As part of the global impact of El Niño, heavy storms for 1997–1998 were predicted for California.

In anticipation of a serious El Niño winter season, emergency services agencies throughout the state started making preparations. During a summit convened on October 6, 1997, Governor Pete Wilson directed the state to take a series of actions to prepare for the severe storms that were predicted to hit California as a result of El Niño. The governor directed the California Office of Emergency Services and the Department of Water Resources (DWR) to conduct a series of regional briefings over the next two months to assist local communities with their El Niño preparations. In October 1997, the first of six briefings for local and state agencies was held. FEMA held the "El Niño Community Preparedness Summit" in Santa Monica on October 14, 1997.

Agencies such as DWR and the U.S. Army Corps of Engineers accelerated efforts to complete projects and work that began as a result of the prior year's disastrous flooding. Many local agencies accelerated repairs, cleaned storm channels, and implemented community education efforts, while the state issued environmental permits that allowed repair and mitigation work to move forward prior to the arrival of the storms. Although the effects are difficult to quantify, it is clear that without these and a multitude of other efforts the devastation from the disaster would have been far greater.

About 170 percent of normal precipitation fell in most areas, with several locations receiving 300 percent or more above normal. Rainstorms occurred continuously in February, ranging in duration from 1 to 3 days, with only a day of rest between cycles. The season's most severe storm occurred on February 2, and a series of storms continued until February 24, 1998. A strong jet stream was present across the Pacific during this time, and this colder air mass also increased rain and snow. February rains were three times normal, and the mountain snowpack rose from 15 percent to 185 percent. The pattern was similar to the winter of 1982–83, the most serious past El Niño year. The El Niño '98 storms were of average temperature—unlike those of 1997, which were warmer, resulting in rainfall at higher elevations.

Description of Damage and Impact

Damage occurred almost as soon as the first heavy rains began in November of 1997. In Orange County, the damage became serious enough for a local disaster declaration on December 6, 1997. This was followed by a gubernatorial disaster declaration on December 10, 1997.

Casualties included 17 confirmed deaths and 29 confirmed injuries. The total amount of residential damage was estimated at over $120 million. Roads, utilities, and levees were also damaged. As of April 29, 1998, the Disaster Field Office (DFO) estimated damages as follows: 91 homes had been destroyed, 2,303 homes suffered major damages, and 4,252 homes incurred minor damage.

According to the California Coastal Commission's Storm Summary Report for Coastal California, March 10, 1998, the El Niño '98 storms caused extensive damage along coastal California. In many cases, coastal bluff and mountain soils lost stability due to saturation from copious precipitation and large waves. High river levels caused flooding of several low elevation areas. There was a great deal of beach erosion in Los Angeles, Orange, and San Mateo Counties, as well as in other parts of California. Storm waves damaged many low-lying oceanfront structures. The Coastal Commission issued approximately 75 emergency coastal permits, mostly for rip rap and seawall repairs to protect residential structures.

Impacts to Individuals

By April 28, 1998, FEMA's Human Services Division had received over 70,125 telephonic registrations for FEMA disaster assistance. The Disaster Housing Program had received a total of 46,730 applications, and had provided $20.6 million in assistance. As of April 15, the Small Business Administration (SBA) had issued 31,509 home and personal property loan applications and had approved more than $16 million in low-interest loans. In addition, the SBA had issued 9,699 business loan applications and approved $6,504,400 in business loan funds. The Individual and Family Grant Program (IFGP) had received 37,093 requests as of April 28. For serious, unmet needs beyond the maximum IFGP award, the State Supplemental Grant (SSG) program was able to provide up to an additional $10,000, and had awarded 17 grants for an additional $82,663 in aid to individuals. The Public Assistance (Infrastructure) Program had received 269 damage survey reports (DSRs) totaling $26,582,560 as of April 28, 1998. According to the preliminary damage assessment, damage to local government facilities was estimated at $300 million.

Shelters

The El Niño '98 storms created a need to feed and shelter thousands of people. The American Red Cross (ARC), members of the National Volunteer Organizations Active in Disaster (NVOAD), and numerous other voluntary agencies are usually the first to respond to the needs of disaster victims. The Red Cross provided housing for 5,112 people at 91 shelter locations. More than 140,000 meals were served, and financial assistance was extended to more than 2,300 households. The Red Cross relief efforts for the El Niño winter storms cost more than $4.6 million.

Levees

Unlike the flooding in the previous year (FEMA-1155-DR-CA, California Winter Storms of 1997), the flows were less widespread, and there were fewer levee problems. Due in part to the lower temperatures, the duration of rains, and pre-storm repair efforts to shore up levees at risk, there were only a few levee breaks, and minor seepage. According to DWR, the Sacramento River was not strained to capacity. The San Joaquin River briefly approached flood stage at the Vernalis Gage, but did not exceed it. Many of the areas that flooded were predictable, such as Rio Linda in Sacramento County and the residential areas along the Pajaro River in Monterey County.

The area around Clear Lake in Lake County repeated its flooding history, and set a record for the stage height. The Russian River at Guerneville was above flood stage, as was the Petaluma River.

Landslides

Landslides and debris flows had a greater impact during this disaster than in the federally declared disasters of 1995 and 1997. The severity of the problems ranged from the catastrophic losses in the Rio Nido community of Sonoma County to small erosion problems with minor impact elsewhere.

Landslides and erosion also caused residential damage and destruction in Alameda County, Humboldt County, Los Angeles County, San Mateo County, San Francisco County, Santa Cruz County, Ventura County, and various other sites within the state.

Vulnerability

The frequent storms that occurred in February 1998 saturated soils and triggered numerous debris flows and landslides, resulting in severe damage throughout river valleys and coastal areas. Eroding cliffs jeopardized homes, and debris flows forced many residents to evacuate their homes. Such headline-grabbing events focused attention on the geologic problems produced by the wet season. It should be noted, however, that deep-seated landslide movements could also continue after the heavy rains have stopped.

The soil and rock that make up hill slopes will eventually move downhill. Some of this material will move grain by grain through erosion and soil creep, and some will move as larger slabs or liquefied masses, commonly called landslides and mudslides. Geologists generally classify landslides according to their shape, rate (speed) of movement, type of motion, and material properties. In most classification schemes, there are three distinct types of movement: flow (i.e., debris flows and mudflows); sliding along a discrete plane or failure (i.e., debris slide); and falling (i.e., rock falls and avalanches).

Landslides can be small, involving only a few cubic yards of material, or large, involving more than a square mile of land. Some landslides are shallow—only a few feet deep—while others can be hundreds of feet deep. Landslides can be slow, and move only a few inches a year. They can also be fast, and move at tens to hundreds of miles per hour.

While most hill slopes are marginally stable under dry conditions, the addition of water from rainfall, snowmelt, or human activities (e.g., watering lawns) can radically alter the character of the soil and weathered rock, and lessen slope stability. Generally, all other conditions being equal, if groundwater is at or near the ground surface, there is a great probability that a landslide or debris flow will occur.

Another major factor that may trigger landslides is sudden changes in the shape of the slope. Slope changes that may trigger landslides include man-made cuts and fills, undermining of slopes by stream erosion or formation of gullies, or undermining and overloading of slopes due to landslide movement on adjacent land. In fact, landslide movement in one part of a hill slope can radically affect the stability of adjacent slopes. Events at Rio Nido in Sonoma County illustrate how complex the changes in stability can be. In simplified terms, the Rio Nido landslide began when a block of soil and rock, located high on a ridge, rotated down and out on the slope. This movement pushed a bulge of material onto a steep slope at the toe of the landslide. Fissures opened at both the top of the rotational block and within the toe of the landslide. The rotational movement of the landslide also undermines up-slope areas (decreasing stability), changing the groundwater flow patterns (increasing stability in parts of the slide while decreasing stability in others).

Because the toe of the landslide was no longer supported by the surrounding slope (the slope became overly steep), the saturated outside edge failed by toppling and breaking apart. This loose material then mobilized as debris flow down a stream channel, picking up additional debris (including sediment and trees) as it flowed toward the houses on the canyon floor below. Immediate concerns were that the landslide mass would continue to move high on the slope, and as it did, the entire mass would break apart and fail as a massive debris flow that would inundate a much larger downslope area. Currently, the rotational component of the Rio Nido landslide has not shifted since monitoring equipment was installed two weeks after the failure began.

Hillsides may also be more vulnerable to debris flows following wildfires. Removal of vegetation generally makes hillsides more susceptible to erosion and landslides. After a forest fire there is a reduction in the amount of vegetation present on the hillsides to hold the soil in place.

Also, the roots decay over a period of years following the fire. This results in an increased landslide hazard for three to five years following a large fire. In 1997, Southern California had 27 wildfires greater than 300 acres. At least 22 of those sites had some erosion damage in 1987, and it came in the form of debris flows and minor flooding.

There is evidence to suggest that most landslides and debris flows occur where they have happened in the past. For example, the Rio Nido landslide is next to an existing landslide deposit identified on a California Division of Mines and Geology (DMG) map.

Though landslides are fairly common in California's hillside areas, there is considerable pressure to construct new homes at these locations. Some communities require site-specific investigations prior to permitting development. Engineers attempt to stabilize slopes by providing drainage, flattening slopes, and filing in valleys. Sometimes these modified slopes and fills require maintenance, and while many of these modified slopes could last decades, some failures occur. This is what happened to houses in Laguna Niguel (Orange County), which were built on an engineered slope that had shown signs of distress for three years.

Just as there is pressure to develop hill slope areas, the beautiful ocean views from sea cliffs make them desirable places to live. During the recent disaster, accelerated cliff erosion in Pacifica resulted from slightly higher than normal seasonal ground water infiltration. When the ground becomes saturated, wave action can more easily remove materials that have fallen to the bottom of the cliffs, temporarily accelerating cliff retreat in the areas upslope. The rocks in these particular cliffs are highly fractured and nonresistant. They include sandstone, shale, and metamorphic rocks that are prone to rapid erosion during the rainy season. Erosion usually has occurred episodically, not continually at the same time. This year the cliffs locally eroded as much as 10 feet, compared to the frequently noted annual averages of 3 to 4 inches.

Geography and Geology

The greater Los Angeles basin is the product of rainstorms and erosion that have occurred for millennia. Most of the mountains that ring the valleys and coastal plain are deeply fractured faults and, as they (the mountains) grew taller, their brittle slopes were continually eroded. Rivers and streams carried boulders, rocks, gravel, sand, and silt down these slopes to the valleys and coastal plain. In places these sediments are as much as 20,000 feet thick.

Much of the coastal plain rests on the ancient rock debris and sediment washed down from the mountains. This sediment can act as a sponge, absorbing vast quantities of rain in those years when heavy rains follow a dry period.

But like a sponge that is near saturation, the same soil fills up rapidly when a heavy rain follows a period of relatively wet weather. So even in some years of heavy rain, flooding is minimal because the ground is relatively dry. The same amount of rain following a wet period of time can cause extensive flooding.

The urbanized portions of the greater Los Angeles basin are for all intents and purposes built out. This leaves precious little open land to absorb rainfall. This lack of open ground forces water to remain on the surface, where it rapidly accumulates. If it were not for the massive flood control system with its concrete lined river and stream beds, flooding would be a much more common occurrence. And the tendency is toward even less and less open land. In-fill building is becoming a much more common practice in many areas. Developers tear down an older home that typically covers up to 40 percent of the lot size and replace it with three or four town homes or apartments that may cover 90–95 percent of the lot.

Another potential source of flooding is "asphalt creep." The street space between the curbs of a street is a part of the flood control system. Water leaves property and accumulates in the streets, where it is directed toward the underground portion of the flood control system. The carrying capacity of the street is determined by the width of the street and the height of the curbs along the street.

Often, when streets are being resurfaced, a one- to two-inch layer of asphalt is laid down over the existing asphalt. This added layer of asphalt subtracts from the rated capacity of the street to carry water. Thus the original engineered capacity of the entire storm drain system is marginally reduced over time. Subsequent repaving of the street will further reduce the engineered capacity.

Table 6-4: Beaches of Los Angeles County
(Sources: Los Angeles County Department of Beaches & Harbors, California State Parks & OCNow.com Beach Guide)

Beach	Location
Abalone Cove Shoreline Park	5970 Palos Verdes Dr., Rancho Palos Verdes
Amarillo Beach	24320, 24436, 24606 Malibu Rd., Malibu
Avalon Bay Beach	Crescent Ave., Avalon
Bay Shore Beach	Bay Shore & 2nd St., Long Beach
Belmont Shore Beach	Ocean Blvd. between 39th Place & 54th Place, Long Beach
Big Dume Beach	Westward Beach Rd., Malibu
Big Rock Beach (private beach with public access)	20100 Pacific Coast Hwy., Malibu
Broad Beach (private beach with public access)	31346 Broad Beach Rd., Malibu
Cabrillo Beach	Stephen M White Dr., San Pedro
Corral Canyon County Beach	Pacific Coast Hwy. & Corral Canyon, Malibu
Dan Blocker County Beach	26000 Pacific Coast Hwy., Malibu
Descanso Cove Beach	Descanso Canyon Rd., Avalon
Dockweiler State Beach	8255 Vista del Mar Blvd., Playa del Rey
El Matador State Beach	32215 Pacific Coast Hwy., Malibu

Beach	Location
El Pescador State Beach	32860 Pacific Coast Hwy., Malibu
El Porto Beach	Vista del Mar & 45th St., Manhattan Beach
El Segundo Beach	Grand Ave. & Vista del Mar Blvd., El Segundo
Hermosa Beach	Hermosa Ave. & Pier Ave., Hermosa Beach
La Piedra State Beach	32628 Pacific Coast Hwy., Malibu
Latigo Beach (private beach)	Latigo Shore Dr. & Pacific Coast Hwy., Malibu
Las Tunas County Beach	19444 Pacific Coast Hwy., Malibu
Leo Carrillo State Beach	36000 Pacific Coast Hwy., Malibu
Little Dume Beach (private beach)	North of Paradise Cove, Malibu
Long Beach City Beach	Between Belmont Pier & Alamitos Ave., Long Beach
Lover's Cove/Pebbly Beach	Pebbly Beach Rd., Avalon
Malibu Lagoon State Beach	23200 Pacific Coast Hwy., Malibu
Malibu Surfrider County Beach	23200 Pacific Coast Hwy., Malibu
Manhattan Beach	Manhattan Beach Blvd. & North Ocean Drive, Manhattan Beach
Marina Del Rey Basin D (Mother's Beach)	14000 Palawan Way, Marina del Rey
Marine Park (Mother's Beach)	Appian Way & Attica, Long Beach
Nicolas Canyon County Beach	33850 Pacific Coast Highway, Malibu
Ocean Park	2600 Barnard Way, Santa Monica
Paradise Cove Beach	28128 Pacific Coast Hwy., Malibu
Playa del Rey Beach	Pacific Ave. & Culver Blvd., Playa del Rey
Point Dume State Beach	Westward Beach Rd., Malibu
Point Vicente County Beach	Palos Verdes Dr. near Hawthorne ., Palos Verdes
Redondo Beach	South Esplanade Ave., Redondo Beach
Robert H. Meyer Memorial State Beach	Pacific Coast Hwy., Malibu
Royal Palms County Beach (see White's Point)	---
Santa Monica State Beach	Palisades Beach Rd., Santa Monica
Seaside Lagoon	200 Portofino Way, Redondo Beach
Sunset Point (see Will Rogers State Beach)	---
Surfrider (see Malibu Surfrider)	---
Topanga County Beach	18700 Pacific Coast Hwy., Malibu

Beach	Location
Torrance Beach	Paseo de la Playa, Torrance
Venice Beach	3100–2700 Ocean Front Walk, Venice
Venice Rose (see Venice Beach)	---
White's Point & Royal Palms County Beaches	1799 Paseo del Mar, San Pedro
Will Rogers State Beach	17700 Pacific Coast Hwy., Pacific Palisades
Zuma Beach County Park	30050 Pacific Coast Hwy., Malibu

Flood Terminology

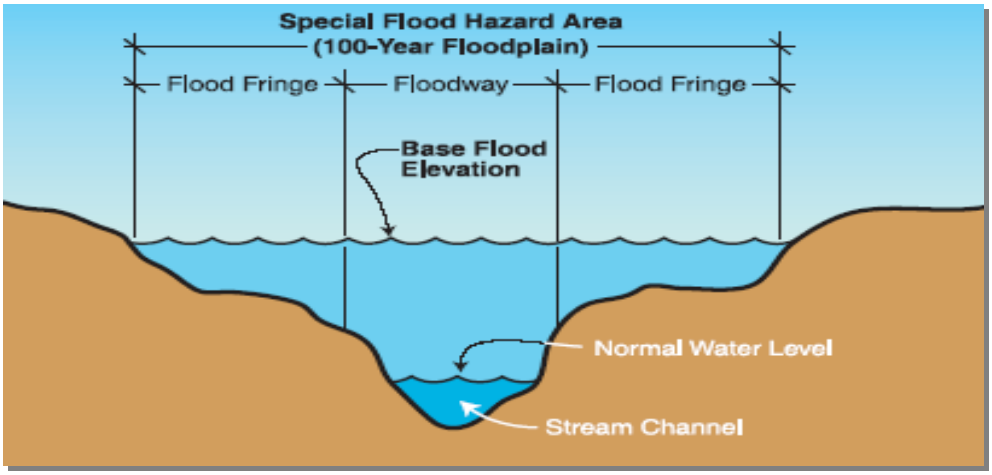
Floodplain

A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess flood water. The floodplain is made up of two sections: the floodway and the flood fringe.

100-Year Flood

The 100-year flooding event is the flood having a 1 percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood.

Schematic 6-1: Floodplain and Floodway (updated 2011)
(Source: FEMA How-To-Guide Assessing Hazards)



Floodway

The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For NFIP purposes, floodways are defined as the channel of a river or stream, and the over-bank areas adjacent to the channel.

The floodway carries the bulk of the flood water downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

The NFIP floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot." Floodways are not mapped for all rivers and streams but are generally mapped in developed areas.

Flood Fringe

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward.

Base Flood Elevation (BFE)

The term "base flood elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities choose to use higher-frequency flood events as their base flood elevation for certain activities, while using lower-frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation, while the 500-year flood event may serve as base flood elevation for the tie-down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

Development and Flooding

When structures or fill are placed in the floodway or floodplain, water is displaced. Development raises the river levels by forcing the river to compensate for the flow space obstructed by and inserted structures or fill. When structures or materials are added to the floodway or floodplain and no fill is removed to compensate, serious problems can arise. Flood waters may be forced away from historic floodplain areas. As a result, other existing floodplain areas may experience flood waters that rise above historic levels. Local governments must require engineer certification to ensure that proposed developments will not adversely affect the flood-carrying capacity of the special flood hazard area (SFHA).

Displacement of only a few inches of water can mean the difference between no structural damage occurring in a given flood event, and the inundation of many homes, businesses, and other facilities. Careful attention should be given to development that occurs within the floodway to ensure that structures are prepared to withstand base flood events. In highly urbanized areas, increased paving can lead to an increase in volume and velocity of runoff after a rainfall event, exacerbating the potential flood hazards. Care should be taken in the development and implementation of storm water management systems to ensure that these runoff waters are dealt with effectively.

Hazard Assessment

Hazard Identification

Hazard identification is the first phase of flood-hazard assessment. Identification is the process of estimating (1) the geographic extent of the floodplain (i.e., the area at risk from flooding); (2) the intensity of the flooding that can be expected in specific areas of the floodplain; and (3) the probability of occurrence of flood events. This process usually results in the creation of a floodplain map. Floodplain maps provide detailed information that can assist jurisdictions in making policies and land-use decisions.

Vulnerability Assessment

Vulnerability assessment is the second step of flood-hazard assessment. It combines the floodplain boundary—generated through hazard identification—with an inventory of the property within the floodplain. Understanding the population and property exposed to hazards will assist in reducing risk and preventing loss from future events. Because site-specific inventory data and inundation levels given for a particular flood event (10-year, 25-year, 50-year, 100-year, and 500-year) are not readily available, calculating a community's vulnerability to flood events is not straightforward. The amount of property in the floodplain, as well as the type and value of structures on those properties, should be calculated to provide a working estimate for potential flood losses.

Risk Analysis

Risk analysis is the third and most advanced phase of a hazard assessment. It builds on the hazard identification and vulnerability assessment. A flood risk analysis for the County of Los Angeles should include two components: (1) the life and value of property that may incur losses from a flood event (defined through the vulnerability assessment); and (2) the number and type of flood events expected to occur over time.

Within the broad components of a risk analysis, it is possible to predict the severity of damage from a range of events. Flow velocity models assist in predicting the amount of damage expected from different magnitudes of flood events.

Flood-Prone Area Identification

NFIP Participation

ELEMENT C. MITIGATION STRATEGY | C2
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

The County of Los Angeles participates in NFIP. Flood maps and flood insurance studies (FIS) are often used to identify flood-prone areas. The NFIP was established in 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In Los Angeles County, the NFIP and related building code regulations went into effect on March 1, 1978. NFIP regulations (44 Code of Federal Regulations (CFR) Ch. 1, §60.3) require that all new construction in floodplains must be elevated at or above base flood level.

Flood insurance rate maps (FIRM) and FIS floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A FIRM is the official map produced by FEMA that delineates SFHA in communities where NFIP regulations apply. FIRMs are also used by insurance agents and mortgage lenders to determine if flood insurance is required, and what insurance rates should apply.

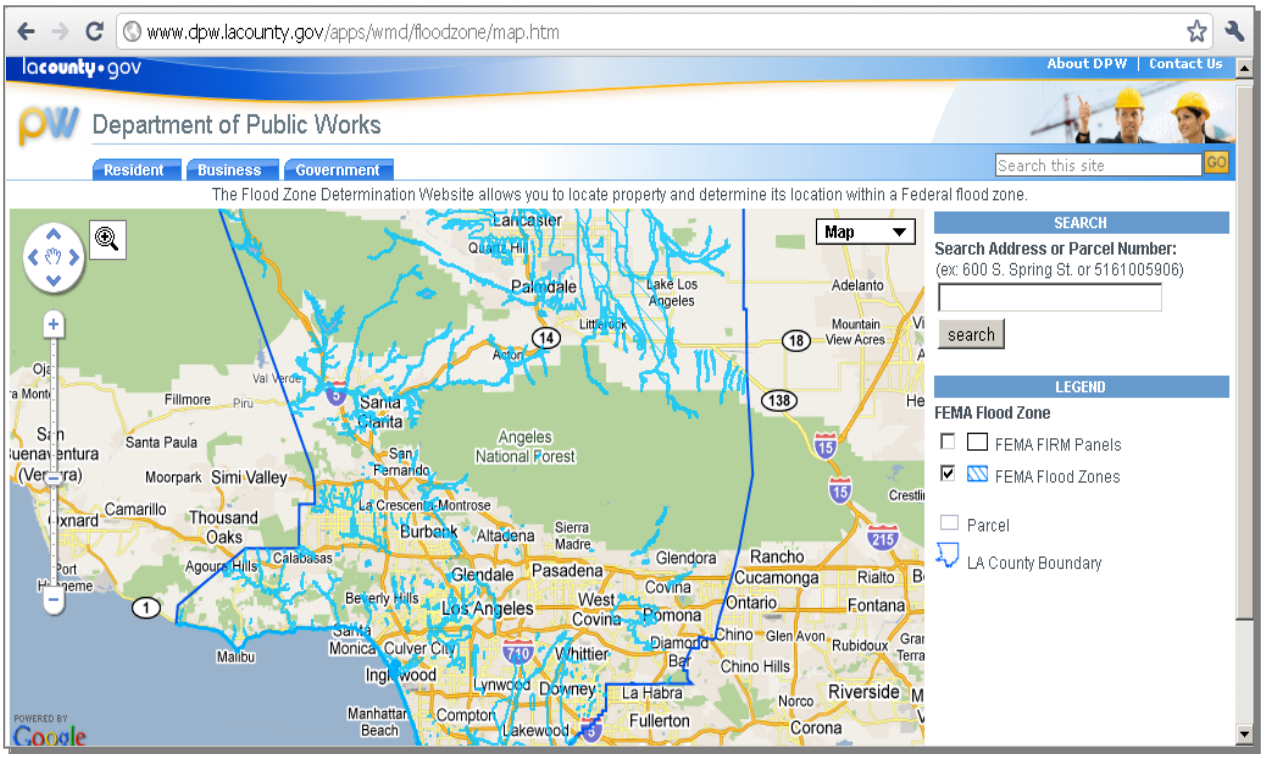
Water surface elevations are combined with topographic data to develop FIRMs. FIRMs illustrate areas that would be inundated during a 100-year flood; floodway areas; and elevations marking the 100-year-flood level. In some cases they also include base flood elevations (BFEs) and areas located within the 500-year floodplain. Flood insurance studies and FIRMs produced for the NFIP provide assessments of the probability of flooding at a given location. FEMA conducted many flood insurance studies in the late 1970s and early 1980s.

These studies and maps represent flood risk at the point in time when FEMA completed the studies. However, it is important to note that not all 100-year or 500-year floodplains have been mapped by FEMA.

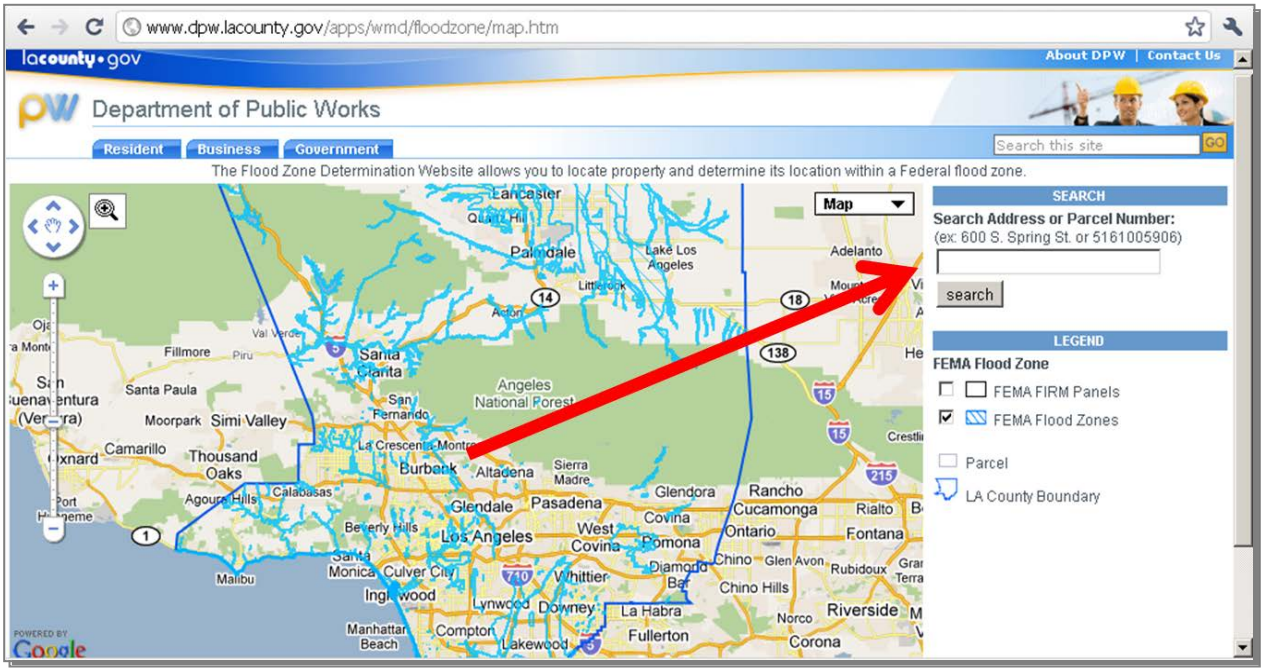
FEMA flood maps are not entirely accurate. These studies and maps do not incorporate planning for floodplain changes in the future that might arise due to new development. Although FEMA is considering changing that policy, it is optional for local communities. Man-made and natural changes to the environment have changed the dynamics of storm water run-off since then.

How to Obtain Flood Insurance Rate Maps

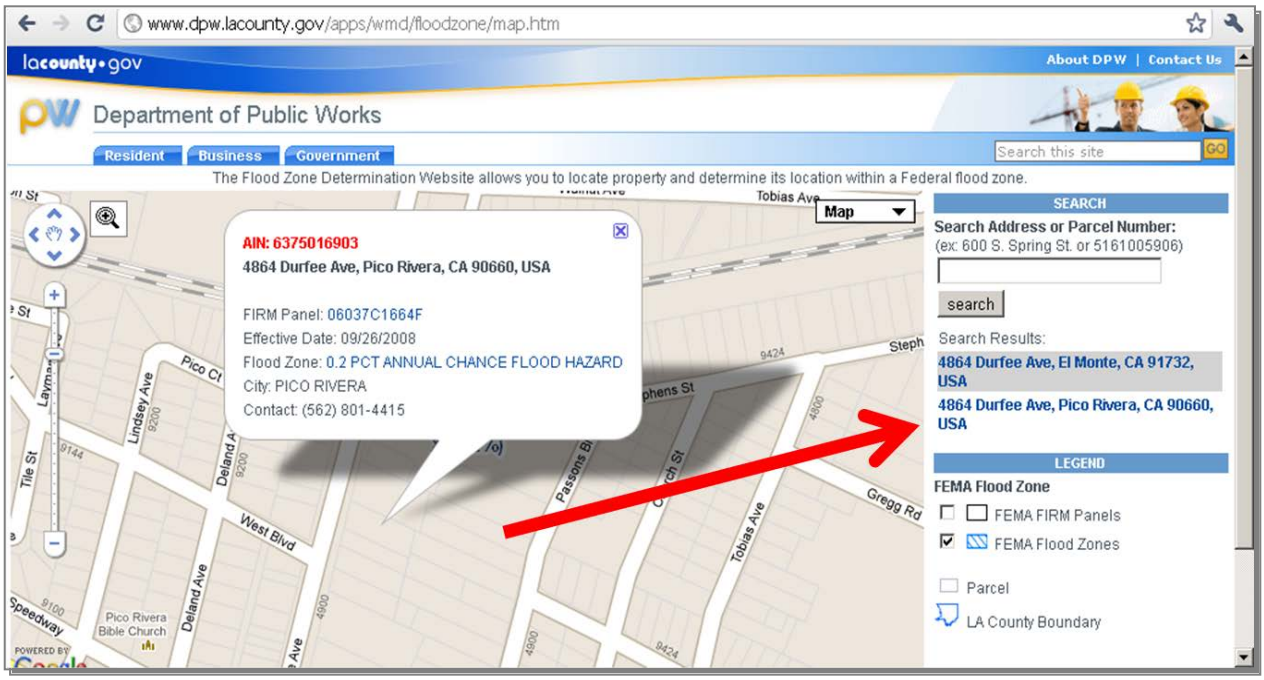
Step 1: Go to www.dpw.lacounty.gov/apps/wmd/floodzone/map.htm.



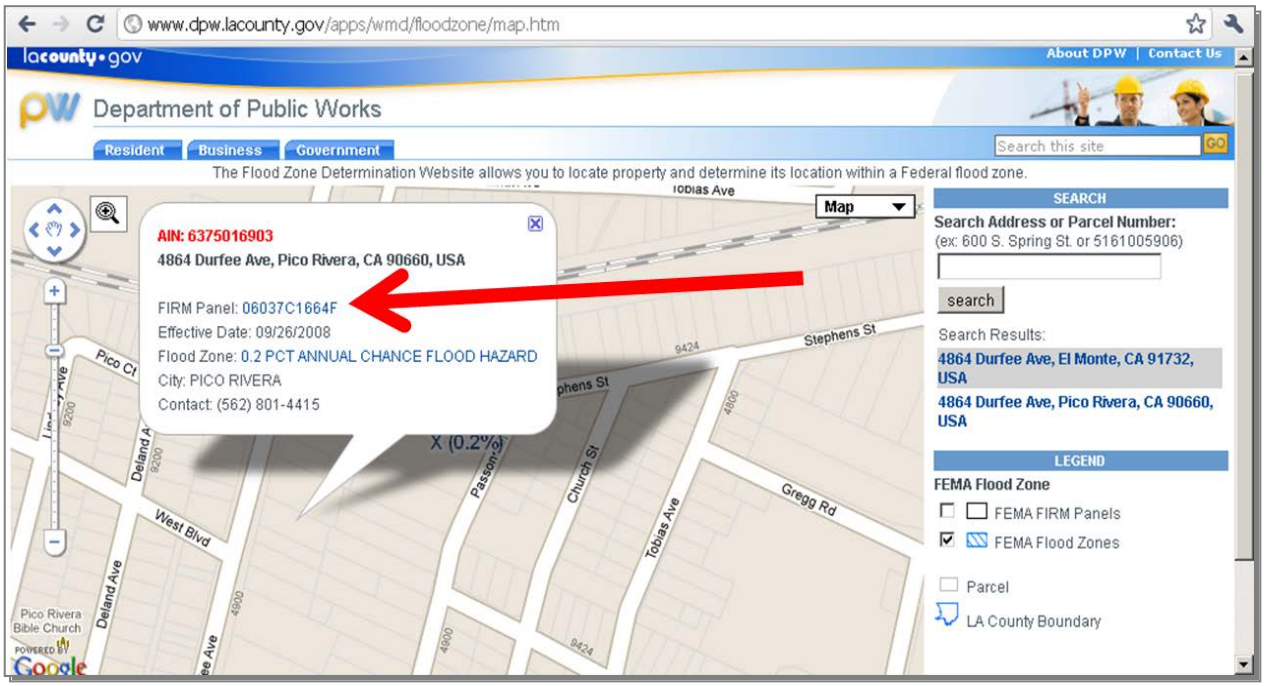
Step 2: Enter your address in the address field.



Step 3: Click the appropriate address on the right as shown.



Step 4: Click on the Flood Insurance Rate Map panel link to get your PDF.



Step 5: Review your complete FEMA flood insurance rate map.



The County of Los Angeles has a history of chronic and destructive floods. Between 1950 and 2009, there were 28 county or federally declared disasters; half were flood related.

While the "Great Flood" of 1861–62 may be unmatched in scope, the devastating effects of recent floods far exceed the damage of a century ago. Despite the construction of massive and relatively effective flood control projects, California remains vulnerable to flooding. A steady rise in population and accompanying development contribute to increased flood risks throughout the state.

Between 1992 and 2002, every county in California was declared a federal disaster area at least once because of a flooding event. The counties of Los Angeles, Orange, and San Bernardino were declared federal flood disaster areas five times, and sixteen other counties were declared disaster areas four times.

The South Coast hydrologic region extends up from the U.S.-Mexico border to the Tehachapi, San Bernardino, San Gabriel, and San Jacinto Mountains. Nearly one-third of the area is coastal plain.

Major stream systems in the South Coast region include the following: Calleguas Creek Basin, Malibu and Santa Monica Bay streams, Ventura River, Santa Clara River, and Los Angeles River.

This region contains major urban centers, including the counties of Los Angeles, Orange, and San Diego. Much of the flooding in these areas is sudden and severe, resulting in massive slides, debris flows, and mudflows. Typical of the flooding that occurs in this area were the 1969 winter storms that killed 47 people and resulted in $300 million in property damage. During these storms, an alluvial flood and debris flow on Deer Creek in San Bernardino County killed 11 people. Normally Deer Creek is dry and is not considered a special flood hazard area on the national FIRMs.

However, the region has experienced tremendous population growth since 1969, and the area of the Deer Creek alluvial fan is now home to several public schools and the Ontario International Airport.

Table 6-5: Federal Flood Disaster Declarations in Los Angeles County 1953–2011
(Source: http://www.fema.gov/news/disaster_totals_annual.fema#markS)

Declaration #	Date	Disaster Description
15	02/05/1954	Flood & erosion
82	04/04/1958	Heavy rainstorms & floods
122	03/06/1962	Floods (Ventura)
145	02/25/1963	Floods
253	01/26/1969	Severe storms & flooding
547	02/15/1978	Coastal storms, mudslides, & flooding
615	02/21/1980	Severe storms, mudslides, & flooding
812	02/05/1988	Severe storms, high tides, & flooding
935	02/25/1992	Rain/snow/wind storms, flooding, mud
979	02/03/1993	Severe winter storm, mud, & land slides

Declaration #	Date	Disaster Description
1005	10/28/1993	Fires, Mud & Landslides, Soil Erosion, Flooding
1044	01/05/1995	Severe Winter Storms, Flooding, Landslides, Mud Flows
1046	03/12/1995	Severe Winter Storms, Flooding, Landslides, Mud Flows
1203	02/09/1998	Severe Winter Storms and Flooding
1577	02/04/2005	Severe Storms, Flooding, Debris Flows, and Mudslides
1585	04/14/2005	Severe Storms, Flooding, Debris Flows, and Mudslides
1884	03/08/2010	Severe Storms, Flooding, Debris Flows, and Mudslides

Severity

Floods threaten life and property. People and animals can drown; structures and their contents can be destroyed; roads, bridges, and railroad tracks can be washed out; and crops are often ruined. Floods can also create health hazards due to the discharge of raw sewage from damaged septic tank leach fields, sewer lines, and sewage treatment plants, or due to hazardous materials carried off by raging waters. Vital public services are disrupted.

County Flood Issues

What Is Susceptible to Floods?

The type of property damage caused by flood events depends on the depth and velocity of the flood waters. Faster-moving flood waters can wash buildings off their foundations and sweep cars downstream. Pipelines, bridges, and other infrastructure can be damaged when high waters combine with flood debris. Extensive damage can be caused by basement flooding and landslide damage related to soil saturation from flood events. Most flood damage is caused by water saturating materials susceptible to loss (e.g., wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances). In many cases, flood damage to homes renders them unlivable.

Business/Industry

Flood events hurt businesses by damaging property and by interrupting business. Flood events can cut off customer access to a business, or even close a business for repairs. A quick response to the needs of businesses affected by flood events can help a community maintain economic vitality in the face of flood damage. Responses to business damage can include funding to assist owners in elevating or relocating flood-prone business structures.

Public Infrastructure

Publicly owned facilities are a key component of daily life for all citizens of the county. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of the government to deliver services. Government can take action to reduce risk to public infrastructure from flood events, as well as craft public policy that reduces risk to private property from flood events.



Roads

During hazard events, or any type of emergency or disaster, dependable road connections are critical for providing emergency services. Roads systems in the County of Los Angeles are maintained by multiple jurisdictions.

Federal, state, county, and city governments all have a stake in protecting roads from flood damage. Road networks often traverse floodplain and floodway areas. Transportation agencies responsible for road maintenance are typically aware of the roads that are at risk from flooding.

Storm Water Systems

Local drainage problems are common throughout the County of Los Angeles. The county's maintenance and operations staff is aware of local drainage threats.

The problems are often present where storm water runoff enters culverts or goes underground into storm sewers. Inadequate maintenance can also contribute to the flood hazard in urban areas.

Debris in the Storm Drains

Storm water pollution is urban runoff water that picks up pollutants as it flows through the storm drain system—a network of channels, gutters and pipes that collect runoff from county streets, neighborhoods, farms, construction sites, and parking lots—and empties directly into local waterways.

Unlike sewage, which goes to treatment plants, urban runoff flows untreated through the storm drain system.

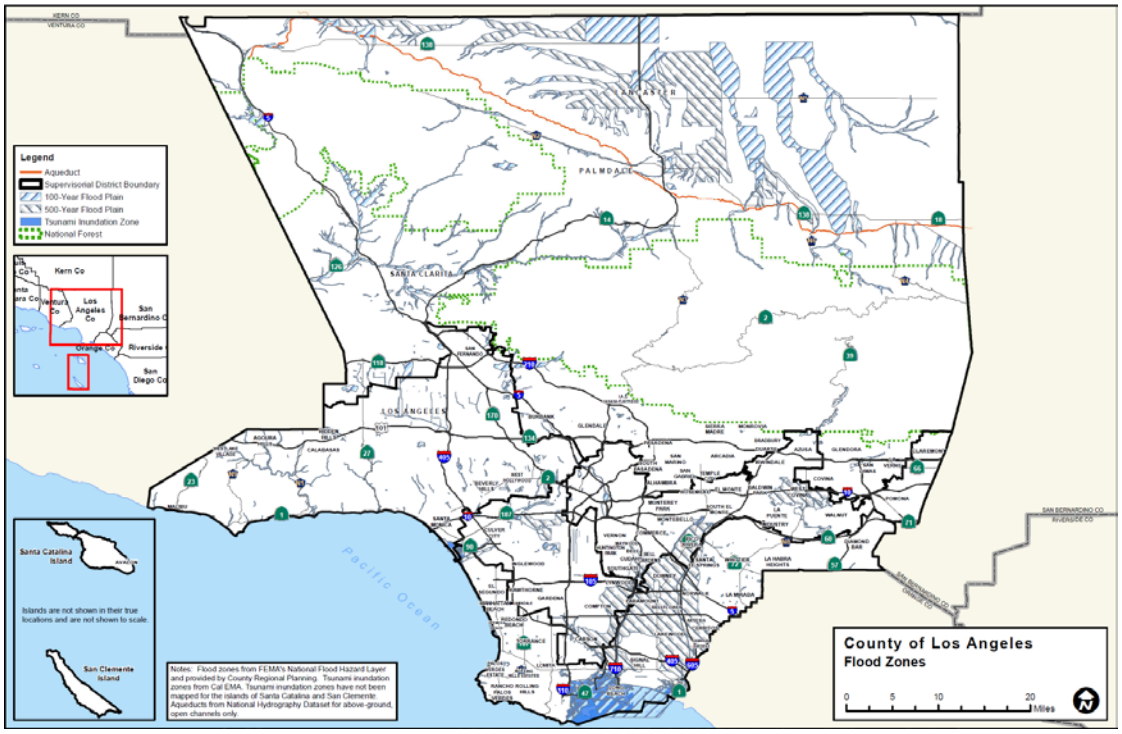
Anything thrown, swept, or poured into the street, gutter, or a catch basin (the curbside openings that lead into the storm drain system) can flow directly into our channels, creeks, bays, and ocean. This includes pollutants like trash, pet waste, cigarette butts, motor oil, antifreeze, runoff from pesticides and fertilizers, paint from brushes and containers rinsed in the gutter, and toxic household chemicals.

Contaminated urban runoff is an uncontrolled nonpoint source of pollution into local waters, and contributes to beach closures. Litter, leaves, and other debris can clog catch basins, causing flooding when it rains. Storm water pollution may contribute to beach closures, which hurt local businesses, tourism, and Los Angeles County's image as a desirable place to live and work. It is illegal for businesses without a permit to discharge wastewater or other materials into the storm drain system.

Water Quality

Environmental quality problems include bacteria, toxins, and pollution.

Map 6-1: County of Los Angeles Flood Map
(Source: County of Los Angles CEO - ITS GIS)



Definitions of FEMA Flood Zone Designations

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's FIRM or flood hazard boundary map. Each zone reflects the severity or type of flooding in the area.

Moderate to Low-Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters in these zones:

ZONE	DESCRIPTION
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from a 100-year flood, or shallow flooding areas with average depths of less than 1 foot or drainage areas less than 1 square mile.
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as a base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from a 100-year flood.

High-Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE zones are now used on new format FIRMs instead of A1-A30 zones.
A1-30	These are known as numbered A zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
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.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, 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. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

High-Risk – Coastal Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1–30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. 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.

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

Characteristics of Flooding

Any low-lying areas have a potential for ponding. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it.

Table 6-6: Types of Flooding in the County of Los Angeles

Flood Type	Problems
Alluvial Fan	Alluvial fan flooding occurs in the steep arid or semiarid mountains found throughout the state. Alluvial fans are fan-shaped deposits of eroded rock and soil carried out of mountains and into valley floors by landslides, mudslides, mudflows, and surface runoff (sheet flows and stream flows). At the beginning of the valley, alluvial fans are steep and narrow, with boulders and other course material. The deposited material becomes increasingly fine as the gradient decreases and the material—mainly gravels, sand and mud—spreads. When rain falls, runoff from the canyon walls flows as a high-velocity sheet that channels into rivulets, and then to natural drainage courses. The rapidly moving water often carries large boulders and other materials from the watershed, depositing them into runoff channels and blocking the flow of water. Floodwater then spills out onto the fan, with each event finding a new channel that soon fills up with deposits and overflows. Flooding in alluvial fans often can cause greater damage than clear-water flooding.
Coastal	Coastal flooding and erosion present some of the most complex and serious high-risk problems. In California, coastal erosion is most often caused by a combination of factors: winter storms, rising sea levels, tidal action, currents and waves, and high winds.
Flash	Flash floods are quick events, particularly where the topography enhances rainfall from Pacific or Gulf storms and thunderstorms. Flash floods are caused by the rapid buildup of runoff after high-intensity rainfall. The precipitation is often so intense that both perennial streams and dry watercourses are rapidly transformed into torrents, sweeping away whatever lies in their path. Loss of life in such flooding is common because of the suddenness of high flows. A flash flood can occur in mountainous regions and urban areas. In the mountains, a stream level may rise quickly in a heavy rainstorm. Dry desert washes, especially those near mountains, can reach flood stage within minutes as a result of thunderstorms occurring miles away. Urban flash flooding can occur in any terrain. It is particularly aggravated where natural cover has been removed to construct buildings, roads, and parking lots. Streets become rivers, inundating vehicles and causing heavy damage to residential and industrial properties situated along stream channels.
Fluvial	California rivers generally flow west to the Pacific Ocean and may fall as much as 5,000 feet within the first 20 miles. This relatively steep slope creates a high-velocity flow that carries eroded material. As the slope of the river flattens, the velocity slows and the material is deposited. As a result, the lower reaches of many streams pass through the sandy alluvial plains they have formed. Flood flows can cause these streams to migrate, resulting in a higher and wider floodplain. Developed areas on land originally outside the defined floodplain can later flood.
Lake	Lake level fluctuations primarily concern shoreline property owners, but they also affect local, state, and federal agencies with regulatory or financial responsibilities for water and related land use associated with lakes. Both natural and human actions cause changing lake levels. Natural factors include direct precipitation, surface runoff, evaporation, ground water inflow, ice formation, aquatic growth, meteorological disturbances, and, in larger lakes, tidal and crustal movement. Human factors include dredging, diversion, consumptive uses, and intruding structures.

Flood Type	Problems
Levee	Levees are a basic means of providing flood protection along rivers and 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. The causes of levee problems are structural failures, foundation failures of underlying soils, and overtopping by flood flows, tides, and waves. Contributing factors include poor construction materials, erosion by current and wave action, seepage through or under the levee, burrowing rodents, and improper repairs. Lack of adequate and regular maintenance to correct these problems also contributes to levee failure. Most failures are composites of several of these factors.
Mudslides	Mud floods and mudflows cause several types of flood damage that are not characteristic of clear-water flooding. These include the following: • The force of debris-laden water, which can be tens or hundreds of times greater than that generated by clear water, destroys retaining walls and other protective works. • Mud and debris may fill drainage channels, river or stream channels, and sediment basins, causing otherwise normal runoff to suddenly inundate areas outside the floodplains. • Sediment and debris are more damaging to houses and their contents than clear water. Frame structures are often total losses, and if they remain intact, sediment and mud must be removed and washed out. Stains, mildew, and dry rot often result. Major floods almost always involve heavy intrusions of mud, sediment, and debris. Such conditions are caused or worsened by forest and brush fires. Once the hills have been denuded of vegetation, there is more runoff and less infiltration. Even light rainfall can develop into rapid runoff, with severe erosion occurring in such areas.
Riverine	Riverine flooding, the most common type of flooding in the state, occurs when a stream channel fills with more water than it can carry. The water rises and flows over the channel banks onto the adjacent floodplain.
Seiche and Tsunami	Tsunamis, or seismic sea waves, are usually created by undersea earthquakes or landslides. Seiches are similar, large waves in lakes. Waves are generated by a crustal disturbance giving a vertical impulse to the sea surface. These are long-period waves that travel long distances at speeds of up to 600 miles per hour with little or no loss of energy. When tsunami waves approach a coastal region in which water depth decreases rapidly, their height is increased by refraction, shoaling, and local bay or harbor conditions, and speed is increased. Tsunamis frequently arrive in a series of spaced intervals.

Floodplain Management Plan for Repetitive-Loss Properties

Repetitive-loss properties (RLPs) are most susceptible to flood damage; therefore, they have been the focus of flood hazard mitigation programs. Unlike a countywide program, the floodplain management plan (FMP) for repetitive-loss properties involves highly diversified property profiles, drainage issues, and property owners' interests. It also requires public involvement processes unique to each RLP area. The objective of an FMP is to provide specific potential mitigation measures and activities to best address the problems and needs of communities with repetitive-loss properties. A repetitive-loss property is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given ten-year period.

National Flood Insurance Program (NFIP) and the Community Ratings System (CRS)

The NFIP provides federally supported flood insurance in communities that regulate development in their floodplains. The Community Ratings System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. The CRS encourages comprehensive planning to address the community's flooding problems and provides credit for preparing, adopting, implementing, evaluating, and updating a comprehensive FMP.

Los Angeles County has been a voluntary participant in the CRS established by the Federal Emergency Management Agency (FEMA). This program provides a discount on flood insurance premiums for participating property owners, including those properties located within the designated special flood hazard areas defined by the FIRMs.

On March 31, 1992, the Los Angeles County Board of Supervisors adopted the "Repetitive-Loss Plan for the National Flood Insurance Program CRS," which was approved by FEMA for CRS activity.

To continue program participation, the county is required to prepare an annual update of activities in the repetitive-loss plan that reduce the number of and/or mitigate the risk to properties with multiple flood damage claims.

CRS Application and Certification

Community application for the CRS is voluntary. Communities apply for a CRS classification and are given credit points that reflect the impact of their activities on reducing flood losses, improving the insurance rating, and promoting the awareness of flood insurance. The CRS encourages programs and projects that preserve or restore the natural state of floodplains and protect these functions. The CRS also encourages communities to coordinate their flood loss reduction programs with habitat conservation plans and other public and private activities that preserve and protect natural and beneficial floodplain functions.

Depending on the credit points received during CRS certification, a community can fall into one of ten classes: Class 1 requires the most credit points and gives the largest premium reduction, while Class 10 receives no premium reduction. The county's current CRS classification is 8. Preparation of site-specific FMPs will help communities to retain or improve the CRS classification.

FMP Procedure and Process

The FMP planning process involves review, research, investigation, discussion, interview, and consensus building.

It includes receiving input from all parties involved, and collaborating with existing and future regional programs that relate to flood hazard mitigation (such as land use plans, capital improvement plans, neighborhood redevelopment plans, floodplain ordinances, and environmental preservation/ enhancement plans). The FMP for RLPs intends to address the site-specific problems and possible resolutions, under the authority of individual homeowners and/or their homeowner associations.

CRS credit is provided for preparing, adopting, implementing, evaluating, and updating a comprehensive floodplain management plan. Credit is not based on the activities the FMP recommends, but rather on the process that is used to prepare the FMP.

FMP Committee

The development, modification, and revision of the FMP are accomplished through the direction and oversight of an FMP committee. FEMA places a high priority on the establishment of a committee that consists of residents, businesses, and property owners that are most affected by flood hazards. The county has maximized the involvement of the public throughout the FMP process.

RLPs in Los Angeles County

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended (NFIA), 42 U.S.C. 4102a. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and that meets either of the following criteria:

a) It has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or

b) At least two separate claims payments (building payments only) have been made for the property, with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart.

Los Angeles County has a total of 28 repetitive-loss properties. Nineteen properties are located in the unincorporated areas of Malibu Lake, and 9 properties are within the unincorporated areas of the Santa Monica Mountains, the San Gabriel Mountains, and Quartz Hill (4 in the Santa Monica Mountains, 3 in the San Gabriel Mountains, and 2 in Quartz Hill) (updated 2011).

Table 6-7: Repetitive-Loss Properties in the County of Los Angeles (updated 2011)

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B4

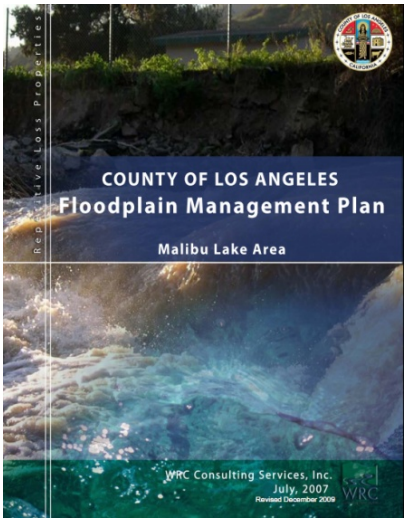
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

Rank	Losses	Properties	Community	Building $	Contents $	Total $	CRS Rating	FEMA Plan
10	142	45	Los Angeles County	1,461,070.07	543,404.07	2,004,474.14	8	Presentation
4	284	120	City of Los Angeles	2,779,104.58	494,007.21	3,273,111.79	9	Yes
2	464	169	City of Malibu	7,228,124.92	1,190,328.89	8,418,453.81		Yes

Through the direction and oversight of FMP committees, site-specific floodplain management plans for these repetitive-loss properties are updated annually to meet CRS certification and NFIP participation requirements. These plans follow the general requirements of the NFIP and the specific procedures outlined in the CRS coordinator's manual.

(See (1) "*Floodplain Management Plan for Repetitive Loss Properties: Los Angeles County, Santa Monica Mountains, San Gabriel Mountains, Quartz Hills*." September 2001. (2) "*Floodplain Management Plan for Repetitive Loss Properties: Los Angeles County*, *Malibu Lake Area*." September 2001). *County of Los Angeles Floodplain Management Plan – Present Mitigation*

In 2001 the Department of Public Works Watershed Management Division contracted with Tetra Tech, Inc., for development of a comprehensive flood management plan for the repetitive-loss flood damage areas, including properties in the Santa Monica Mountains, the San Gabriel Mountains, Quartz Hill, and Malibu Lake.



The objective of the 2,000-page plan was to provide specific potential mitigation measures and activities to best address the communities' flood problems and needs associated with RLPs. The plan specifically targets plans for a total of 28 RLPs (20 in Agoura, 2 in Calabasas, 2 in Altadena, and 1 each in Malibu, Canyon Country, Palmdale, and Quartz Hill.) The plan includes site-specific plans, a hydrology analysis, documentation of public comment, and economic assessments.

This summary provides sample pages with the following information (where sample pages are included, these are representative of reports that covered all of the RLPs):

The objective of a floodplain management plan (FMP) is to provide specific mitigation measures and activities that reflect continued compliance with the National Flood Insurance Program (NFIP) to best address the community's flood problems and needs associated with RLPs. An RLP is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within a given ten-year period since 1978.

Current Mitigation

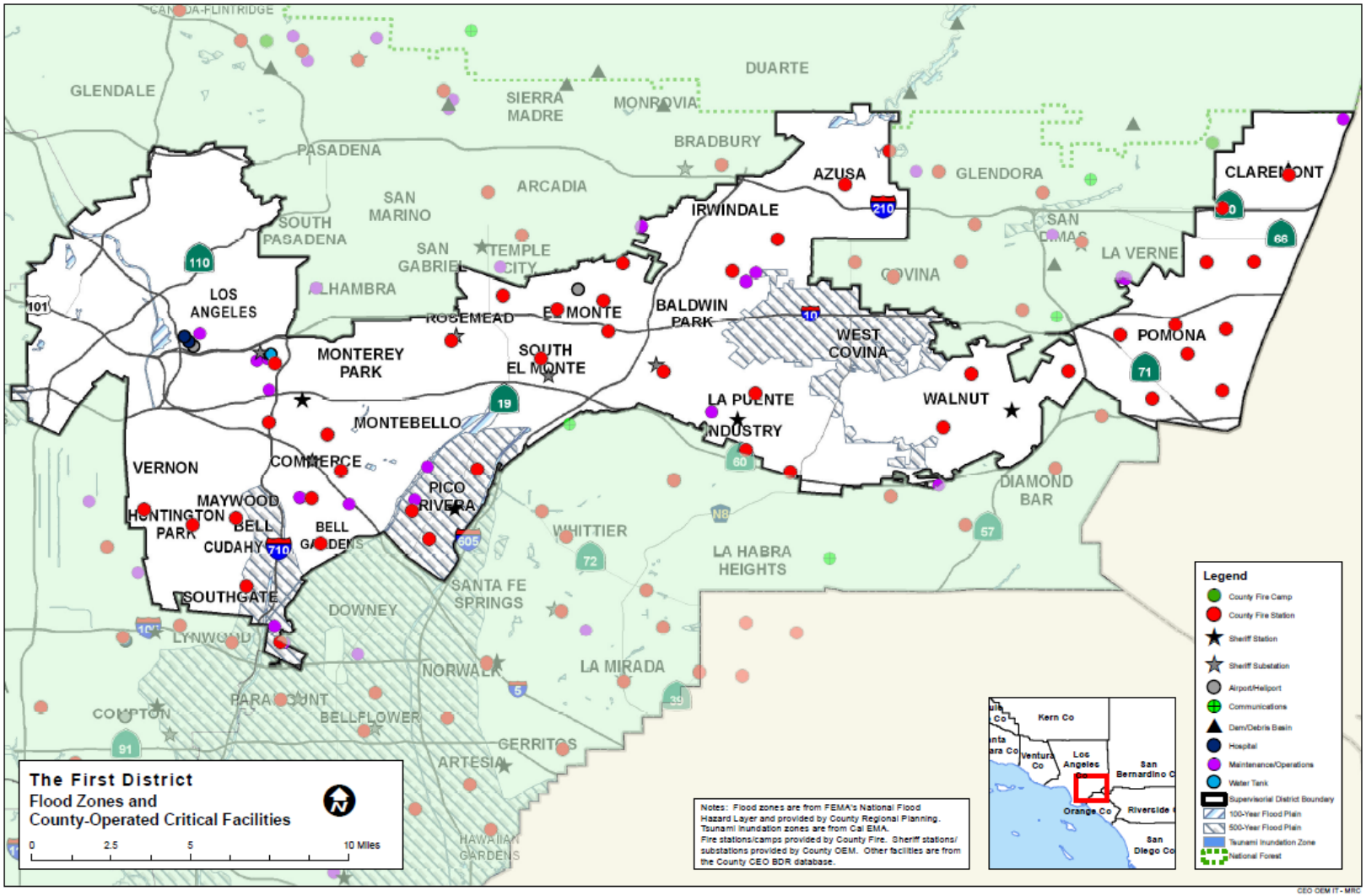
Map 6-2: Repetitive Loss Project Area – Malibu Lake
(Source: County of Los Angeles Floodplain Management Plan, 2010)



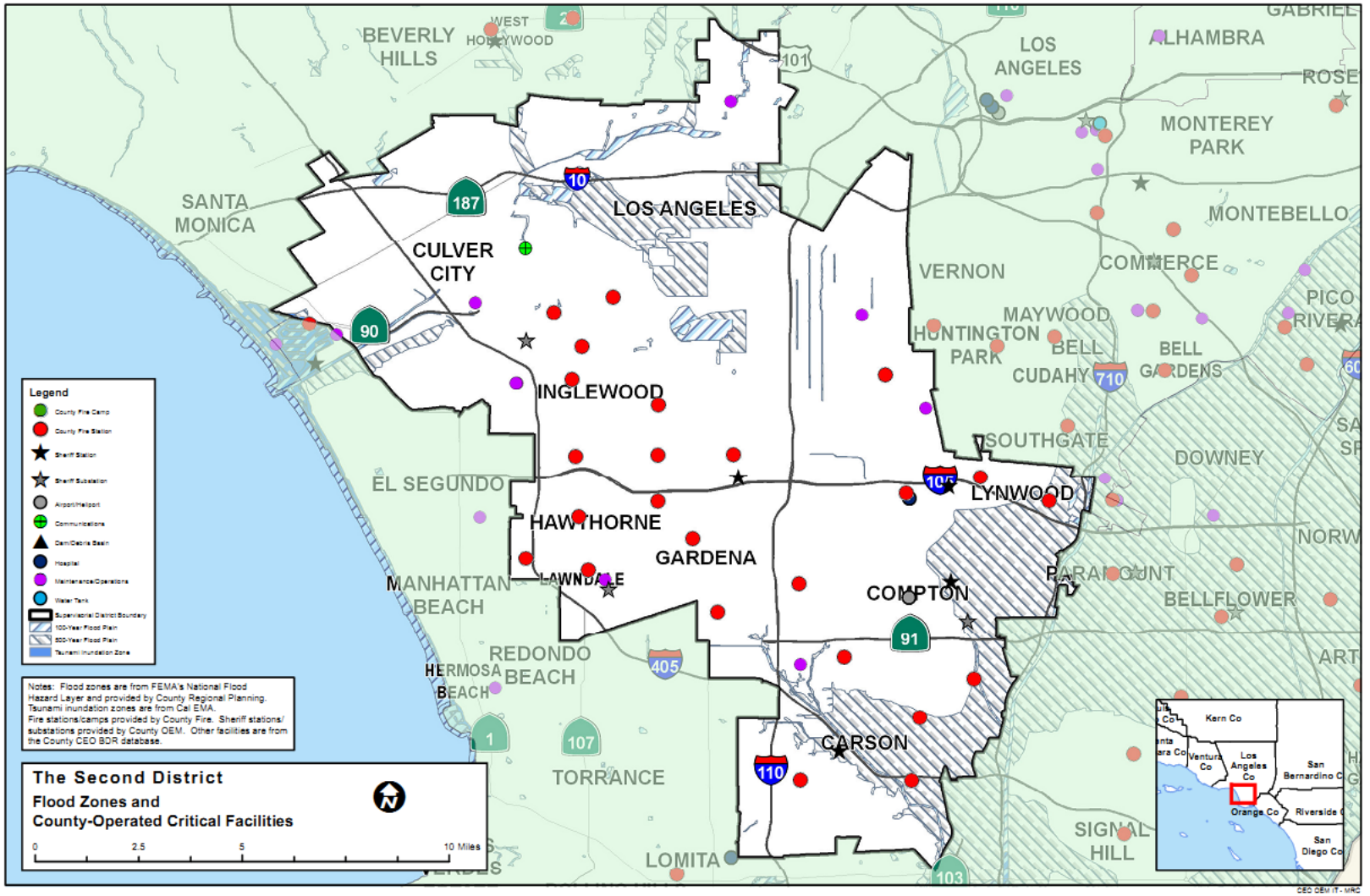
Map 6-3: Repetitive Loss Project Area – Santa Monica Mountains, San Gabriel Mountains, Lancaster, Rowland Heights, and Quartz Hill



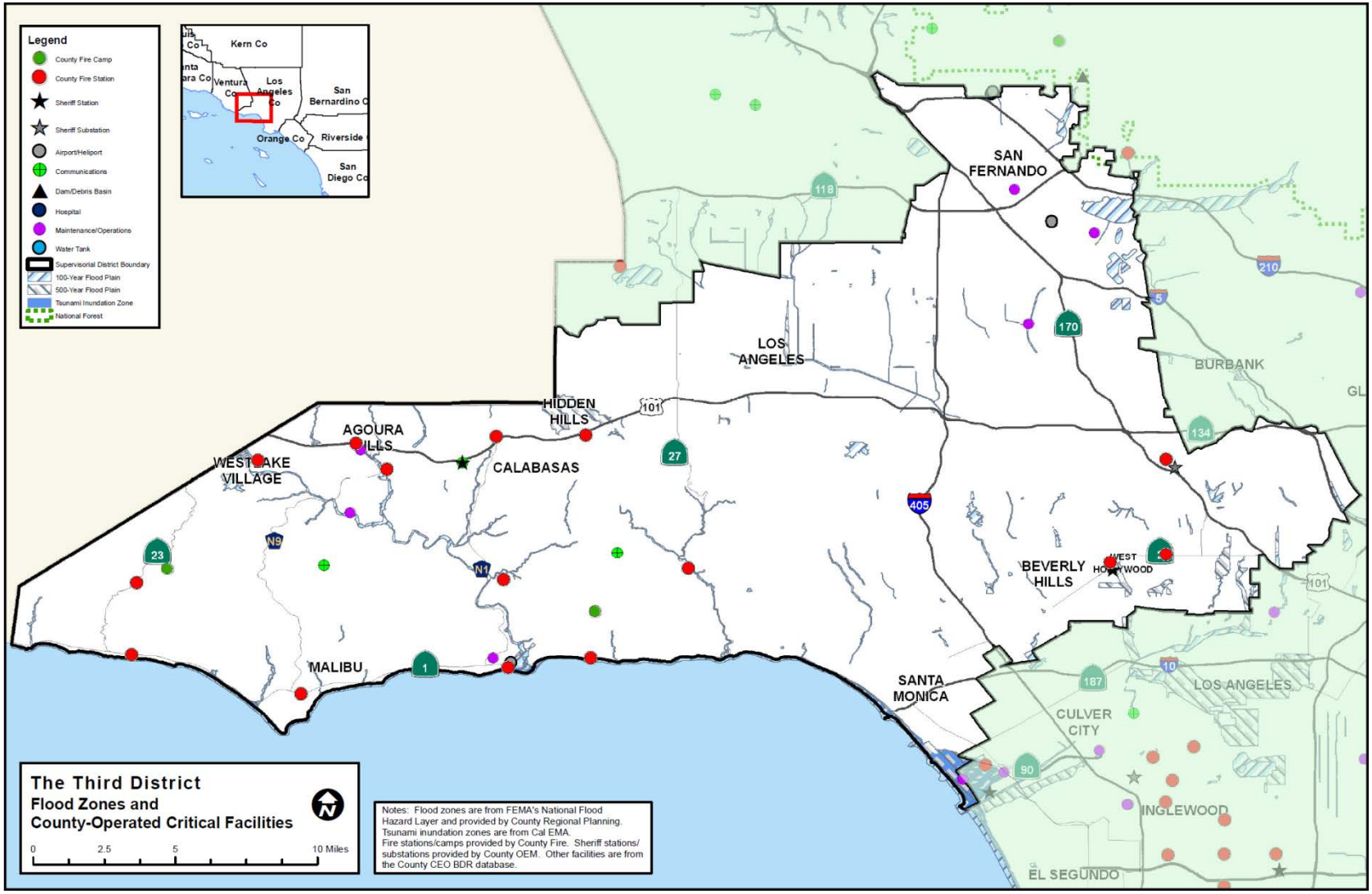
Map 6-4: L.A. County Flood Zones and County-Operated Critical Facilities, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



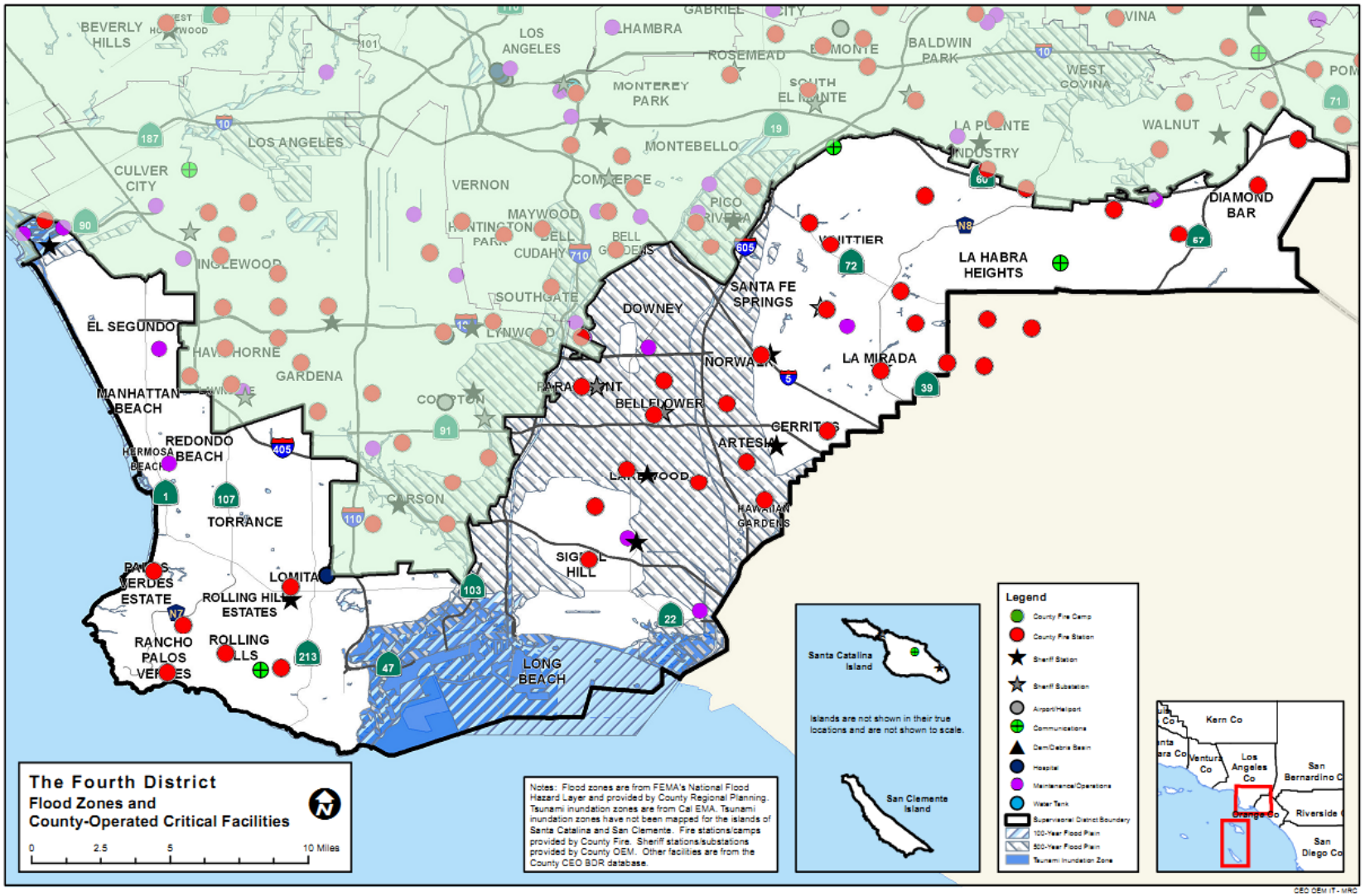
Map 6-5: Flood Zones and County-Operated Critical Facilities, Board of Supervisorial District 2
(Source: County of Los Angeles CEO – ITS GIS)



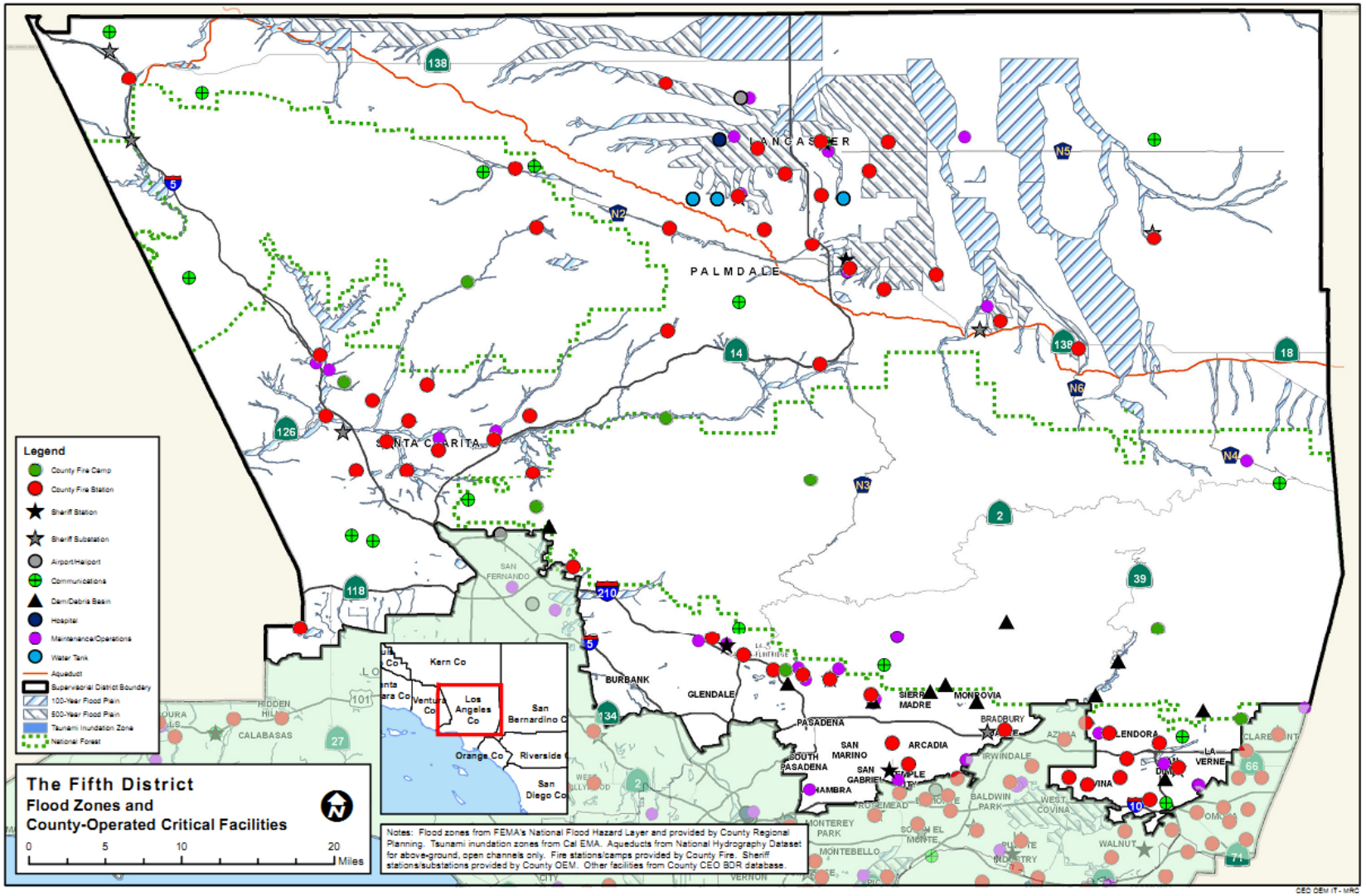
Map 6-6: Flood Zones and County-Operated Critical Facilities, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



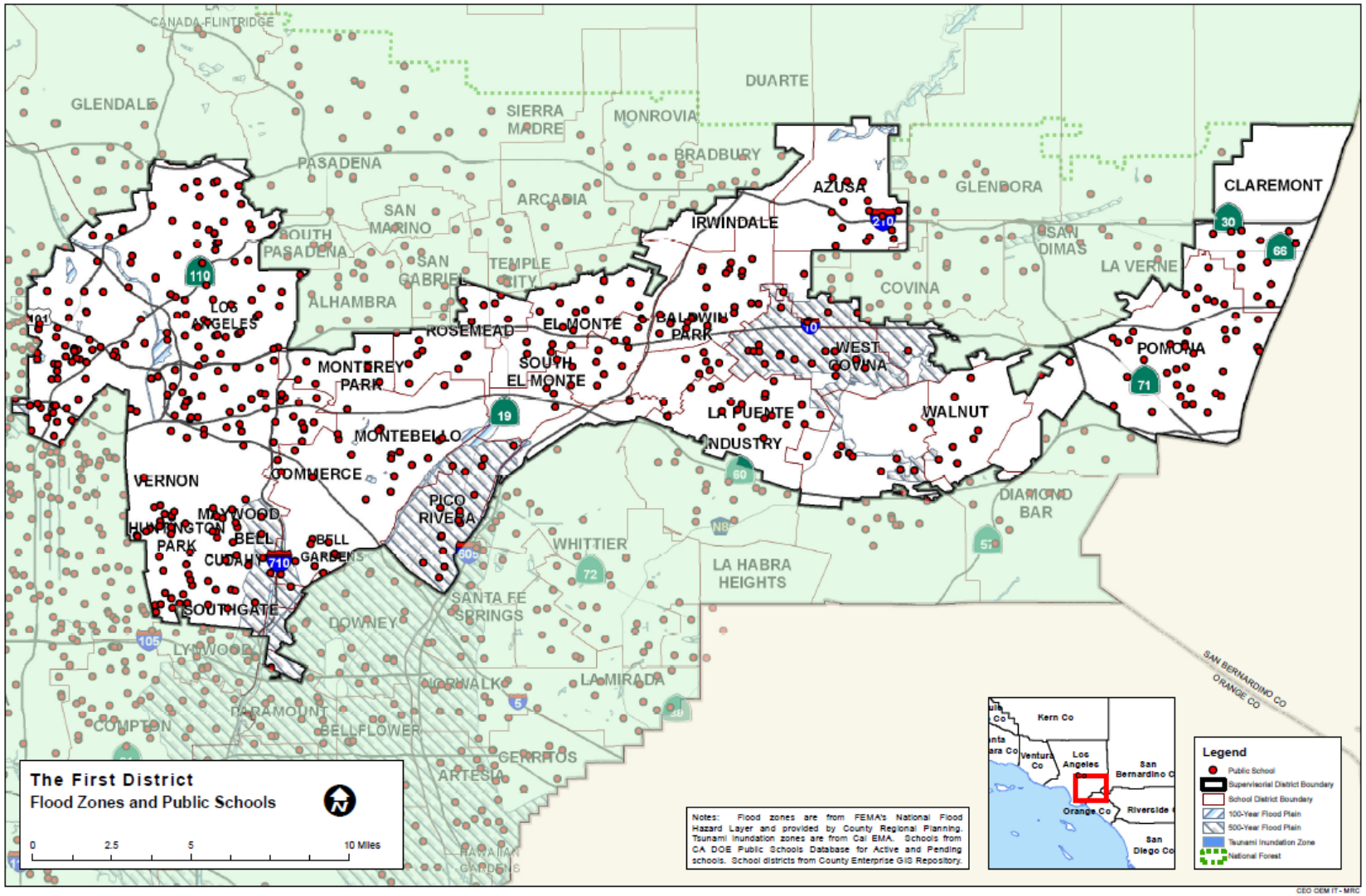
Map 6-7: Flood Zones and County-Operated Critical Facilities, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



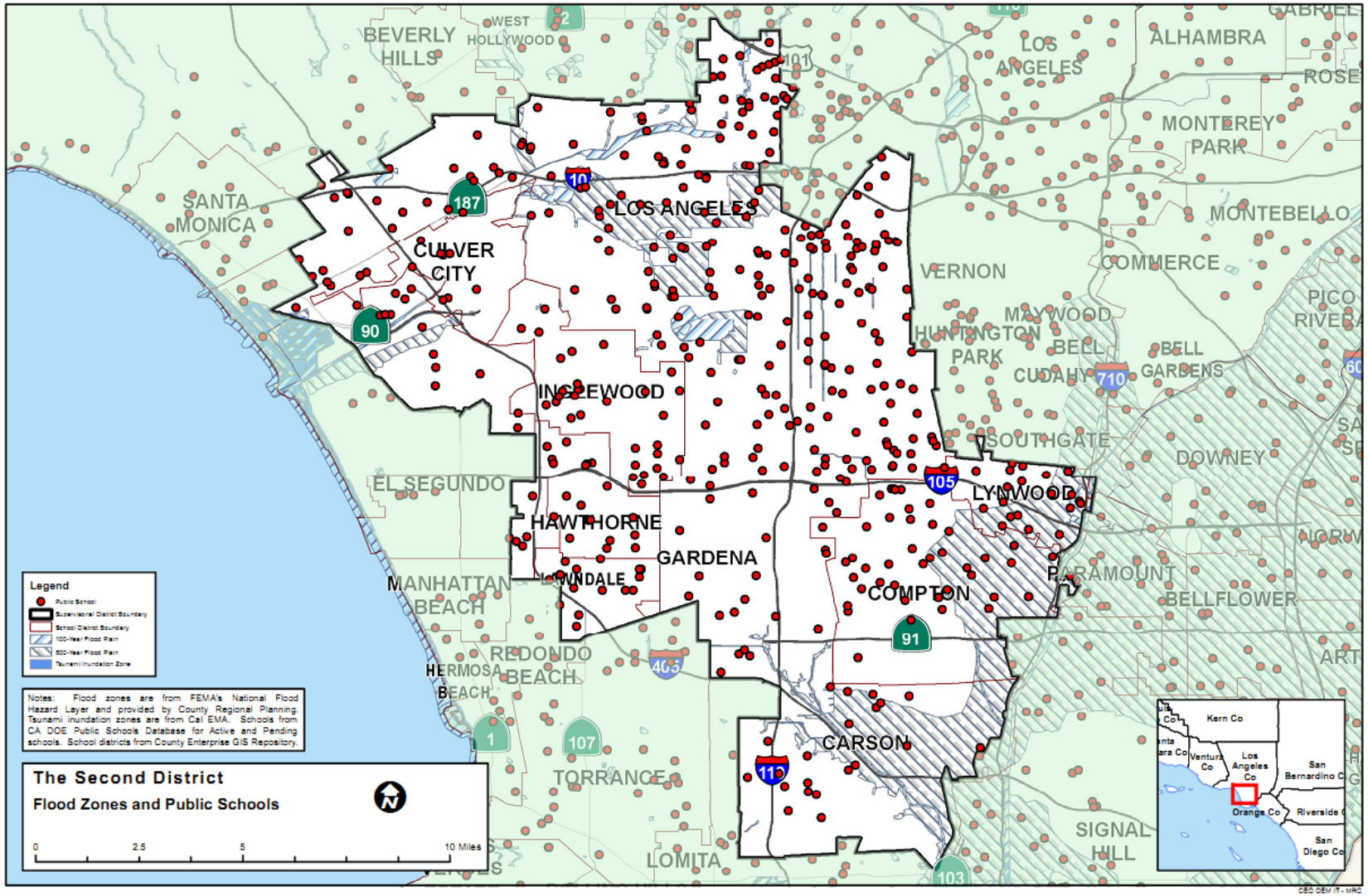
Map 6-8: Flood Zones and County-Operated Critical Facilities, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



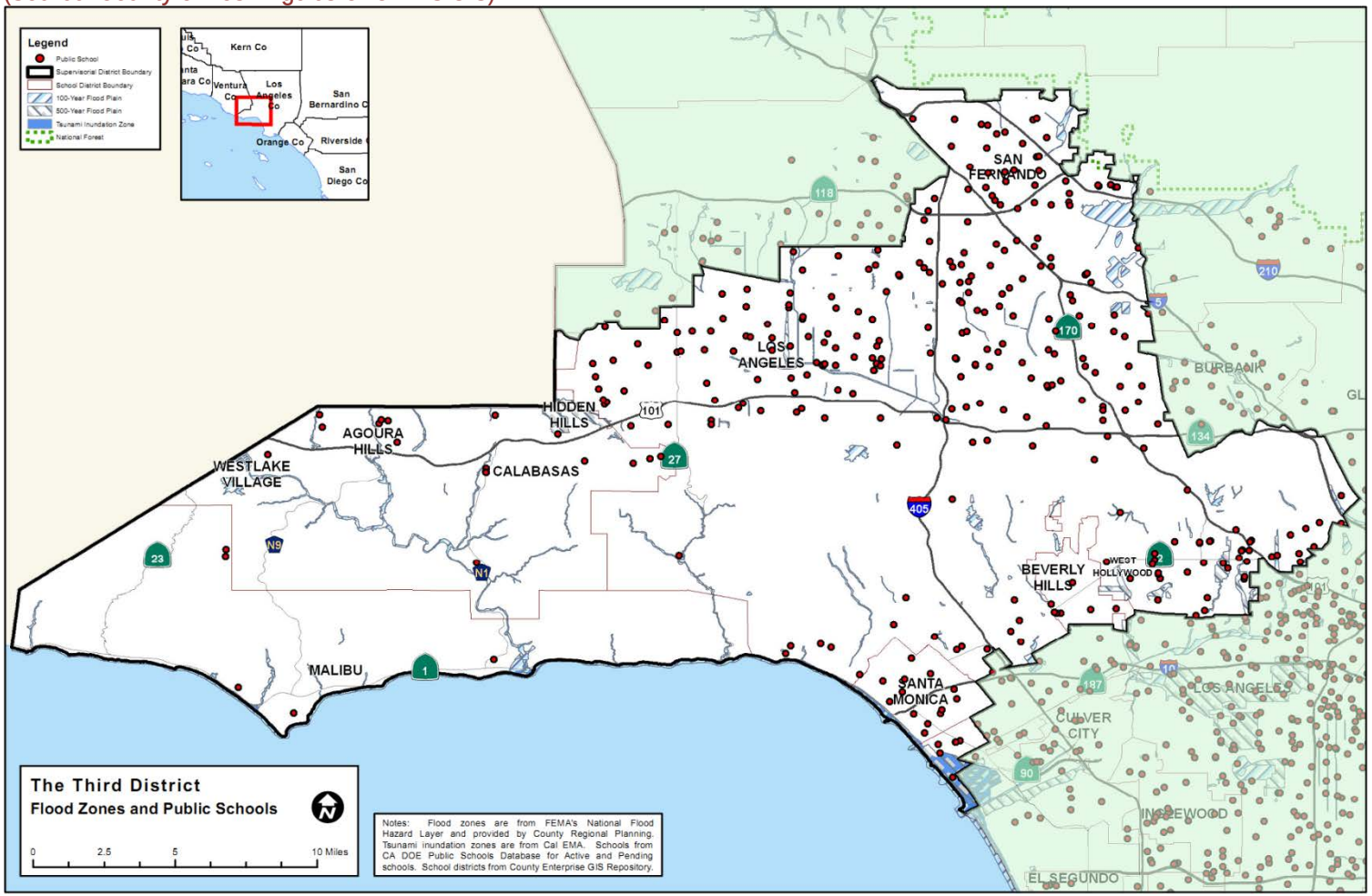
Map 6-9: Flood Zones and Public Schools, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



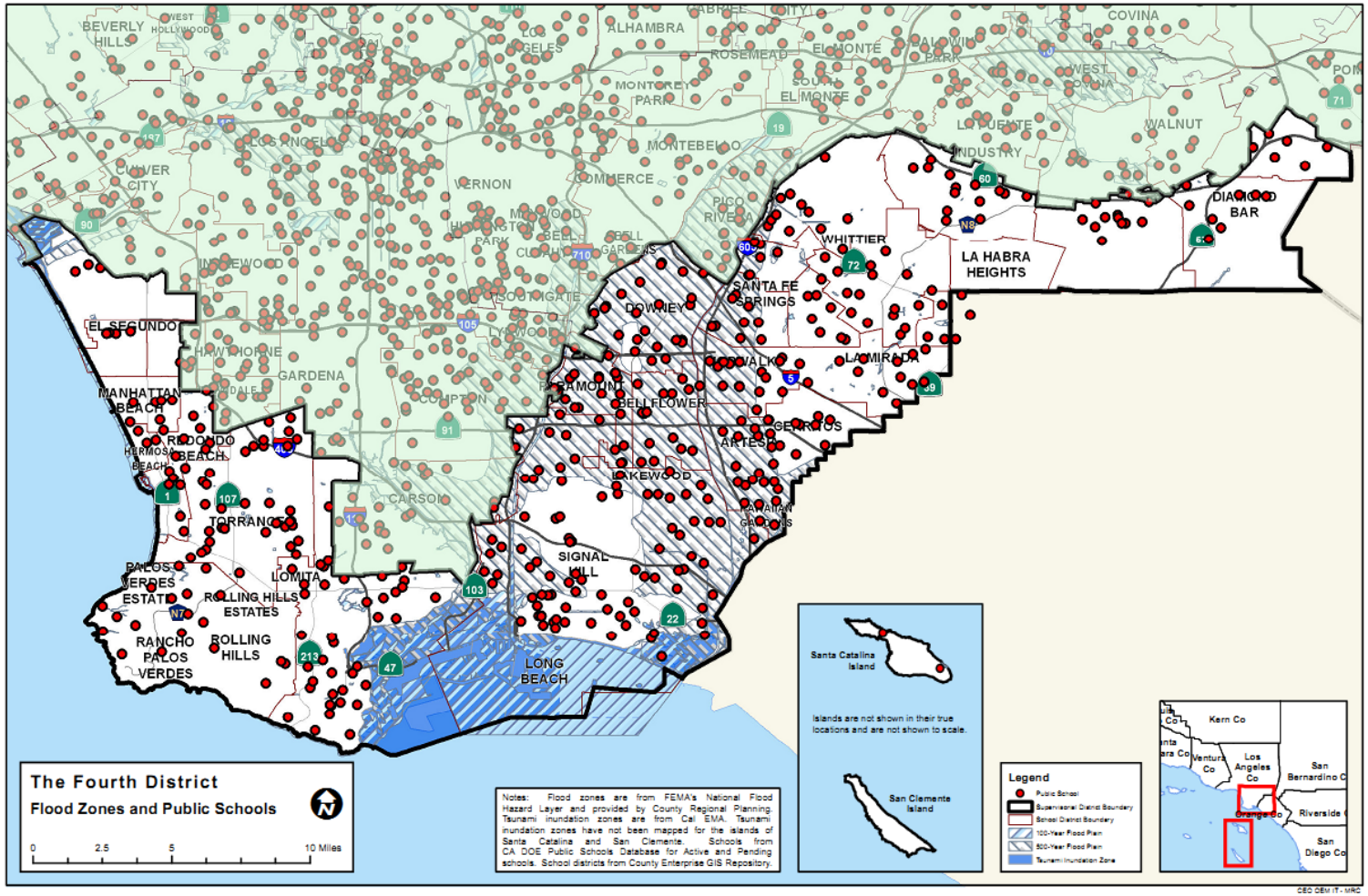
Map 6-10: Flood Zones and Public Schools, Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



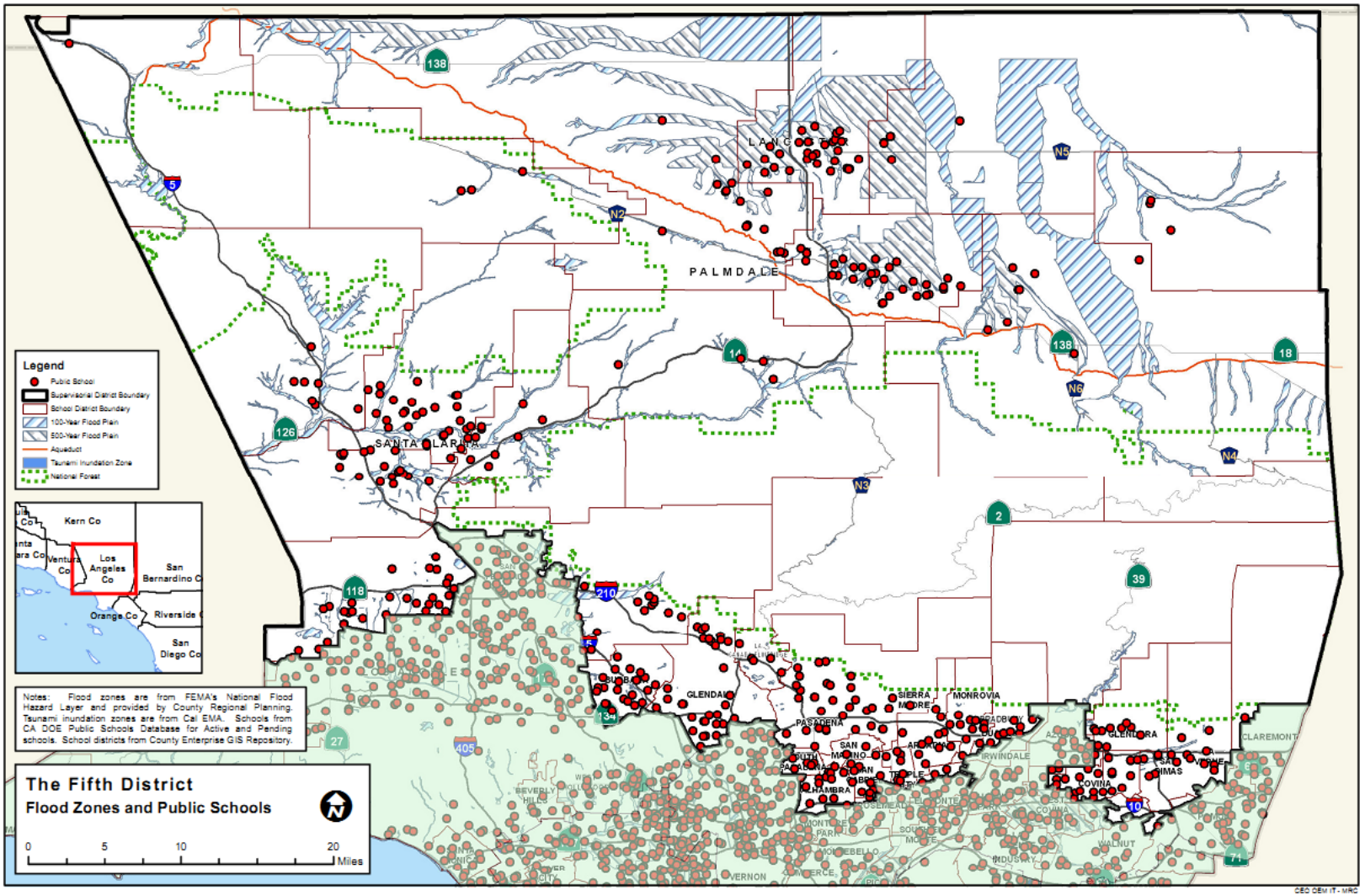
Map 6-11: Flood Zones and Public Schools, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



Map 6-12: Flood Zones and Public Schools, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



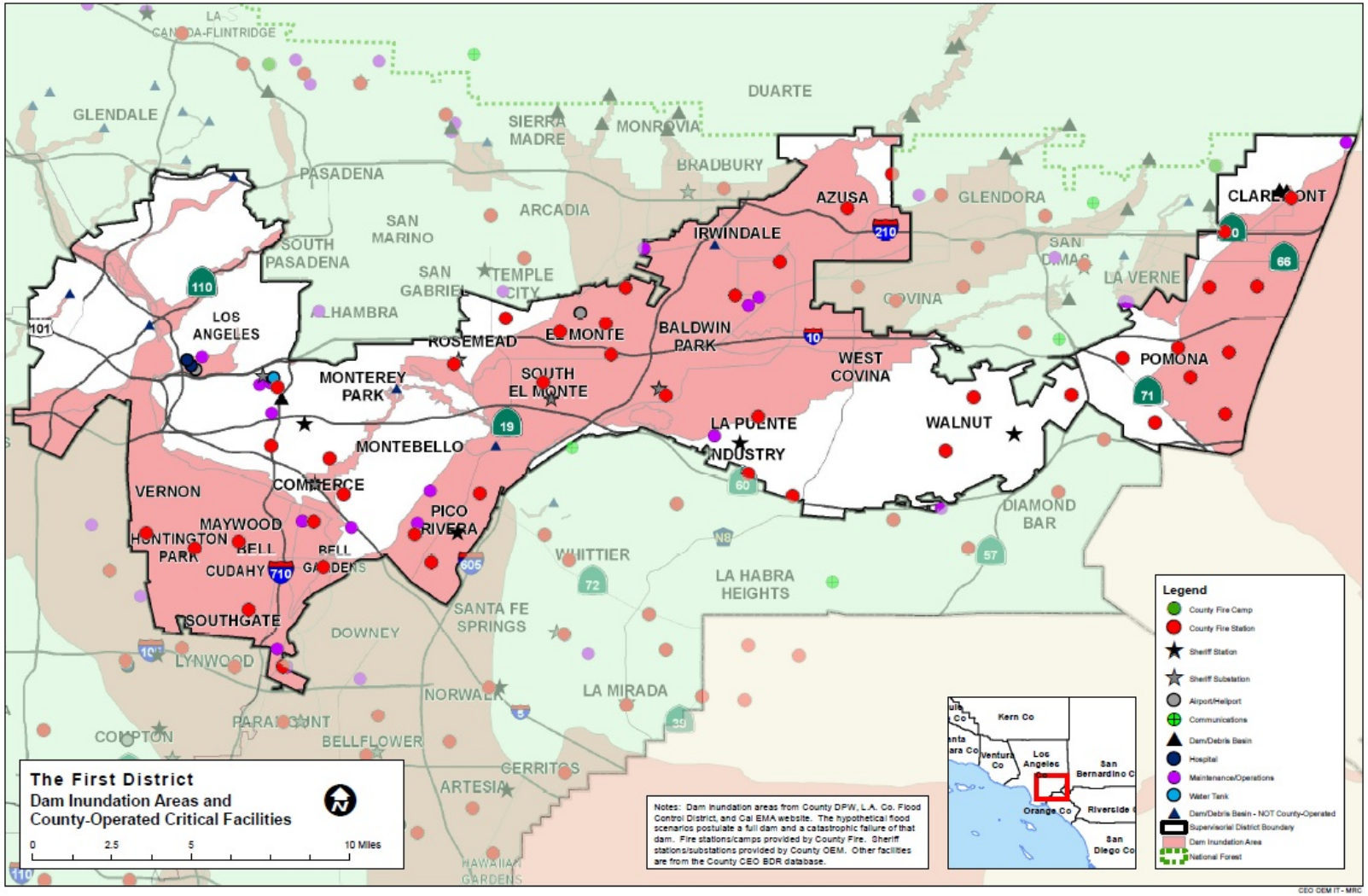
Map 6-13: Flood Zones and Public Schools, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



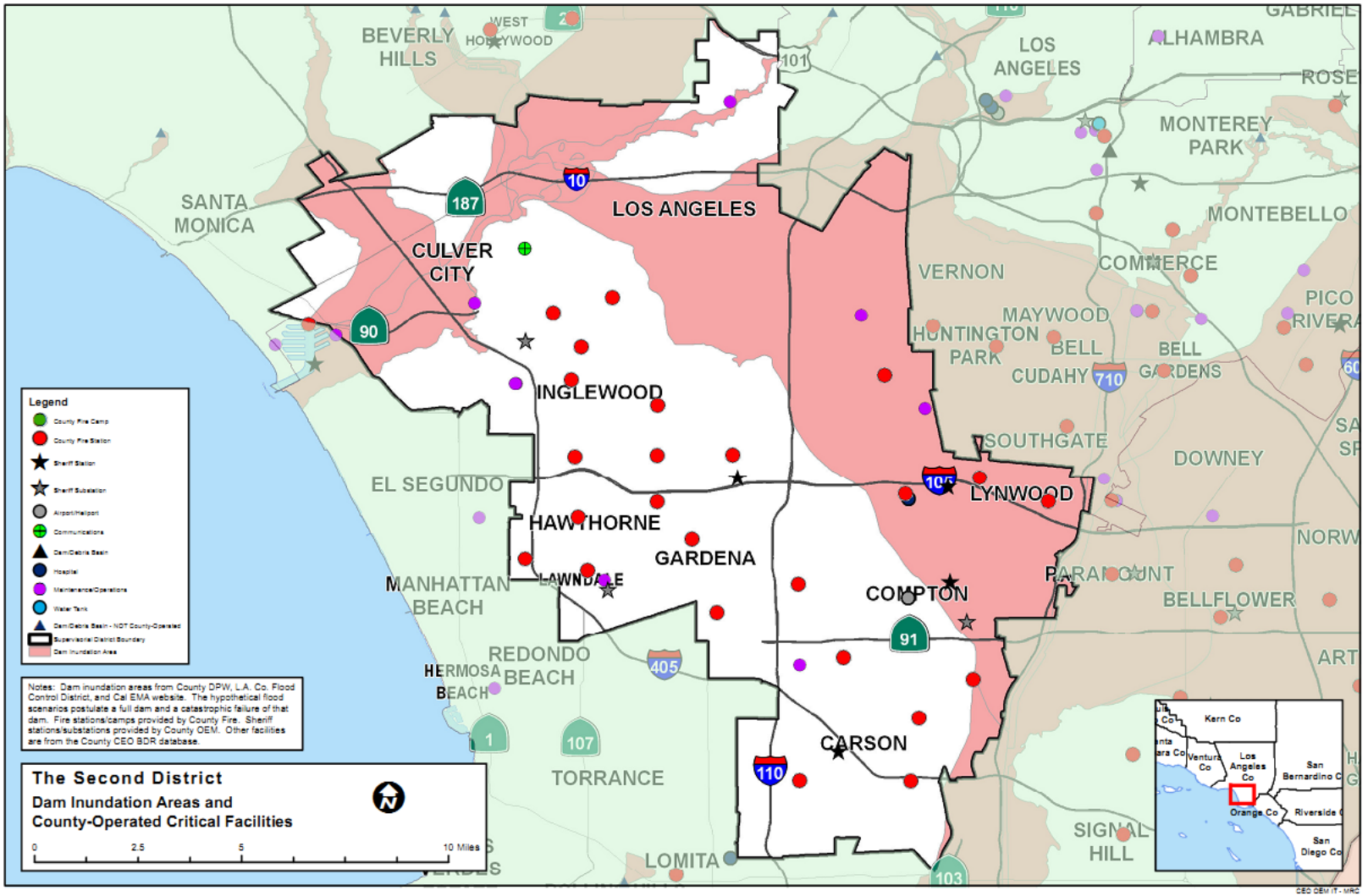
Dam Failure Flooding

There are a total of 103 dams in Los Angeles County. They are owned by 23 agencies or organizations, ranging from the federal government to home owner associations. These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from flood waters and to store domestic water. Seismic activity can compromise the dam structures, and the resultant flooding could cause catastrophic flooding. Following the 1971 Sylmar earthquake the Lower Van Norman Dam showed signs of structural compromise, and tens of thousands of persons had to be evacuated until the dam could be drained. The dam has never been refilled.

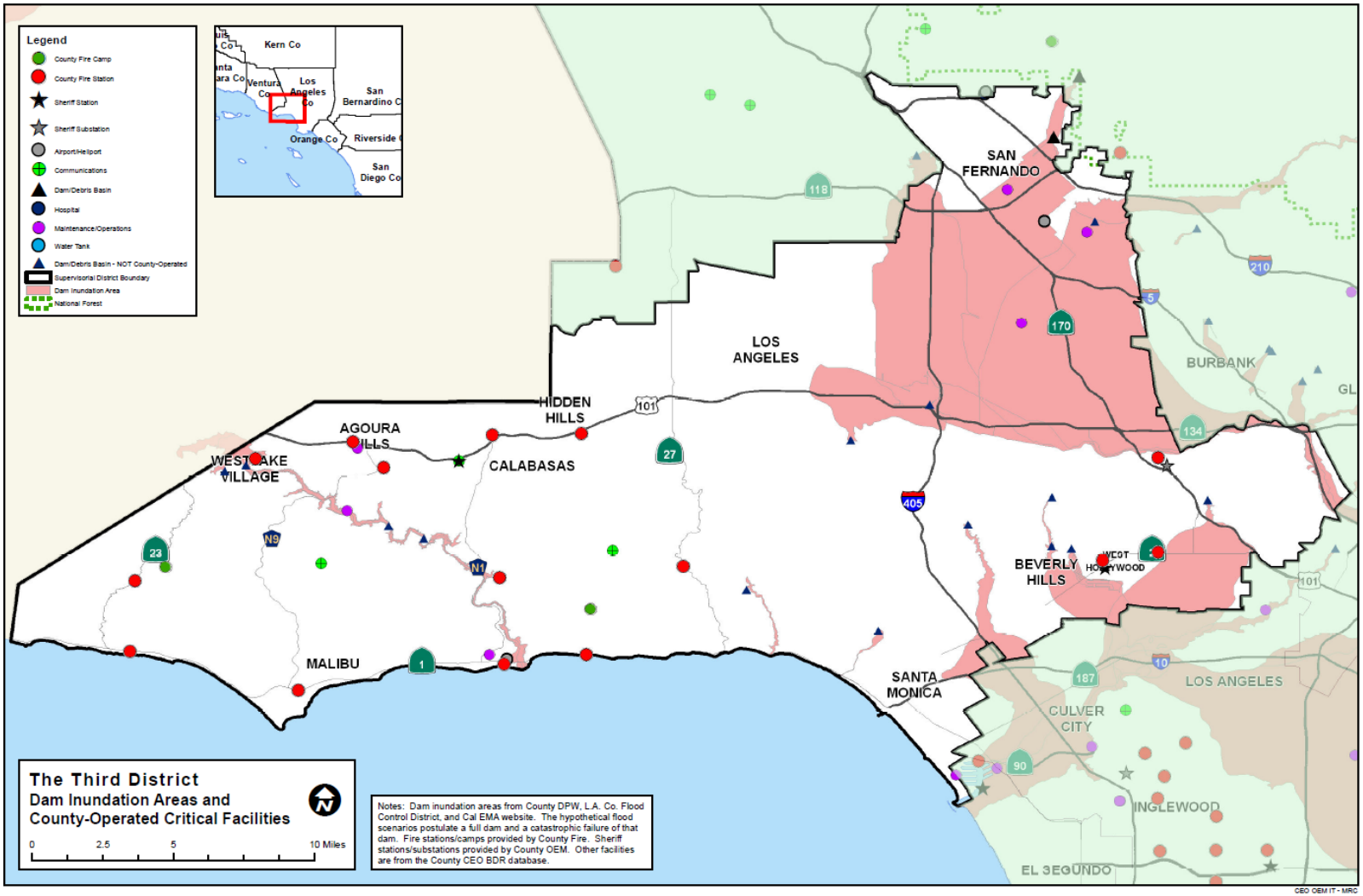
Map 6-14: Dam Inundation Areas and County-Operated Critical Facilities, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



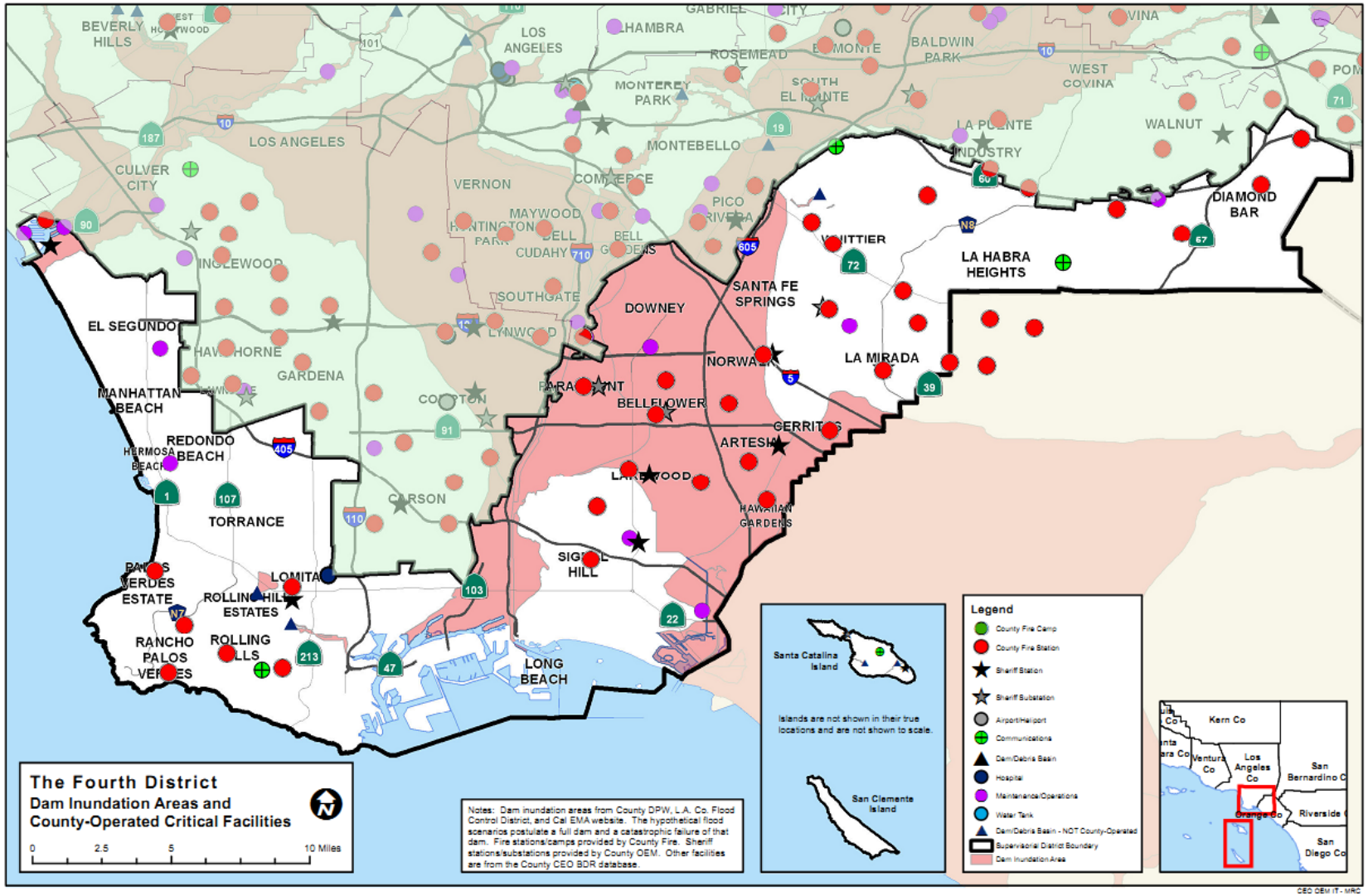
Map 6-15: Dam Inundation Areas and County-Operated Critical Facilities, Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



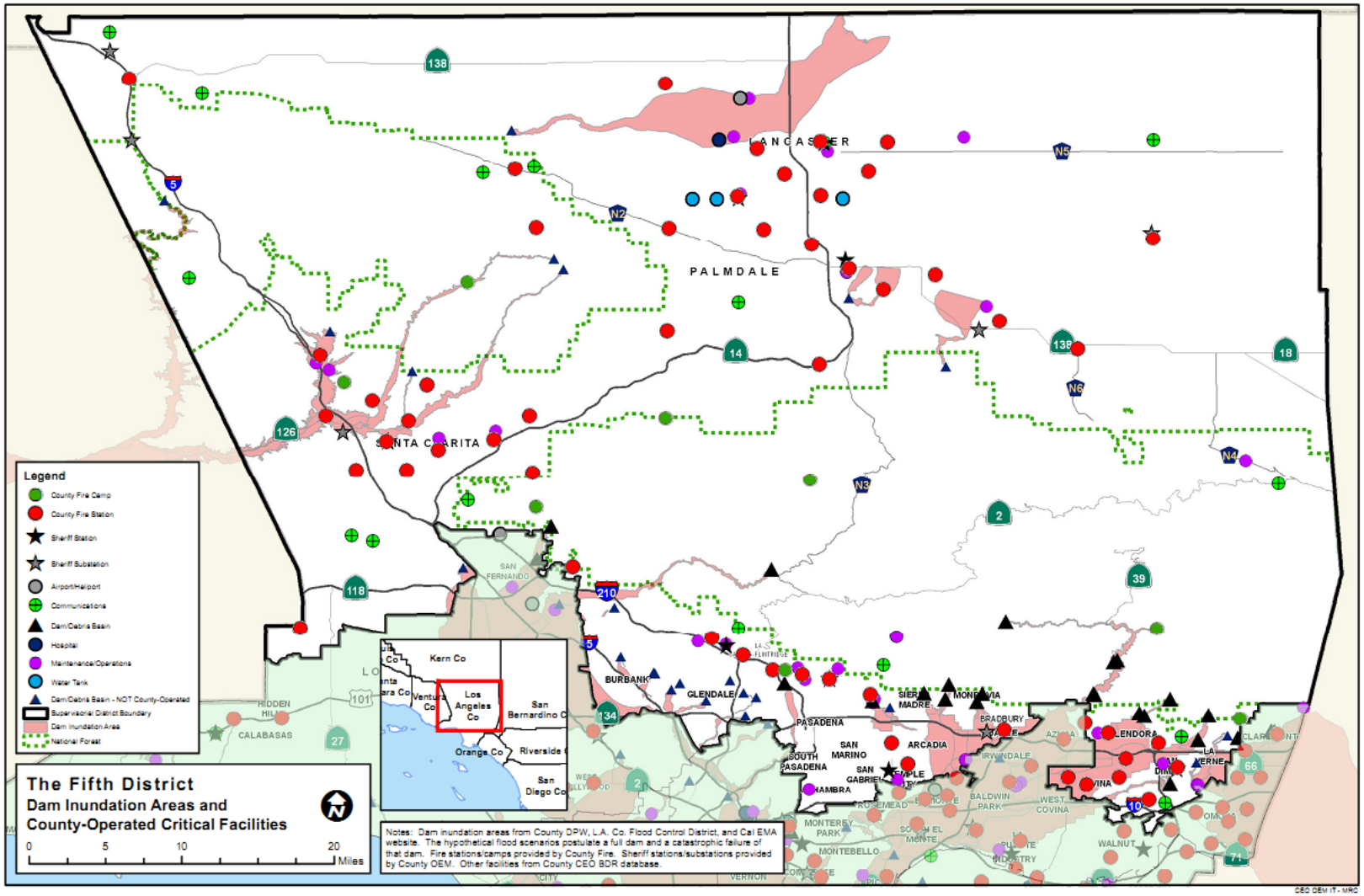
Map 6-16: Dam Inundation Areas and County-Operated Critical Facilities, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



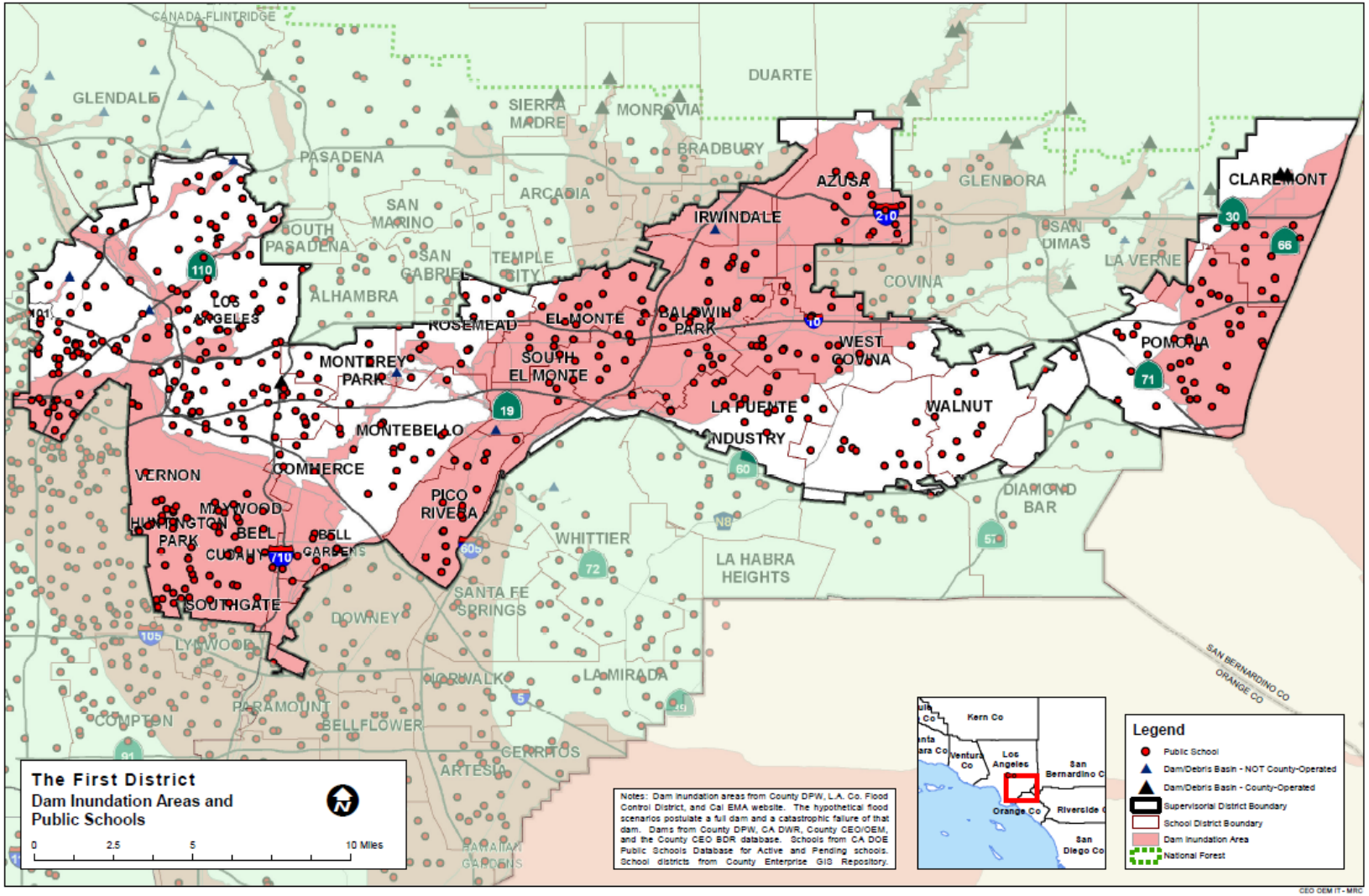
Map 6-17: Dam Inundation Areas and County-Operated Critical Facilities, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



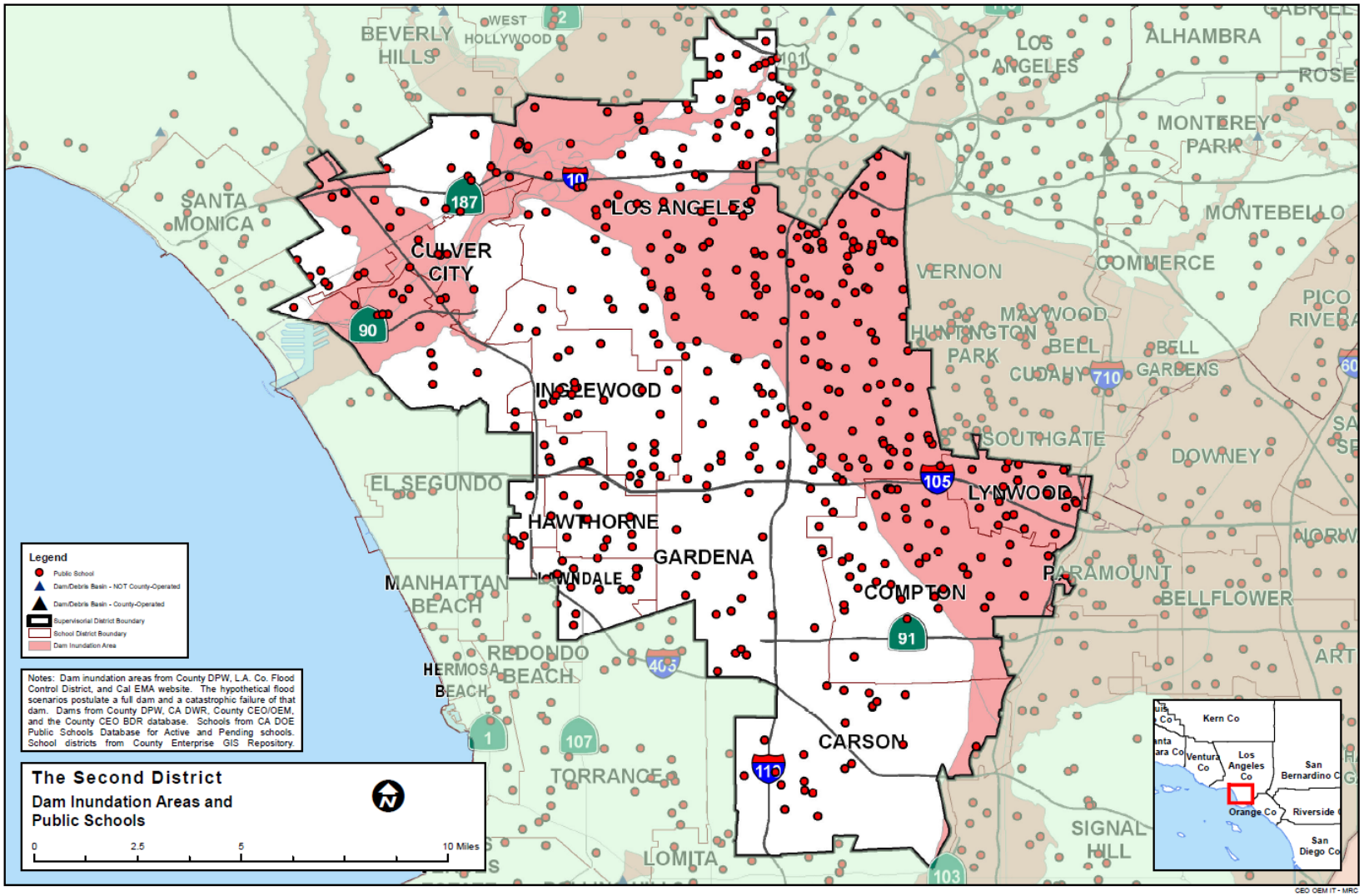
Map 6-18: Dam Inundation Areas and County-Operated Critical Facilities, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



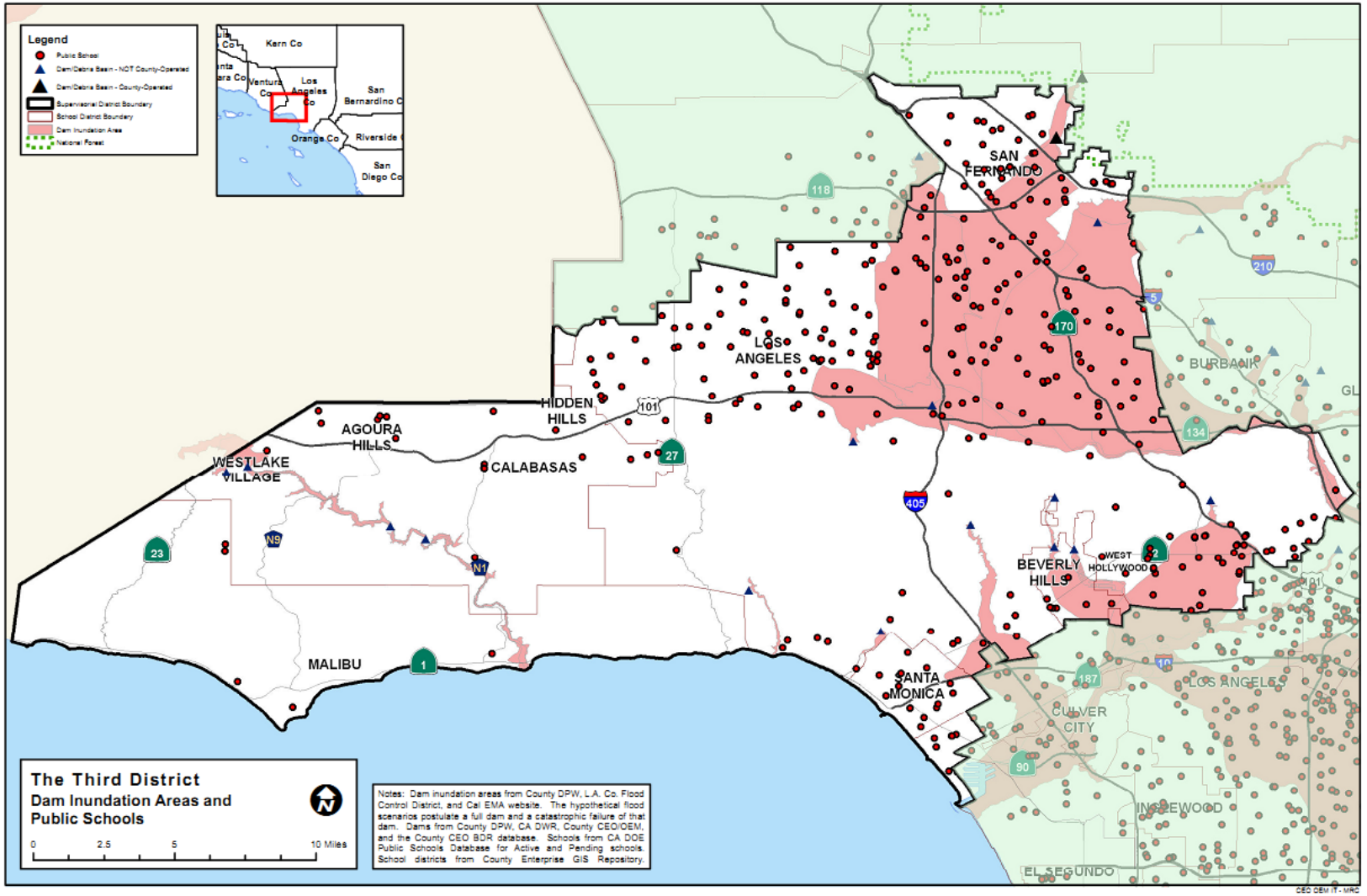
Map 6-19: Dam Inundation Areas and Public Schools, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



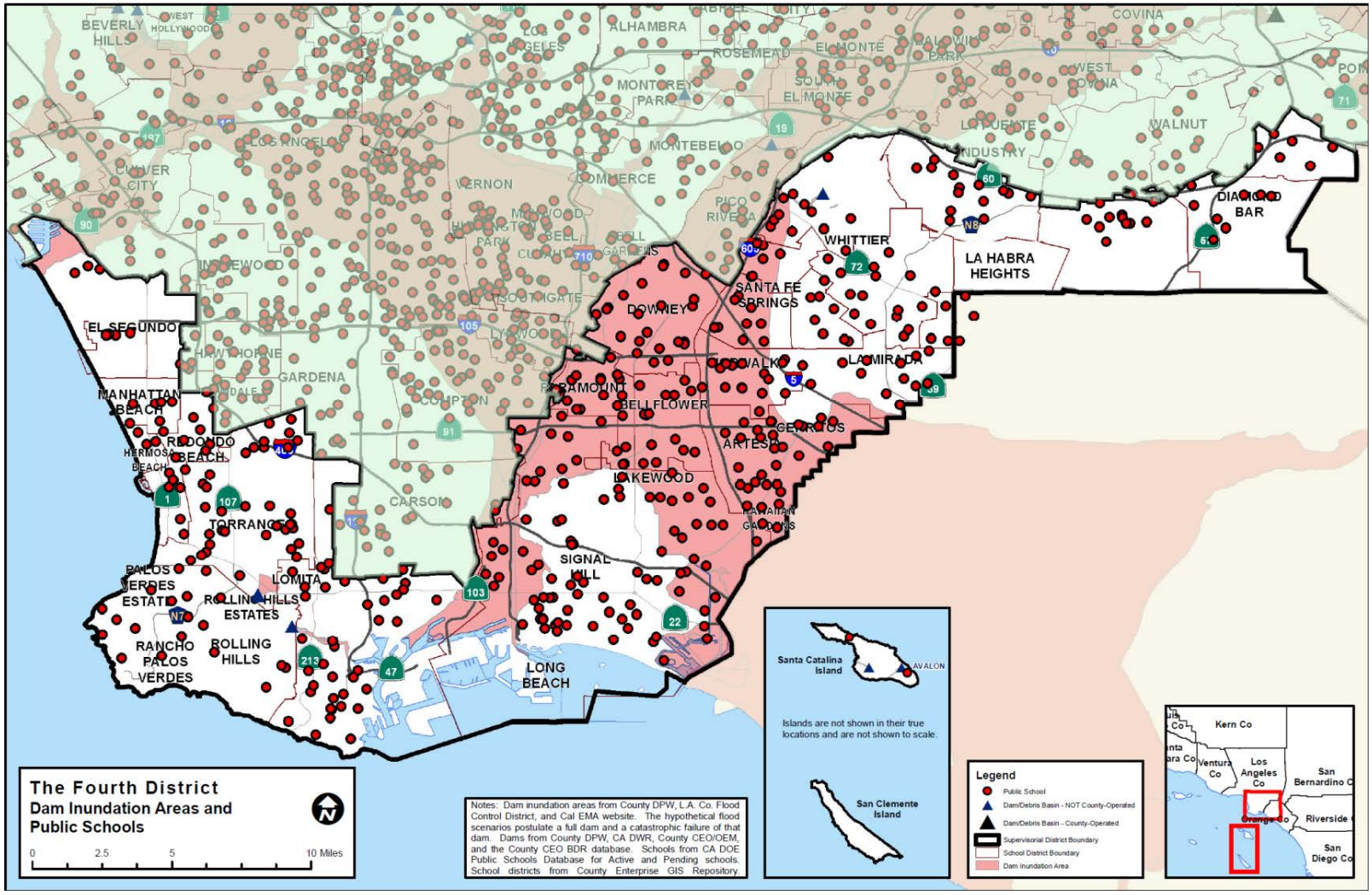
Map 6-20: Dam Inundation Areas and Public Schools, Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



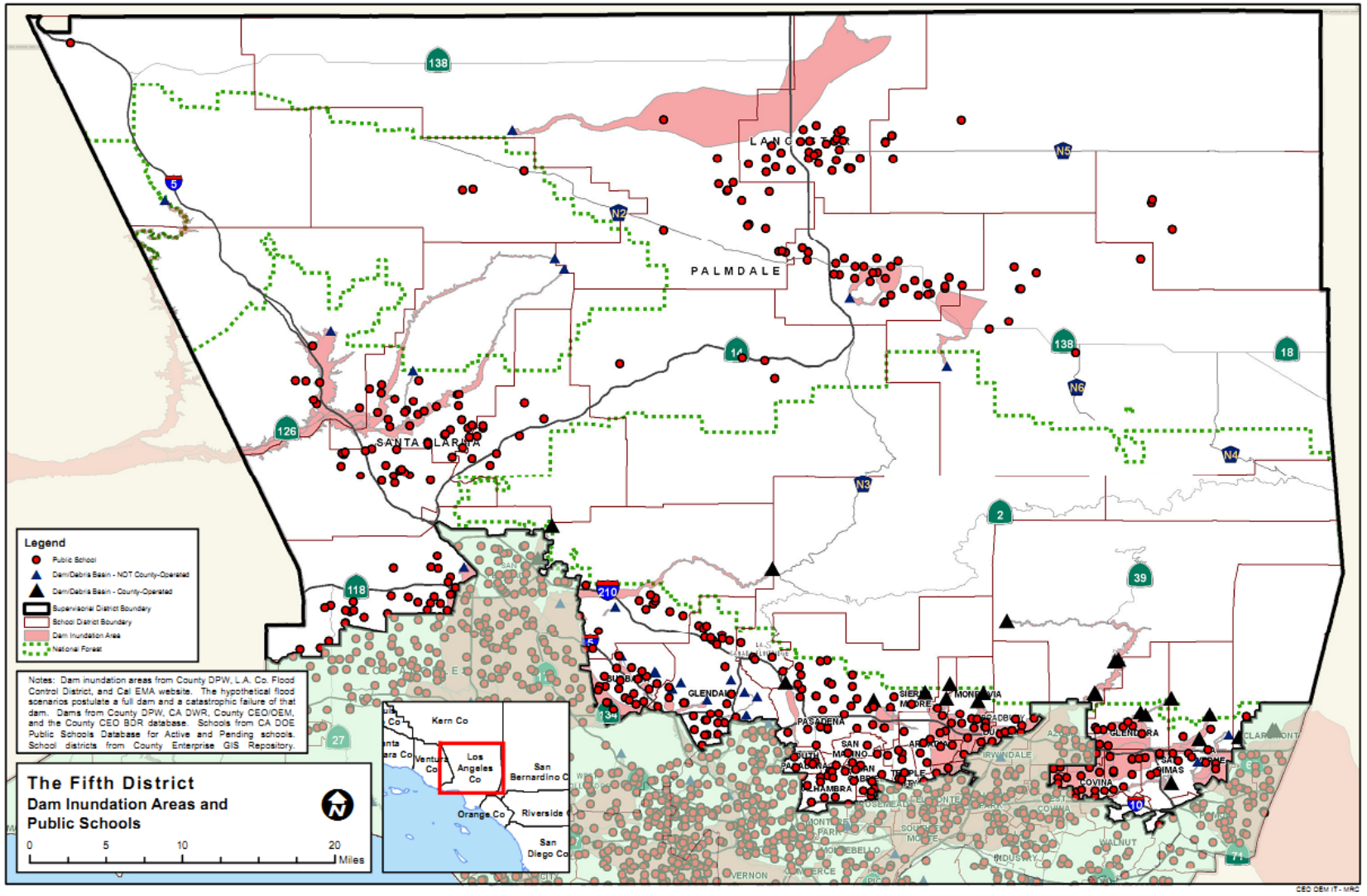
Map 6-21: Dam Inundation Areas and Public Schools, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



Map 6-22: Dam Inundation Areas and Public Schools, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



Map 6-23: Dam Inundation Areas and Public Schools, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



Section 7:

Wildfire

Table of Contents

Section 7: Wildfire 1

Why Are Wildfires a Threat to Southern California? 1

Local Conditions 2

Weather *2*

Topography *2*

Vegetation *2*

Community Wildfire Issues 3

What Is Susceptible to Wildfires? *3*

California Fire Plan 4

Levels of Wildland Fire Protection Services *4*

Wildland Fire Protection Fiscal Issues 19

Fire-Safe and Land Use Planning 20

Wildland-Urban Interface (WUI) Building Codes 24

The 2007 Southern California Fires 27

CAL FIRE Fire Suppression Cost *28*

Dollar Damage Costs *28*

Structures Destroyed *28*

Progression of the 2007 Wildfires *29*

Wildfire Smoke 30

Characteristics of Wildfire Smoke *30*

Estimating Particulate Matter Levels *30*

Smoke Hazards as a Result of Wildland Fires *31*

Sensitive Populations *32*

Hazards Associated with Cleanup of Wildland Fires *33*

Los Angeles County Fire Plan 35

Los Angeles County Fire Department *36*

Wildland Fire Protection Strategy *37*

General Description of Current Fire Situation **45**

Fire History *46*

The Wildfire Environment *46*

Fuel *46*

Weather *46*

Topography *46*

Hazardous Fuels *46*

Severe Fire Weather *51*

Fire Protection Level of Service **53**

Ignition/Workload Analysis *53*

Fire Suppression Philosophy *59*

The Fire Protection System *59*

Priority Areas *59*

Vulnerablility *63*

Impact of Wildfires in the County of Los Angeles *63*

Wildfire Characteristics **63**

The Interface *64*

Fuel *64*

Topography *65*

Weather *65*

Drought *65*

Development *66*

Wildfire Hazard Assessment **66**

Hazard Identification *66*

Vulnerability Assessment *67*

Risk Analysis *67*

Severity *67*

Growth and Development in the Interface *68*

Road Access *68*

Water Supply *69*

Interface Fire Education Programs and Enforcement *69*

The Need for Mitigation Programs **69**

La Cañada Flintridge Project *69*

Pitchess Detention Center (No Map) *70*

Poppy Park Reserve *70*

Malibu Creek State Park (No Map) *70*

Cheeseboro *71*

Kenneth Hahn State Recreational Area (No Map) *71*

Hathaway *72*

Descanso *73*

Glendora *74*

Stunt *75*

Colby Ranch *76*

Proposed Projects **77**

Horizon Hills *77*

Lakeside Firewise II *78*

Whittier Hills *79*

City of Industry/Tonner Canyon *80*

Oak Woodland Restoration (No Map) *81*

Stevenson Ranch (No Map) *81*

Placerita Canyon State Park (No Map) *81*

Section 7: Wildfire

Why Are Wildfires a Threat to Los Angeles County?

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

The most recent significant wildfire event to afflict the County of Los Angeles was the Station Fire in 2009.

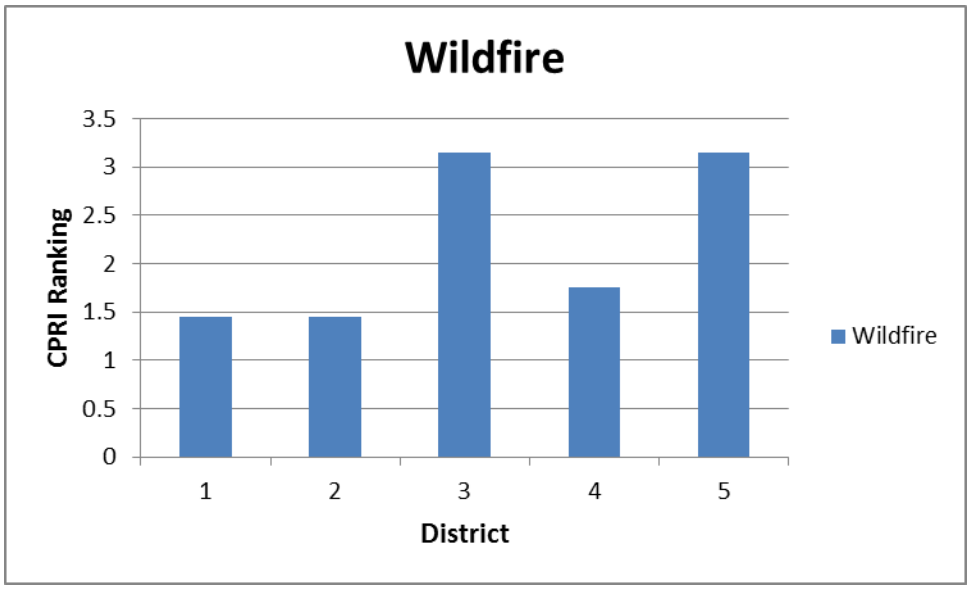
A wildfire is an uncontrolled fire spreading through vegetative fuels and exposing or possibly consuming structures. Wildfires often begin unnoticed and spread quickly. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. A wildland/urban interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

People start more than 80% of wildfires, usually as debris burns or through arson or carelessness. Lightning strikes are the next leading cause of wildfires. Wildfire behavior is based on three primary factors: fuel, topography, and weather.

The type and amount of fuel—as well as its burning qualities and the level of moisture—affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components, is also a determinant of wildfire potential and behavior. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the speed at which the fire travels, and the ability of firefighters to reach and extinguish the fire. Weather affects the probability of a wildfire occurring, and has a significant effect on its behavior. Temperature, humidity, and wind (both short- and long-term) affect the severity and duration of wildfires. Los Angeles County's topography consists of a semi-arid coastal plain and rolling highlands, creating an ever-present threat of wildland fire—especially when fueled by shrub overgrowth, occasional Santa Ana winds, and high temperatures. Extreme weather conditions such as high temperature, low humidity, and winds of extraordinary force may cause an ordinary fire to expand into one of massive proportions.

For thousands of years, fires have been a natural part of the ecosystem in Southern California. However, wildfires present a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas. There is a potential for substantial losses resulting from wildland/urban interface fires in Southern California. According to the California Department of Forestry and Fire Protection (CAL FIRE), there were over 7,000 reportable fires in California in 2003, with over 1 million acres burned. According to CAL FIRE statistics, in the October 2003 firestorms, over 4,800 homes were destroyed and 22 lives were lost.

Board of Supervisorial District	Wildfire
Board of Supervisorial District 1	1.45
Board of Supervisorial District 2	1.45
Board of Supervisorial District 3	3.15
Board of Supervisorial District 4	1.75
Board of Supervisorial District 5	3.15



Local Conditions

Fire hazards threaten lives, property, and natural resources, and damage vegetation and wildlife habitats.

Weather

Weather conditions have many complex and important effects on fire intensity and behavior. Wind is of prime importance; as wind increases in velocity, the rate of fire spread also increases. Relative humidity (i.e., the relative dryness of the air) also has a direct effect; the drier the air, and the drier the vegetation, the more likely the vegetation will ignite and burn. Precipitation (annual total, seasonal distribution and storm intensity) further affects the moisture content of dead and living vegetation, which influences fire ignition and behavior.

In addition to winds, structural development within or adjacent to wildland exposures represents an extreme fire protection problem due to flying embers and the predominance of combustible roof coverings.

Topography

Topography affects wildland fire behavior, and the ability of firefighters and their equipment to take action to suppress those fires. One example is a fire starting in the bottom of a canyon; it may expand quickly to the ridge top before initial attack forces can arrive. Rough topography greatly limits road construction, road standards, and accessibility by ground equipment. Steep topography also channels airflow, creating extremely erratic winds on lee slopes and in canyons. The water supply available for fire protection for structures at higher elevations is frequently dependent on pumping units. The source of power for such units is usually from overhead distribution lines, which are subject to destruction by wildland fires.

Vegetation

A key to effective fire control and the successful accommodation of fire in wildland management is the understanding of fire and its environment. The “fire environment” is the complex of fuel, topographic, and air mass factors that influence the inception, growth, and behavior of a fire. The topography and weather components are, for all practical purposes, beyond man's control, but it is a different story with fuels,

which can be controlled before the outbreak of fires. In terms of future urban expansion, finding new ways to control and understand these fuels can reduce both the likelihood and the severity of fires.

Of these different vegetation types, coastal sage scrub, chaparral, and grasslands reach some degree of flammability during the dry summer months and, under certain conditions, during the winter months. For example, as chaparral gets older, twigs and branches within the plants die and are held in place. A stand of brush 10 to 20 years of age usually has enough dead material to produce rates of spread about the same as in grass fires when the fuels have dried out. In severe drought years additional plant material may die, contributing to the fuel load. There will normally be enough dead fuel accumulated in 20- to 30-year-old brush to give rates of spread about twice as fast as in a grass fire. Under moderate weather conditions that produce a spread rate of 0.5 foot per second in grass, a 20- to 30-year-old stand of chaparral may have a rate of fire spread of about 1 foot per second. Fire spread in old brush (40 years or older) has been measured at eight times as fast as in grass, about 4 feet per second. Under extreme weather conditions, the fastest fire spread in grass is 12 feet per second, or about 8 miles per hour.

Community Wildfire Issues

What Is Susceptible to Wildfires?

The county has identified properties within areas classified as "Very High Fire Hazard Severity Zones (VHFHSZ)," as shown in the following maps. Defensible space can be created around structures by taking precautionary measures, such as (1) thinning trees and brush within a minimum of 30 feet of a home; (2) beyond 30 feet, removing dead wood, debris, and low tree branches; (3) keeping lawns trimmed, leaves raked, and the roof and rain gutters free from debris such as dead limbs and leaves; (4) stacking firewood at least 30 feet away from a home; and (5) storing flammable materials, liquids, and solvents in metal containers outside the home, and at least 30 feet away from structures and wooden fences.



In Los Angeles County, this scenario highlights the need for fire mitigation activity in all sectors of the region, wildland/urban interface or not. Actions homeowners can take to mitigate fires include the following:

- Define a defensible space of a 30-foot noncombustible buffer area around the house.
- Reduce flammable vegetation, trees, and brush around the house.
- Remove or prune trees.

- Cut grass and weeds regularly.
- Relocate wood piles and leftover materials.
- Keep the area clean.
- Install fire-resistant roofing materials and spark arrestors on chimneys.

California Fire Plan

The following information is summarized from the *California Fire Plan 2010*.

Levels of Wildland Fire Protection Services

The risk from wildfire to life, property, natural resources, and firefighter safety is increasing. The history of California wildfires indicates that the following trends will continue:

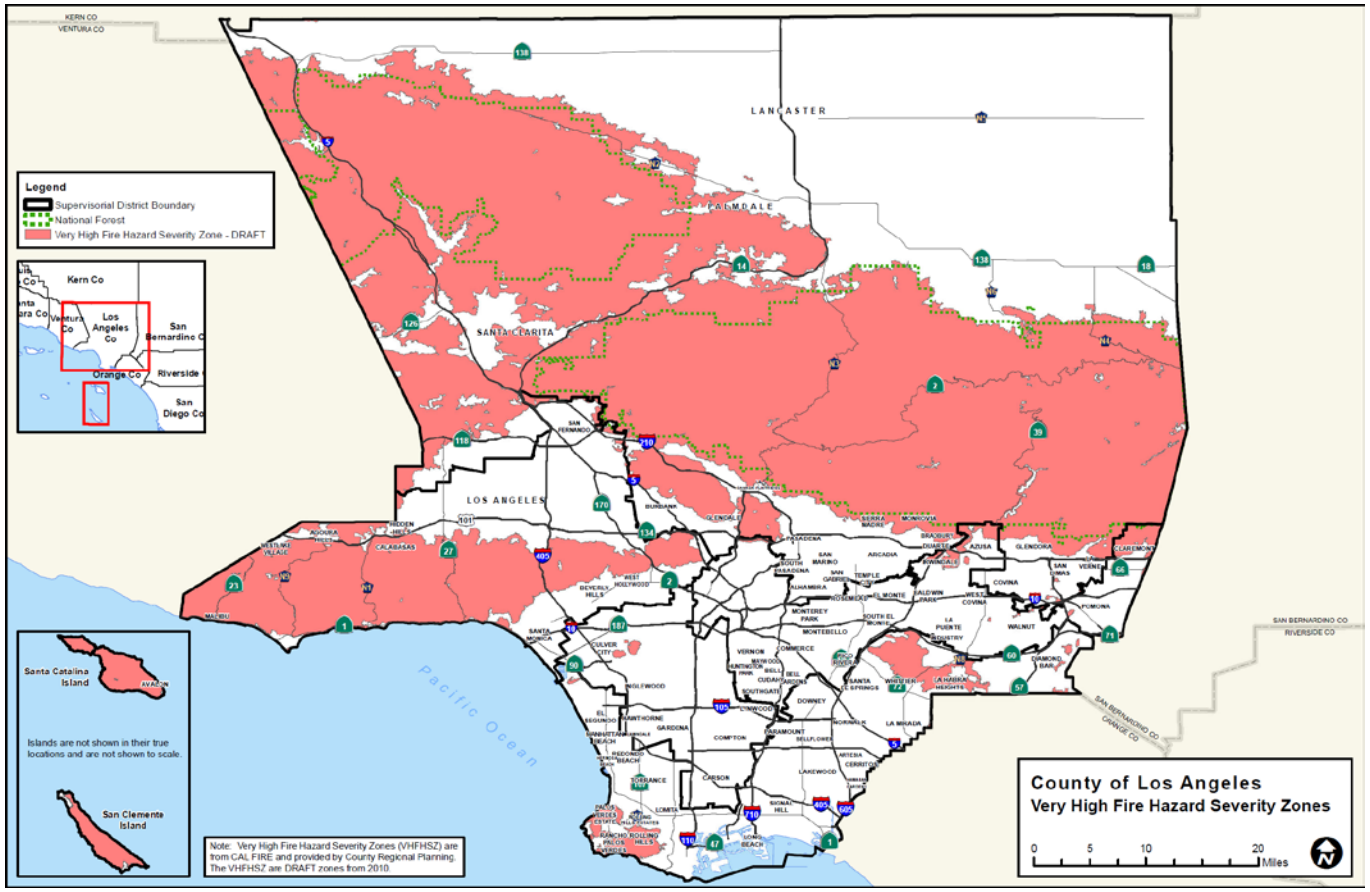
- Population will grow and more people will live and use wildland areas, especially in the Central Sierra and in the Southern California counties of Riverside, San Bernardino, and San Diego.
- Topography and climate support ecosystems where large wildfires can be expected.
- Drought and fuel moisture conditions will be unpredictable, but they are almost always dangerous in fire season.
- More structures will be constructed in areas that are very susceptible to wildfire.
- The historical legacy of narrow roads, difficult entrance, insufficient water supplies, flammable building construction, and locations that make many communities and homes wildfire-prone still exists.
- Public demand for wildland fire protection and other services will increase.

Deteriorating forest health, increasing fuel loads, and other factors have led to more intense, destructive wildfires; if these conditions are left unabated, this pattern will continue.

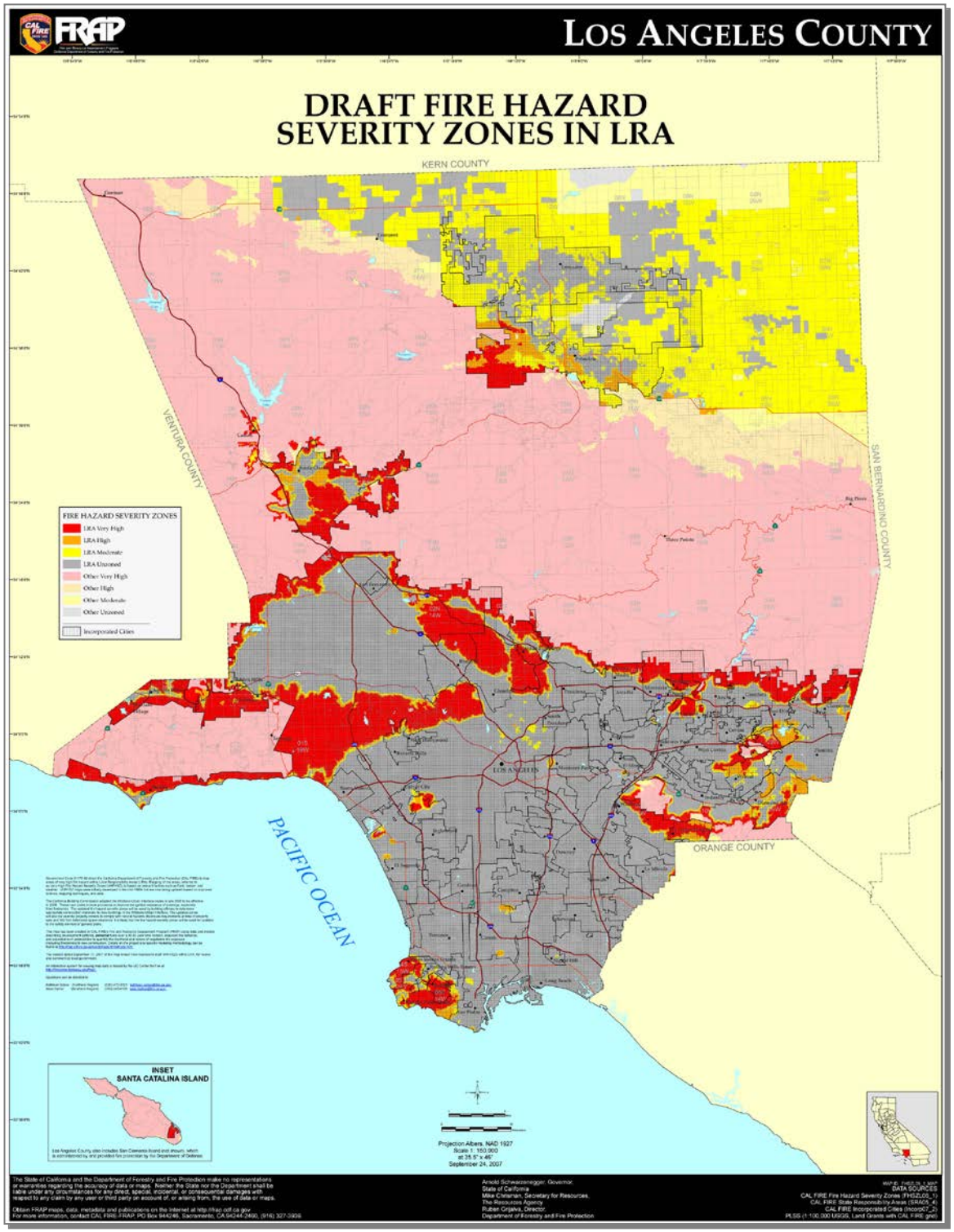
Assets at risk will increase, especially watershed assets, because of the rapid rise in the demand for water to supply more people. Based on population projections, the potential for accelerating loss of protected assets, especially life and property, will be greater from disastrous wildfires.

Large wildfires do not respect political or property boundaries. Historically, California's firefighting agencies have leveraged their efficacy through a concept of mutual cooperation at the federal, state, and local levels of government. Day-to-day mutual aid for the initial attack, as well as a statewide mutual-aid system for fire disasters, is the basis of this cooperation and coordination. The ability to rapidly mobilize, effectively deploy, and continuously support large numbers of specialized firefighting resources is essential to cope with large multiple fires. Hence, CAL FIRE, in cooperation with other fire agencies, must maintain the infrastructure, including communications and capital improvements, necessary to facilitate such a response.

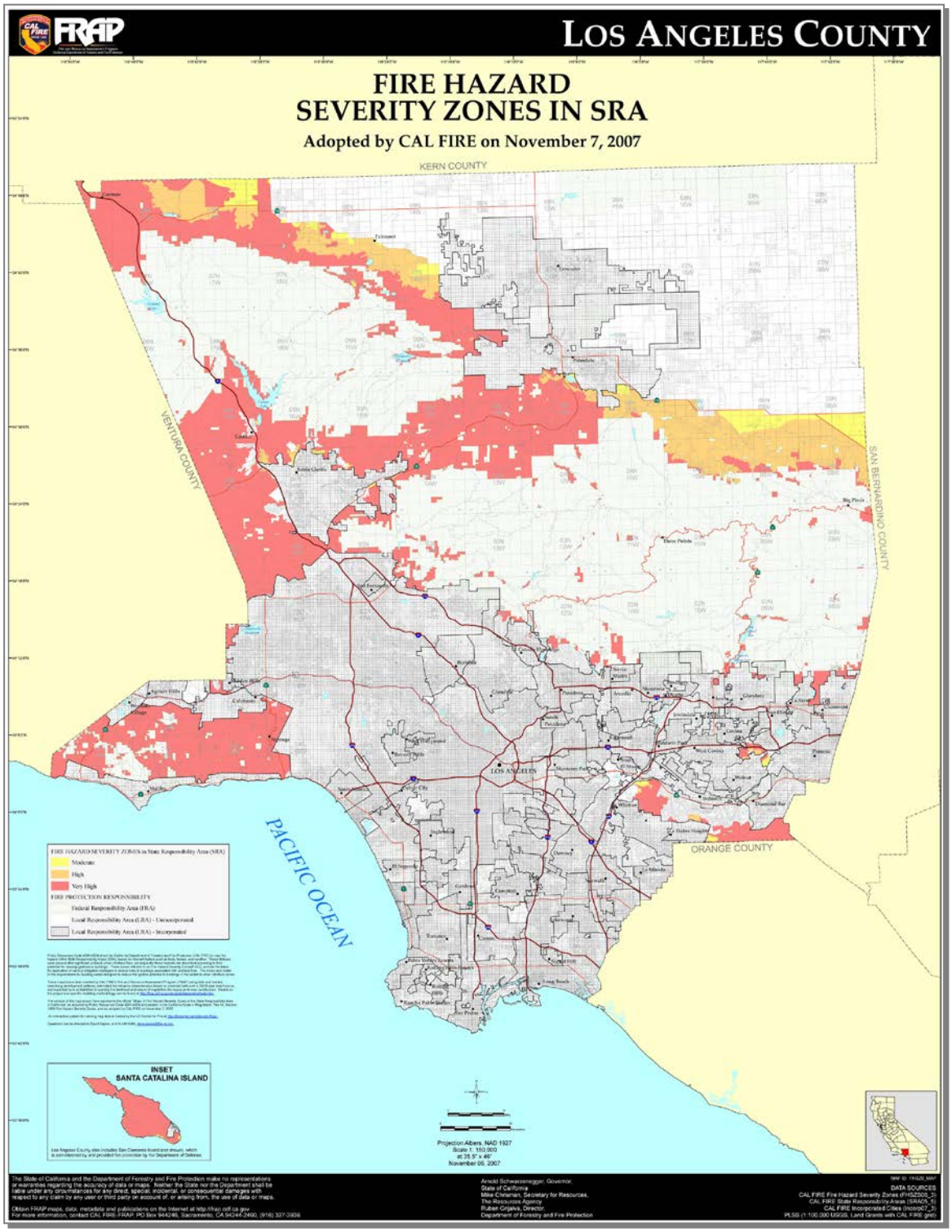
Map 7-1: Los Angeles County Very High Fire Hazard Severity Zones
(Source: County of Los Angeles CEO - ITS GIS)



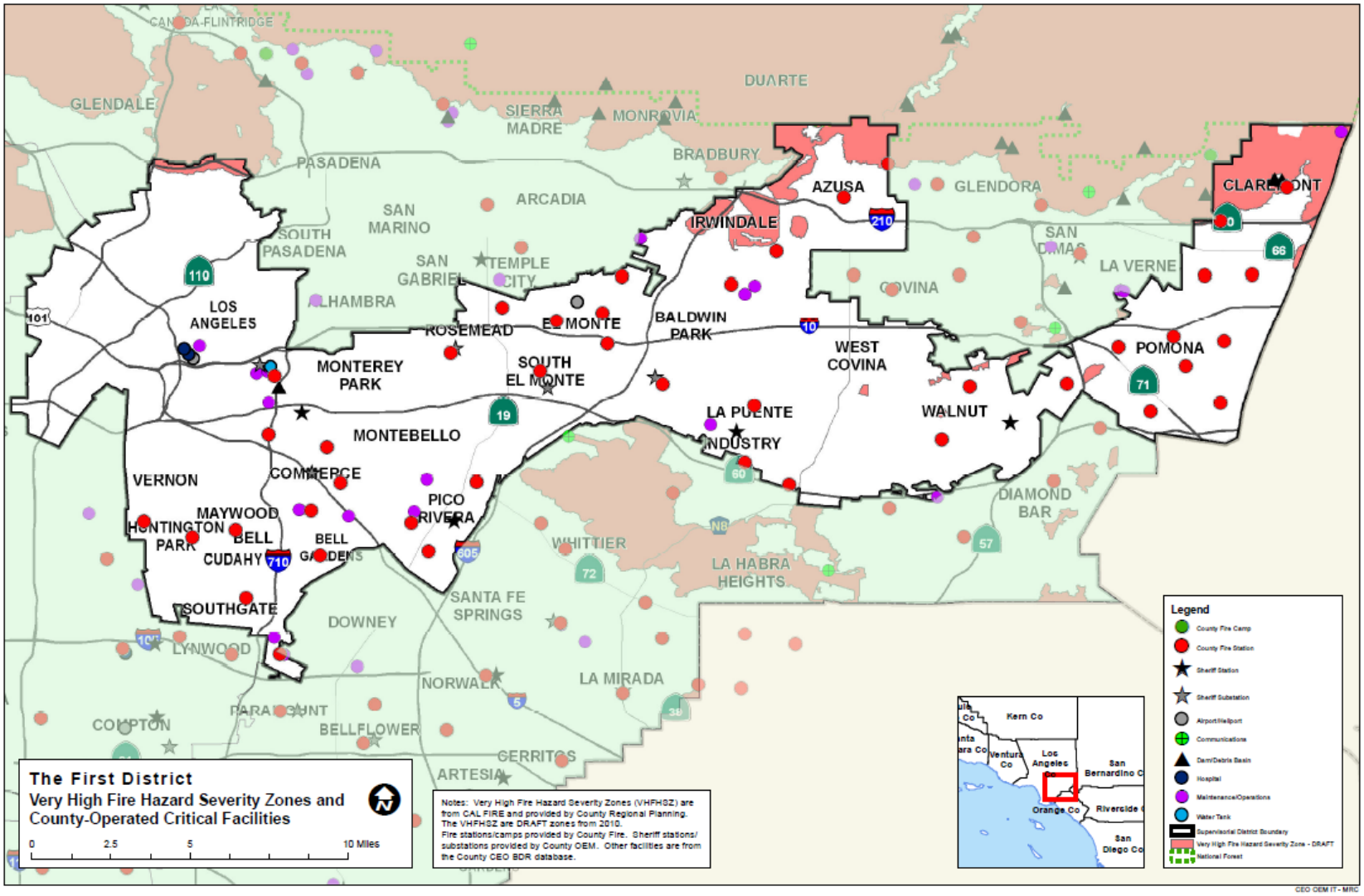
Map 7-2: Local Responsibility Zones for Los Angeles County
(Source: CAL FIRE)



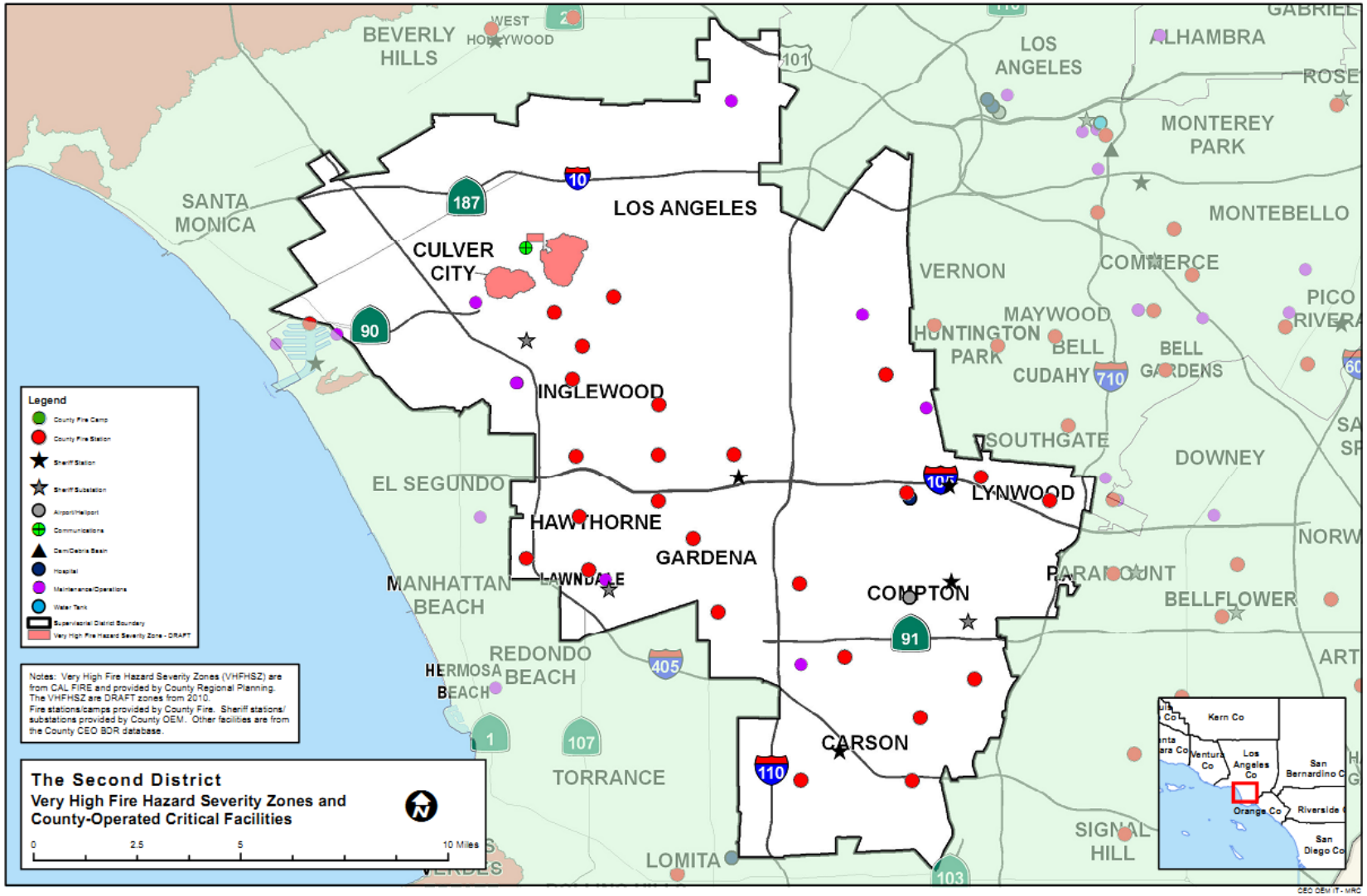
Map 7-3: State Responsibility Zones
(Source: CAL FIRE)



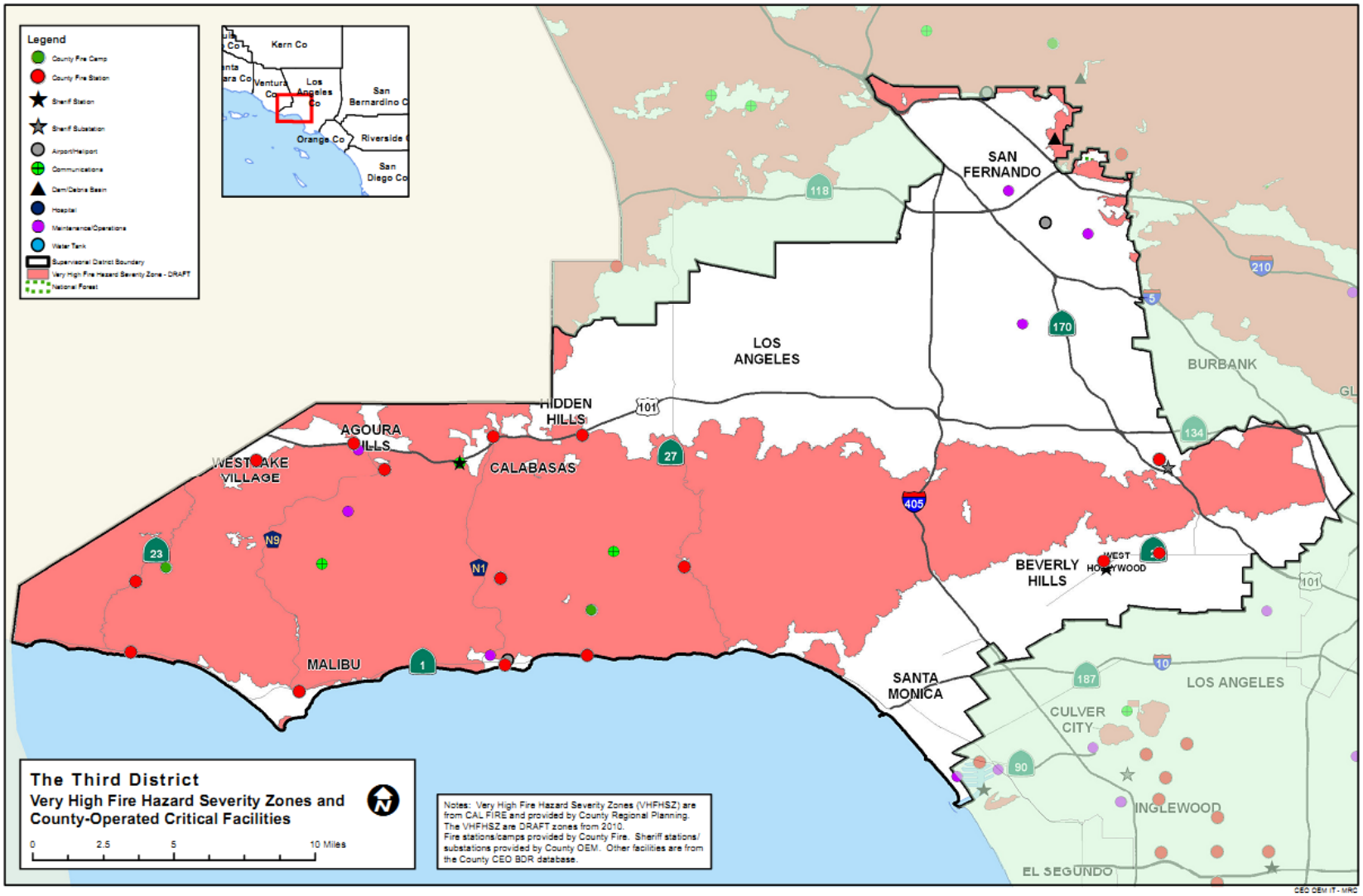
Map 7-4: Very High Fire Hazard Severity Zones and County-Operated Facilities in Los Angeles County, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



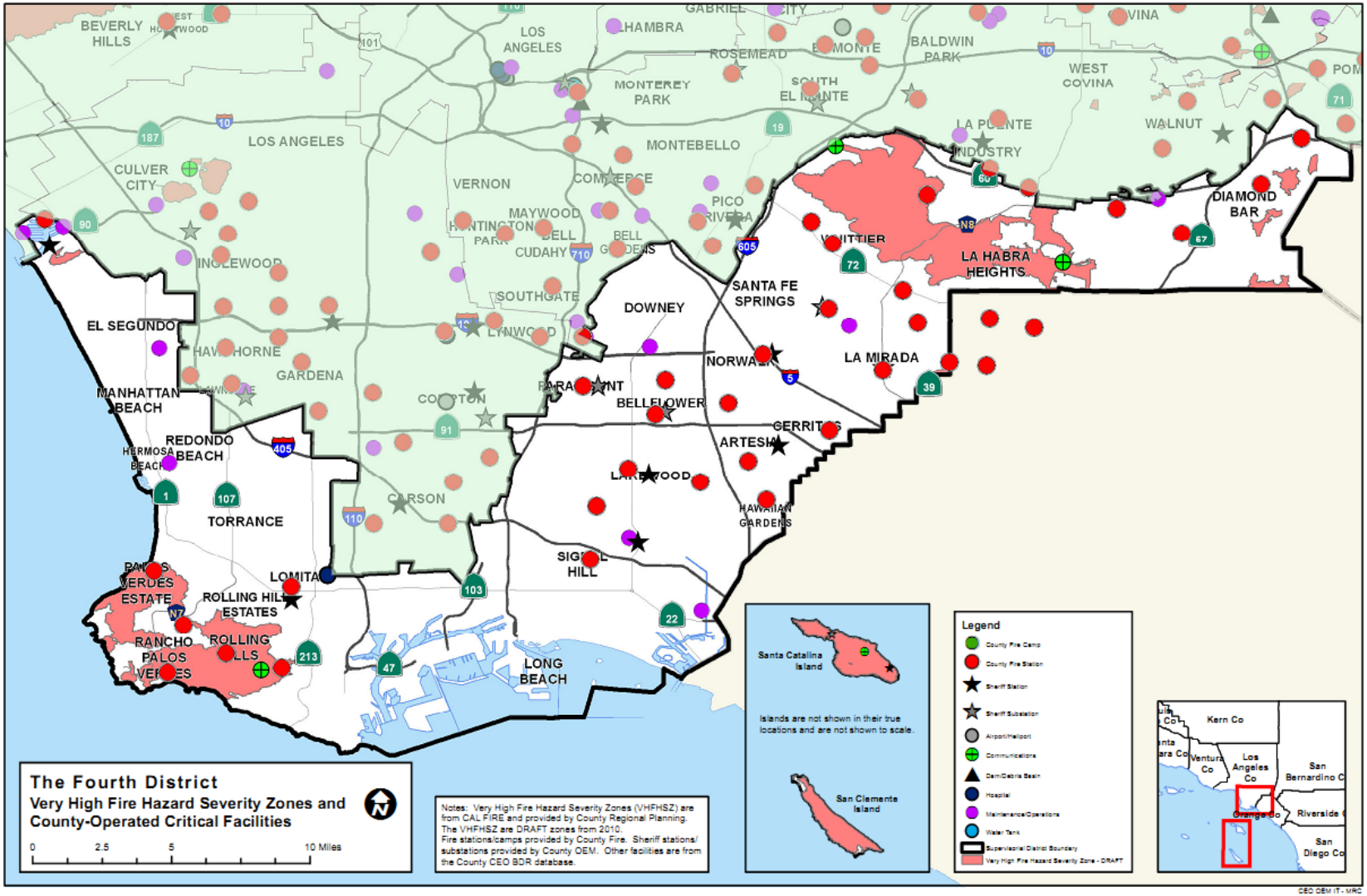
Map 7-5: Very High Fire Hazard Severity Zones and County-Operated Facilities in Los Angeles County, Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



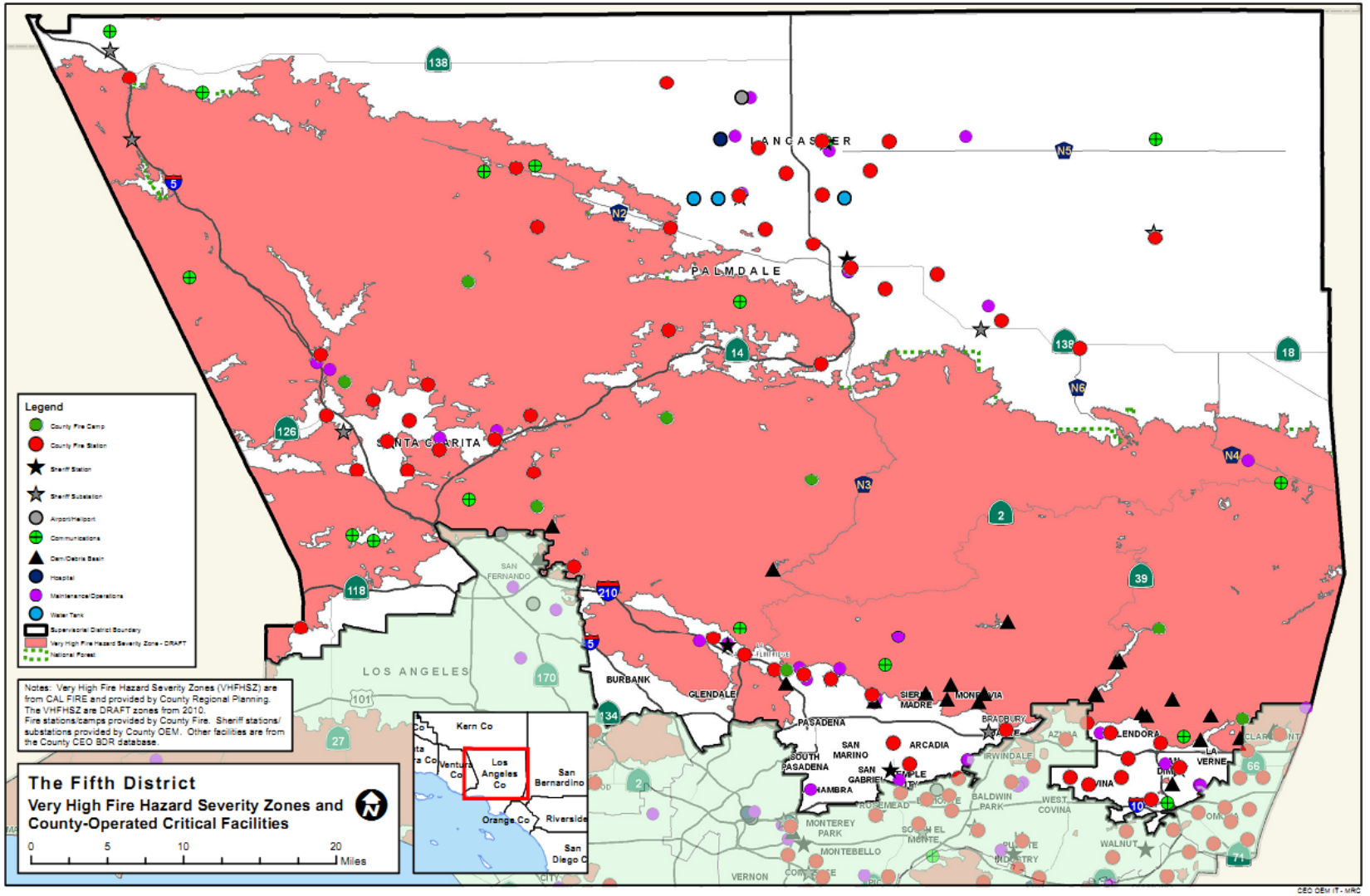
Map 7-6: Very High Fire Hazard Severity Zones and County-Operated Facilities in Los Angeles County, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



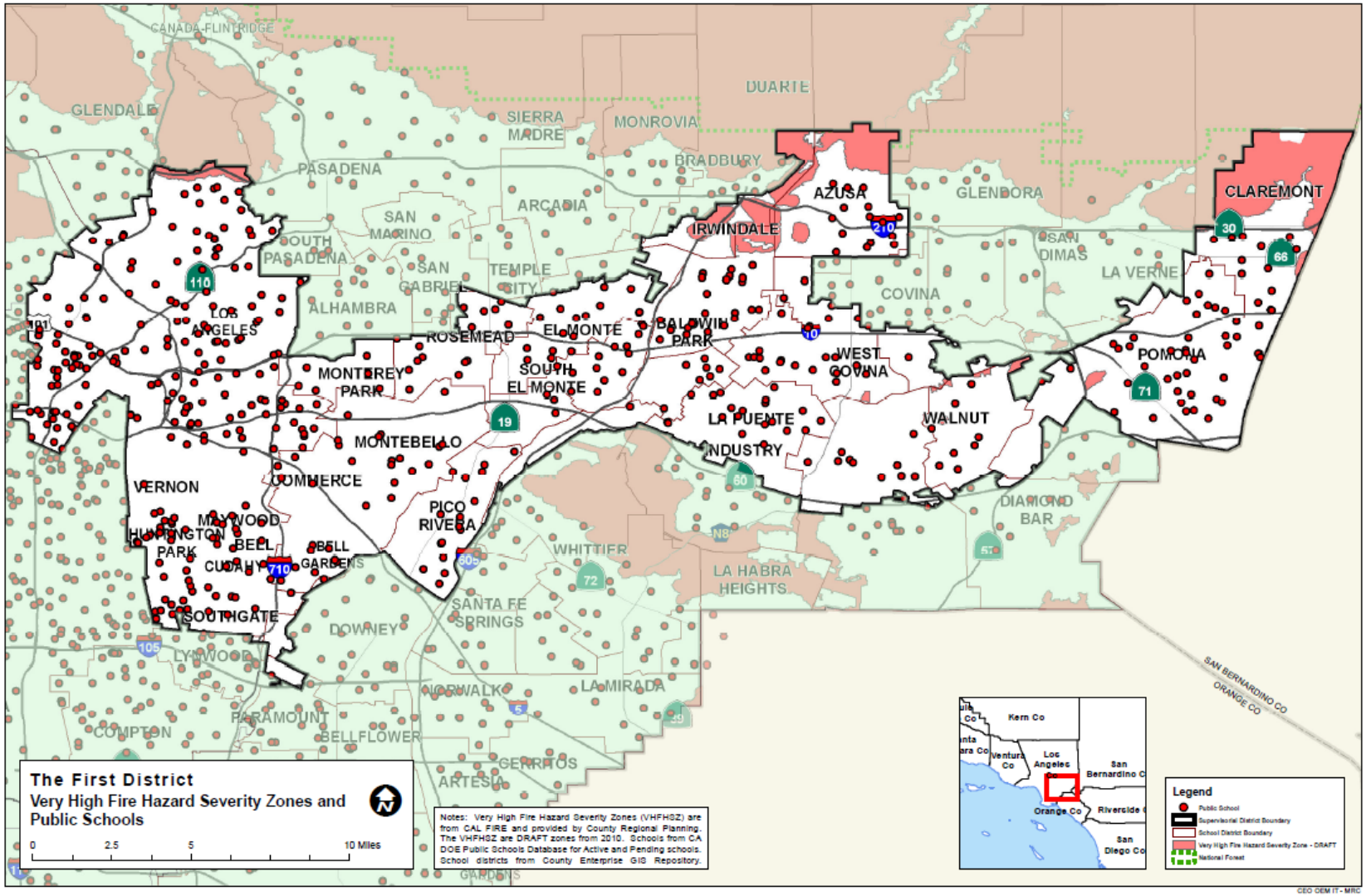
Map 7-7: Very High Fire Hazard Severity Zones and County-Operated Facilities in Los Angeles County, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)



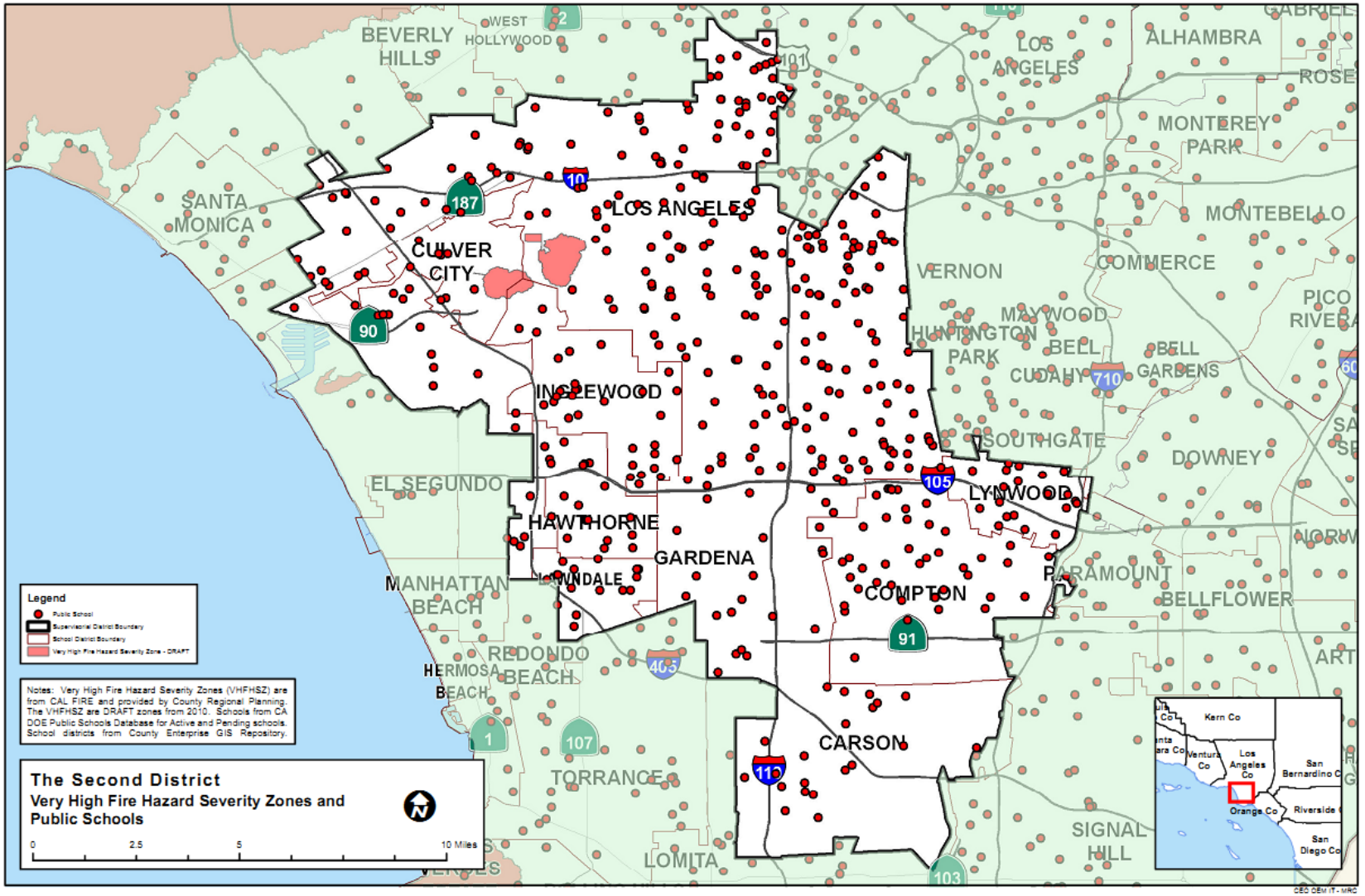
Map 7-8: Very High Fire Hazard Severity Zones and County-Operated Facilities in Los Angeles County, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



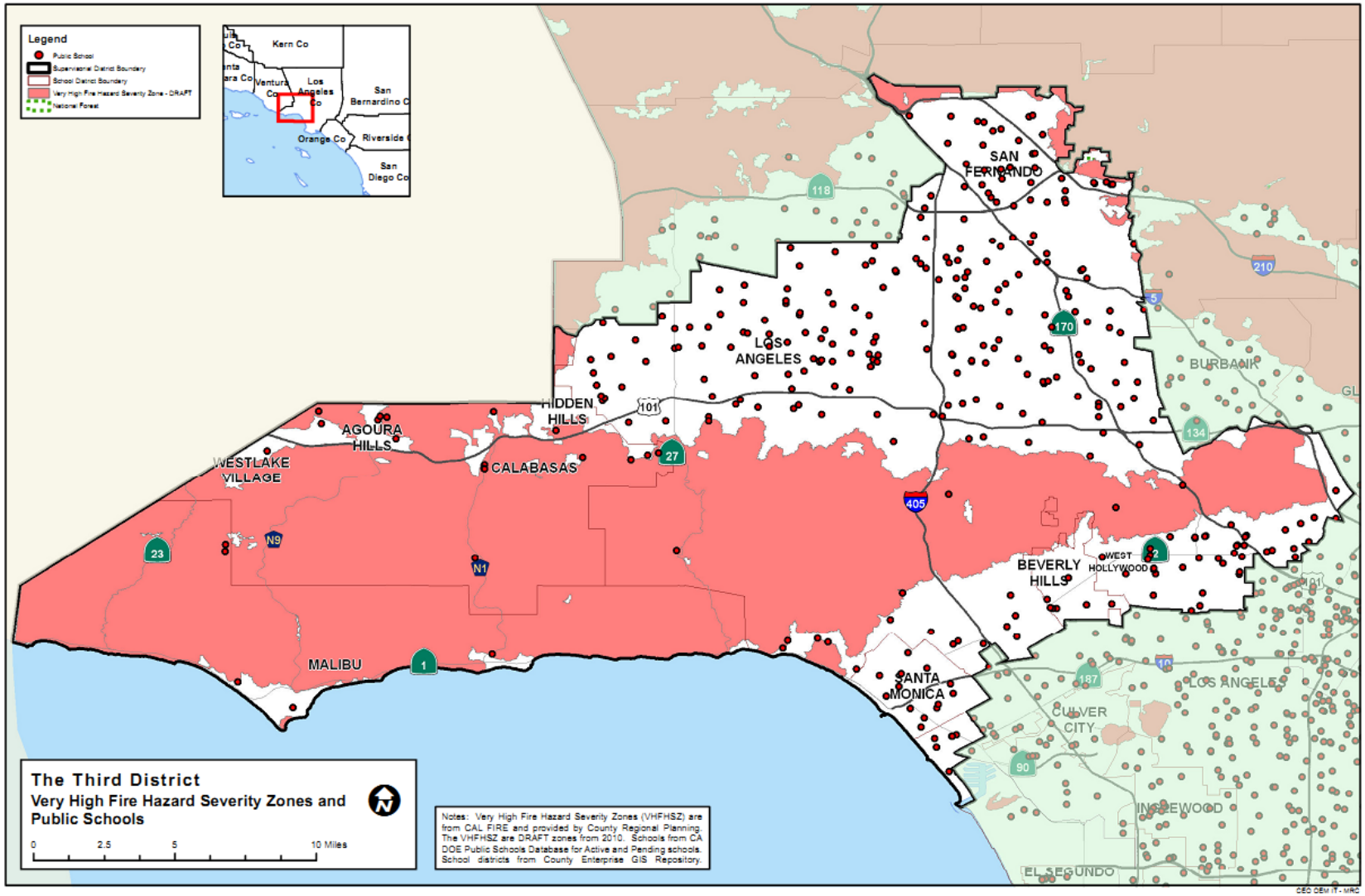
Map 7-9: Very High Fire Severity Zones and Public Schools, Board of Supervisorial District 1
(Source: County of Los Angeles CEO - ITS GIS)



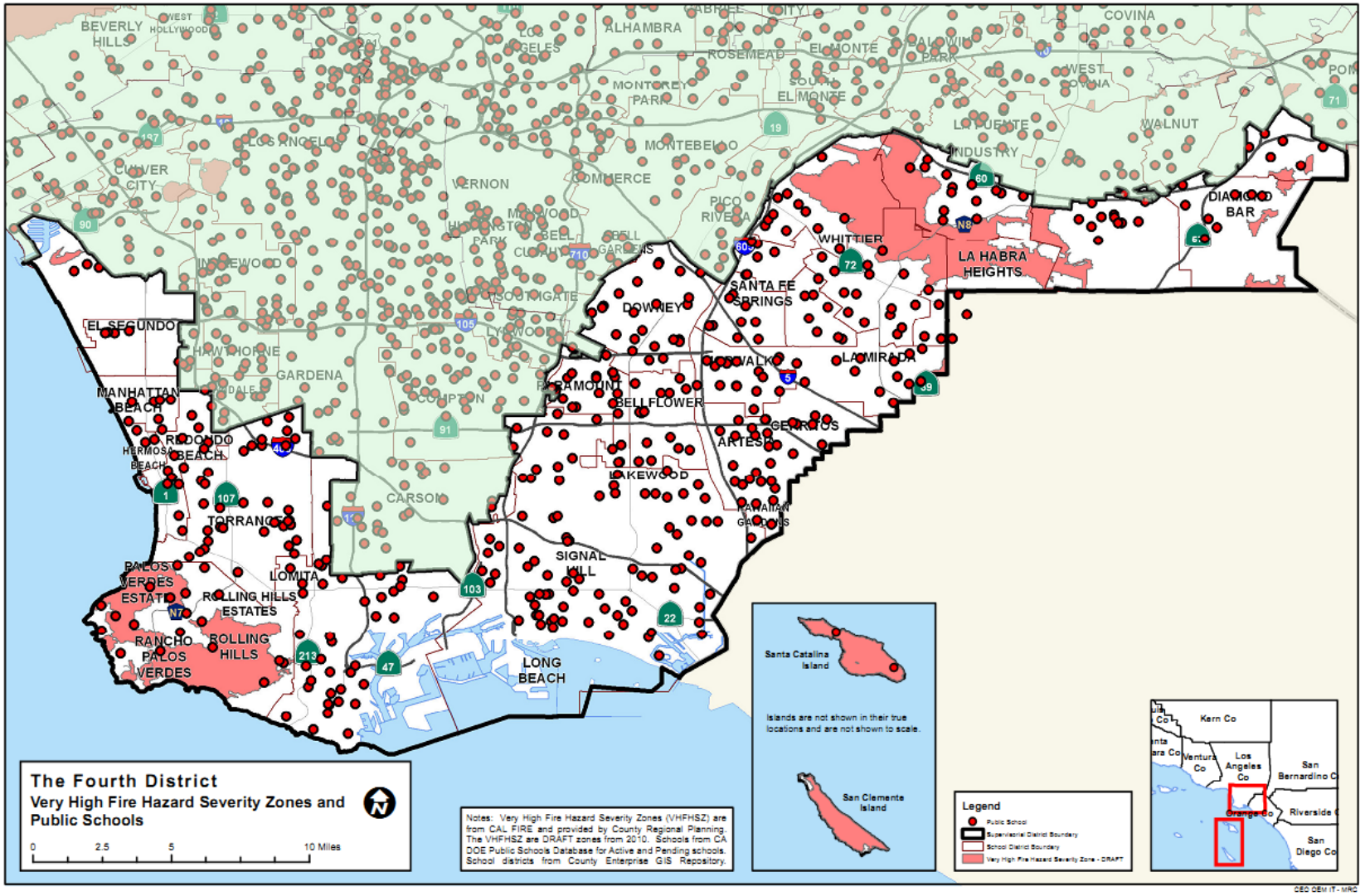
Map 7-10: Very High Fire Severity Zones and Public Schools, Board of Supervisorial District 2
(Source: County of Los Angeles CEO - ITS GIS)



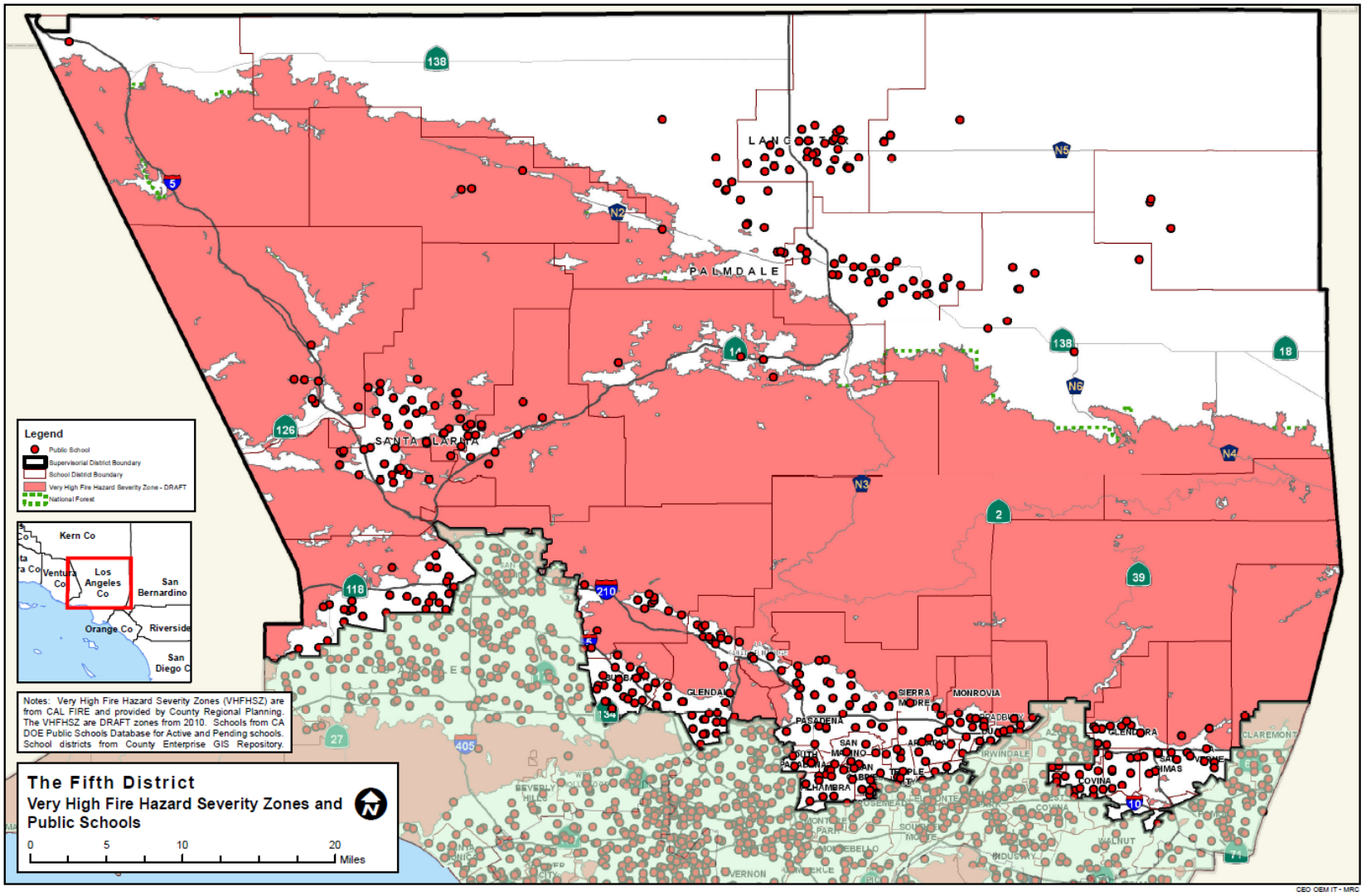
Map 7-11: Very High Fire Severity Zones and Public Schools, Board of Supervisorial District 3
(Source: County of Los Angeles CEO - ITS GIS)



Map 7-12: Very High Fire Severity Zones and Public Schools, Board of Supervisorial District 4
(Source: County of Los Angeles CEO - ITS GIS)

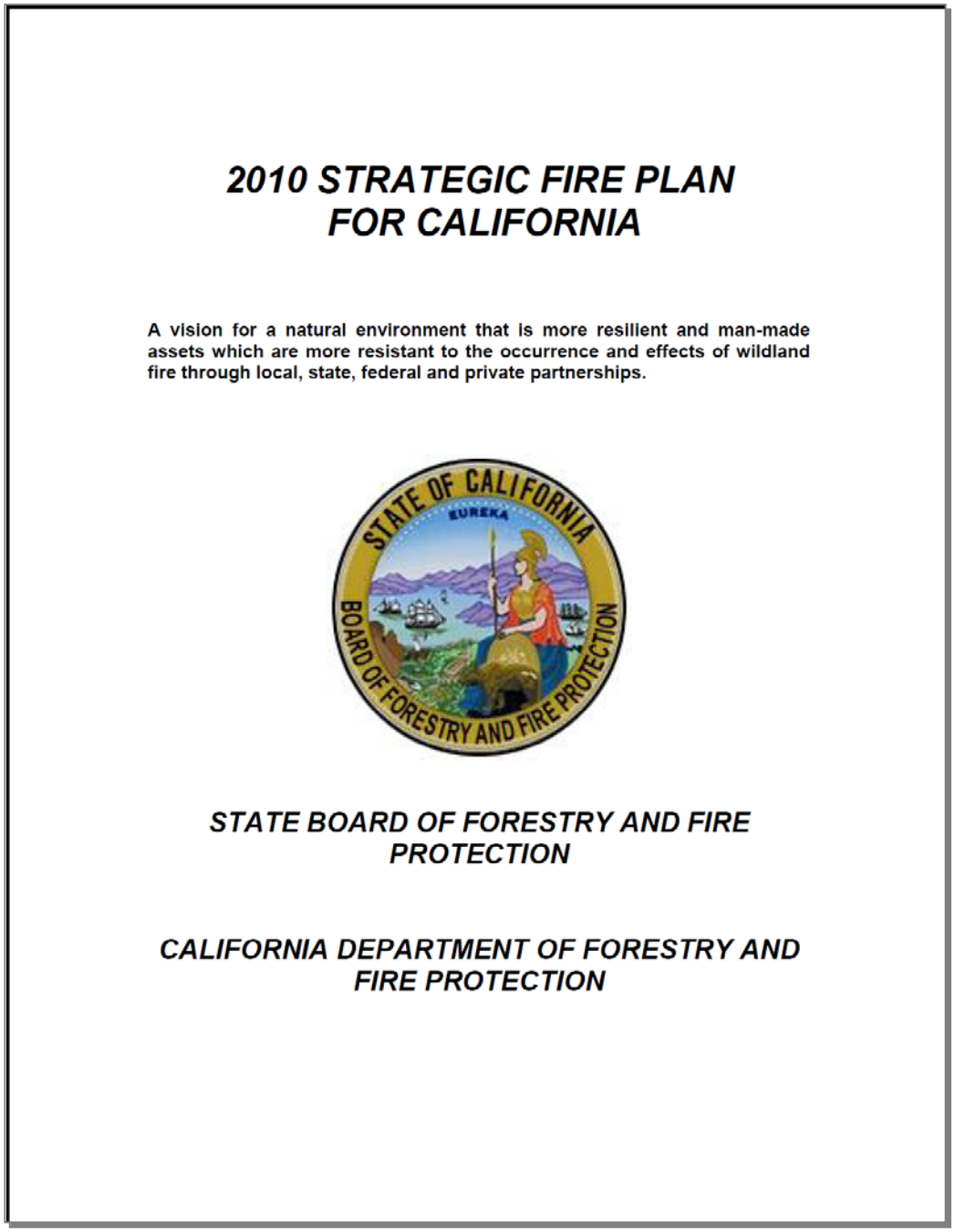


Map 7-13: Very High Fire Severity Zones and Public Schools, Board of Supervisorial District 5
(Source: County of Los Angeles CEO - ITS GIS)



Fire protection forces in California must have sufficient depth to respond to large, multiple wildfires, while preventing other small fires from *becoming* large damaging fires. CAL FIRE plays a key role in supplying and coordinating such forces; it should maintain and enhance this ability. The 1985 fire plan includes a model to provide adequate depth of resources that show CAL FIRE needing 96 additional engines and 825 personnel for managing large fires using the Incident Command System. There is an even greater need today, as reflected in the *2010 Strategic Fire Plan for California*.

(Source: http://cdfdata.fire.ca.gov/fire_er/fpp_planning_cafireplan)



2010 STRATEGIC FIRE PLAN FOR CALIFORNIA

A vision for a natural environment that is more resilient and man-made assets which are more resistant to the occurrence and effects of wildland fire through local, state, federal and private partnerships.

STATE OF CALIFORNIA
EUREKA
BOARD OF FORESTRY AND FIRE PROTECTION

STATE BOARD OF FORESTRY AND FIRE PROTECTION

CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

Wildland Fire Protection Fiscal Issues

Multiyear fiscal problems are occurring at all governmental levels. This constrains the availability of funding to cope with the increasing workload, costs, and losses that must be addressed by the California wildland fire protection system.

The increasing number of structures and people in California wildlands and the growing importance of the state's natural resources create a growing demand to fund additional wildland fire protection services for both the structures and the wildland resource assets.

The primary fiscal responsibilities for the initial attack are assigned as follows: (1) federal taxpayers are responsible for federal wildland fire protection; (2) state taxpayers are responsible for privately owned wildland fire protection; and (3) local taxpayers are responsible for structure fire protection in wildland areas. However, during the annual fire season, the state and federal taxpayers provide a minimum level of structural fire protection that is incidental to their primary missions of wildland fire protection. Similarly, in most wildland areas, local taxpayers provide year-round wildland fire protection on both state and federal responsibility areas; this protection is incidental to the local governments' primary mission of structural fire protection.

Over the past decade, some of the increased costs for additional initial attack wildland resource protection and structural protection have been funded by local taxpayers through property taxes and fire district fees, supplemented by the services of volunteer firefighters. However, when a wildland fire overwhelms local resources and reaches major fire status, both the state and the federal taxpayers pay for the costs of wildfires, structure protection, and the resulting disaster relief.



Santa Clarita 2009

For the local taxpayers, the following continue to increase: (1) the structural values and number of people being protected on wildlands, (2) the costs of wildland and structure initial attack fire suppression funded at the local levels, and (3) the losses from the extended attack and larger fires.

For state and federal taxpayers, the following will continue to increase: (1) extended and large fire emergency fund expenditures for wildland fires, (2) protecting structures during initial attack and extended attack fires, and (3) state and federal agency disaster expenditures for damages to wildland resources and structures.

Health and Safety Code Section 13009 allows for recovery of fire suppression costs which, when obtained, are to be placed back into the state's general fund (rather than invested in a pre-fire management program).

There is a direct relationship between reduced expenditures for pre-fire management and suppression and increased emergency fund expenditures, disaster funding, and private taxpayer expenditures and losses. Reduction of pre-fire management or suppression resources allows more fires to become major disastrous fires. Major fires create additional suppression and disaster relief costs at all levels of government, and increase citizen and business losses.

According to representatives of the insurance industry that insures structures in California wildland areas, (1) the insurer's average costs and losses are about $1.09 for each $1.00 received in premiums, and (2) urban dwellers are subsidizing the wildland homeowner through service-wide rating schedules.

Fire-Safe and Land Use Planning

Population increases in wildland areas have raised strategic concerns about wildfire protection. Clearance laws, zoning, and related fire safety requirements implemented by state and local authorities need to address these factors:

Fire-resistant construction standards: We can no longer view wildland fires as affecting only watershed, wildlife, and vegetation resources; we must now consider their effect on people and their structures. Further, this increase in vulnerable people and structures has provided increasing ignition sources for fires which, due to their proximity, can spread into the wildland. Building construction standards that encompass such items as roof coverings, opening protection, and fire resistance are designed to both protect the structure from external fires and to contain internal fires for longer periods.

Hazard reduction near structures (defensible space): The public image of defensible space as part of pre-fire management should be expanded to include such immediate benefits as improved aesthetics, increased health of large remaining trees and other valued plants, and enhanced wildlife habitat. The use of defensible space that provides landscape naturalness—along with its compatibility with wildlife, water conservation, and forest health—should be emphasized.

Infrastructure: Effective fire protection in the intermix cannot be accomplished solely through the acquisition of equipment, personnel, and training. The area's infrastructure also must be considered during the formulation of development plans. Specific fire hazard areas should be evaluated and reasonable safety standards adopted, covering such elements as the adequacy of nearby water supplies, routes or throughways for fire equipment, clearly posted addresses and street signs, and maintenance. The ultimate objectives for fire-safe planning and construction are to (1) improve the ability of communities and other high-value assets to survive a large, high-intensity wildfire with minimal fire suppression efforts, and (2) provide for improved citizen and firefighter safety.

Chart 7-1: Percent of Fires by Cause, 2010
(Source: http://www.fire.ca.gov/downloads/redbooks/2010/2010_Redbook_Graphics_ Figures_1-10.pdf)

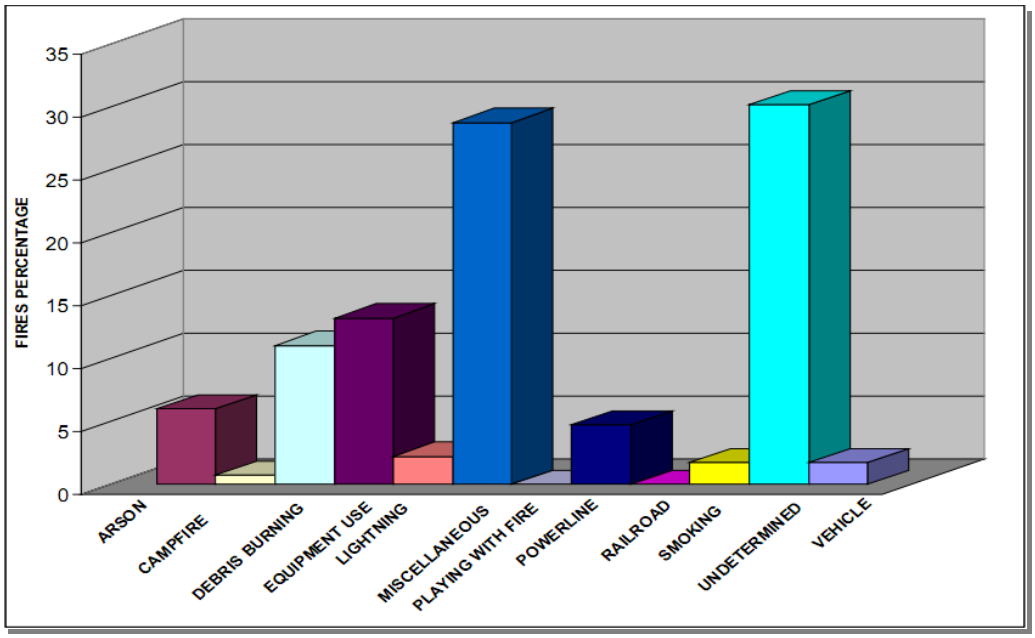


Table 7-1: 20 Largest California Wildland Fires (By Structures Destroyed) (Source: CAL FIRE; updated 2009)

	FIRE NAME/*CAUSE*	DATE	COUNTY	ACRES	*STRUCTURES*	DEATHS
1	TUNNEL *(REKINDLE)*	October 1991	ALAMEDA	1,600	2,900	25
2	CEDAR *(HUMAN)*	October 2003	SAN DIEGO	273,246	2,820	15
3	WITCH *(UNDER INVESTIGATION)*	October 2007	SAN DIEGO	197,990	1,650	2
4	OLD *(HUMAN)*	October 2003	SAN BERNARDINO	91,281	1,003	6
5	JONES *(UNDETERMINED)*	October 1999	SHASTA	26,200	954	1
6	PAINT *(ARSON)*	June 1990	SANTA BARBARA	4,900	641	1
7	FOUNTAIN *(ARSON)*	August 1992	SHASTA	63,960	636	0
8	SAYRE *(MISC)*	Novermber 2008	LOS ANGELES	11,262	604	0
9	CITY OF BERKELEY *(POWERLINES)*	September 1923	ALAMEDA	130	584	0
10	HARRIS *(UNDER INVESTIGATION)*	October 2007	SAN DIEGO	90,440	548	8
11	BEL AIR *(UNDETERMINED)*	November 1961	LOS ANGELES	6,090	484	0
12	LAGUNA FIRE *(ARSON)*	October 1993	ORANGE	14,437	441	0
13	LAGUNA *(POWERLINES)*	September 1970	SAN DIEGO	175,425	382	5
14	HUMBOLDT *(ARSON)*	June 2008	BUTTE	23,344	351	0
15	PANORAMA *(ARSON)*	November 1980	SAN BERNARDINO	23,600	325	4
16	TOPANGA *(ARSON)*	November 1993	LOS ANGELES	18,000	323	3
17	49ER *(BURNING DEBRIS)*	September 1988	NEVADA	33,700	312	0
18	ANGORA (HUMAN)	June 2007	EL DORADO	3,100	309	0
19	SIMI *(UNDER INVESTIGATION)*	October 2003	VENTURA	108,204	300	0
20	SLIDE *(UNDER INVESTIGATION)*	October 2007	SAN BERNARDINO	12,759	272	0

Note that this list does not include fire jurisdiction. These are the Top 20 within California, regardless of whether they were state, federal, or local responsibility. Also note that "structures" is meant to include all loss - homes and outbuildings, etc.

CAL FIRE

11/4/2009

Table 7-2: 20 Largest California Wildland Fires (By *Acreage Burned) (Source: CAL FIRE; updated 2011)

	FIRE NAME/CAUSE	DATE	COUNTY	*ACRES*	STRUCTURES	DEATHS
1	CEDAR *(HUMAN)*	October 2003	SAN DIEGO	273,246	2,820	15
2	ZACA *(HUMAN)*	July 2007	SANTA BARBARA	240,207	1	0
3	MATILIJA *(UNDETERMINED)*	September 1932	VENTURA	220,000	0	0
4	WITCH *(POWERLINES)*	October 2007	SAN DIEGO	197,990	1,650	2
5	KLAMATH THEATER COMPLEX *(LIGHTNING)*	June 2008	SISKIYOU	192,038	0	2
6	MARBLE CONE *(LIGHTNING)*	July 1977	MONTEREY	177,866	0	0
7	LAGUNA *(POWERLINES)*	September 1970	SAN DIEGO	175,425	382	5
8	BASIN COMPLEX *(LIGHTNING)*	June 2008	MONTEREY	162,818	58	0
9	DAY FIRE *(HUMAN)*	September 2006	VENTURA	162,702	11	0
10	STATION FIRE *(HUMAN)*	August 2009	LOS ANGELES	160,557	209	2
11	MCNALLY *(HUMAN)*	July 2002	TULARE	150,696	17	0
12	STANISLAUS COMPLEX *(LIGHTNING)*	August 1987	TUOLUMNE	145,980	28	1
13	BIG BAR COMPLEX *(LIGHTNING)*	August 1999	TRINITY	140,948	0	0
14	CAMPBELL COMPLEX *(POWERLINES)*	August 1990	TEHAMA	125,892	27	0
15	WHEELER *(ARSON)*	July 1985	VENTURA	118,000	26	0
16	SIMI *(UNDER INVESTIGATION)*	October 2003	VENTURA	108,204	300	0
17	HWY. 58 *(VEHICLE)*	August 1996	SAN LUIS OBISPO	106,668	13	0
18	IRON ALPS COMPLEX *(LIGHTNING)*	June 2008	TRINITY	105,805	2	10
19	CLAMPITT *(POWERLINES)*	September 1970	LOS ANGELES	105,212	86	4
20	BAR COMPLEX *(LIGHTNING)*	July 2006	TRINITY	100,414	0	0

There is no doubt that there were fires with significant acreage loss in years prior to 1932, but those records are less reliable, and this list is meant to give an overview of the large acreage-loss fires in more recent times. (Also note that this list does not include fire jurisdiction. These are the top 20 within the state, regardless of whether they were state, federal, or local responsibility.)

Table 7-3: Acreage Burned in Los Angeles County, 2004–2010

Year	Unincorporated Los Angeles County	Other Jurisdictions	All Jurisdictions
2004	34,353.58	361.80	34,715.38
2005	5,221.09	23,834.87	29,055.96
2006	7,355.35	163.66	7,519.01
2007	116,893.76	2,231.35	119,125.11
2008	30,714.17	401.92	31,116.09
2009	162,265.62	870.78	163,136.40
2010	1,513.99	45.02	1,559.01
Totals	**358,317.56**	**27,909.40**	**386,226.96**

Source: Los Angeles County Fire Department, Information Management Section, 2010.

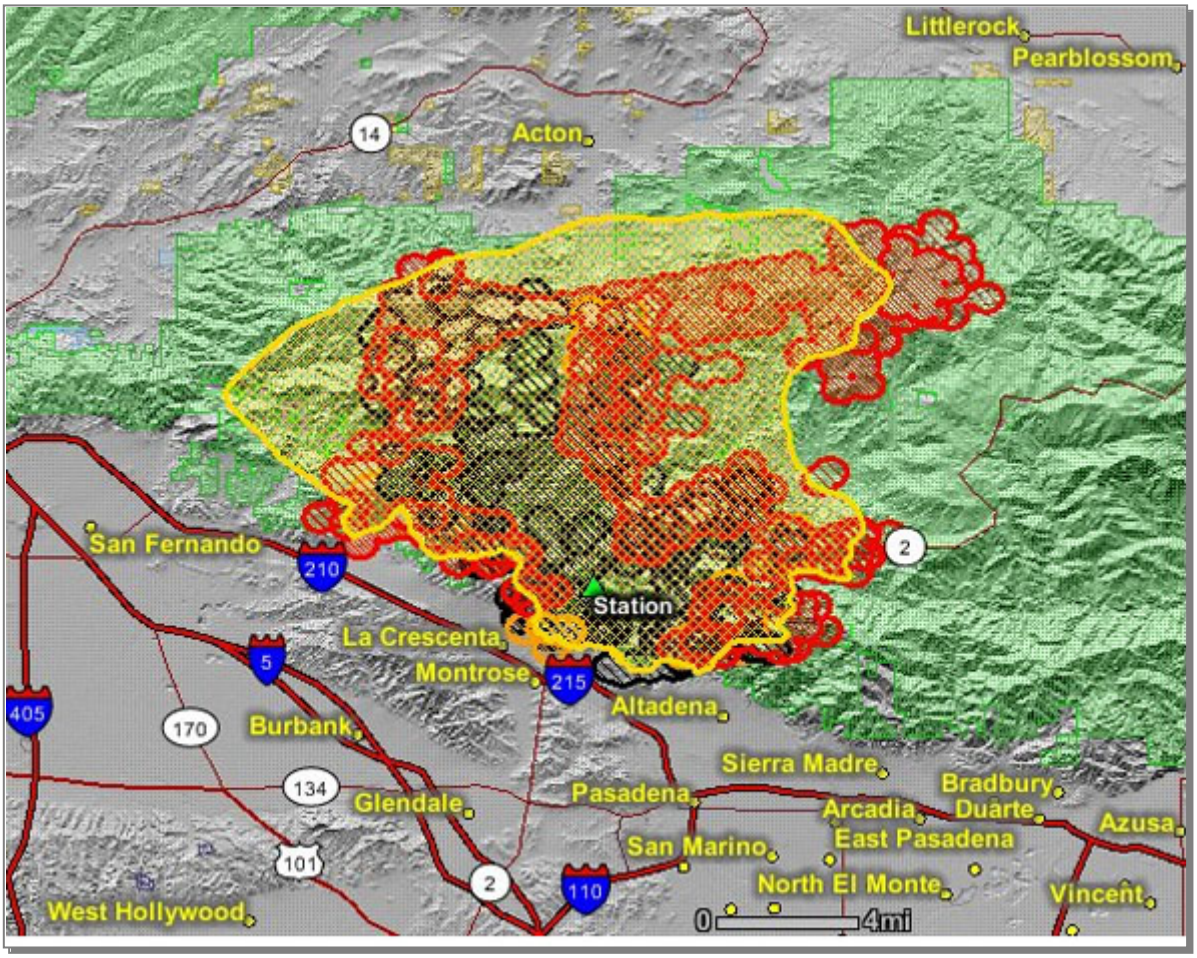
Table 7-4: Los Angeles County Wildfire Incidents, 2007–2010
(Source: Los Angeles County General Plan 2014)

Fire Name	Year	Acres Burned	Structures	
			Damaged	*Destroyed*
Buckweed/Agua Dulce	2007	38,356	30	43
Canyon	2007	4,500	14	8
Magic	2007	2,824	0	0
Ranch	2007	58,401	2	10
Meadow Ridge	2007	20	0	0
October	2007	100	0	0
Sayre	2008	11,262	0	634
Sesnon	2008	14,703	11	78
Marek	2008	4,824	10	42
Osito	2009	304	0	0
Morris	2009	2,168	0	0
Station	2009	160,577	57	209
Crown	2010	14,000	6	10
Briggs	2010	530	0	0
Totals		**312,569**	**130**	**1,034**

Source: Cal Fire Fire Incident Reports

*Data on structures damaged and destroyed was not available for all wildfires, just for the one listed above.

Map 7-14: Station Fire: Affected Areas
(Source: http://wildfiretoday.com/wp-content/uploads/2009/08/Map_Station_fire_1226a_Aug_31. jpg)



Wildland-Urban Interface (WUI) Building Codes

Wildland-urban interface (WUI) building codes that have been adopted by the California Building Standards Commission took effect January 1, 2008, and use fire hazard severity zone (FHSZ) maps as the basis for applicability of certain code sections. FHSZ maps will follow established adoption processes required by state statute (see http://osfm.fire.ca.gov/strucfireengineer/pdf/bml/wuiproducts.pdf).

CALIFORNIA DEPARTMENT of FORESTRY
and FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL

WILDLAND URBAN INTERFACE (WUI) PRODUCTS

Published by *CAL-FIRE*
FIRE ENGINEERING DIVISION
BUILDING MATERIALS LISTING PROGRAM

Revised April 11, 2011

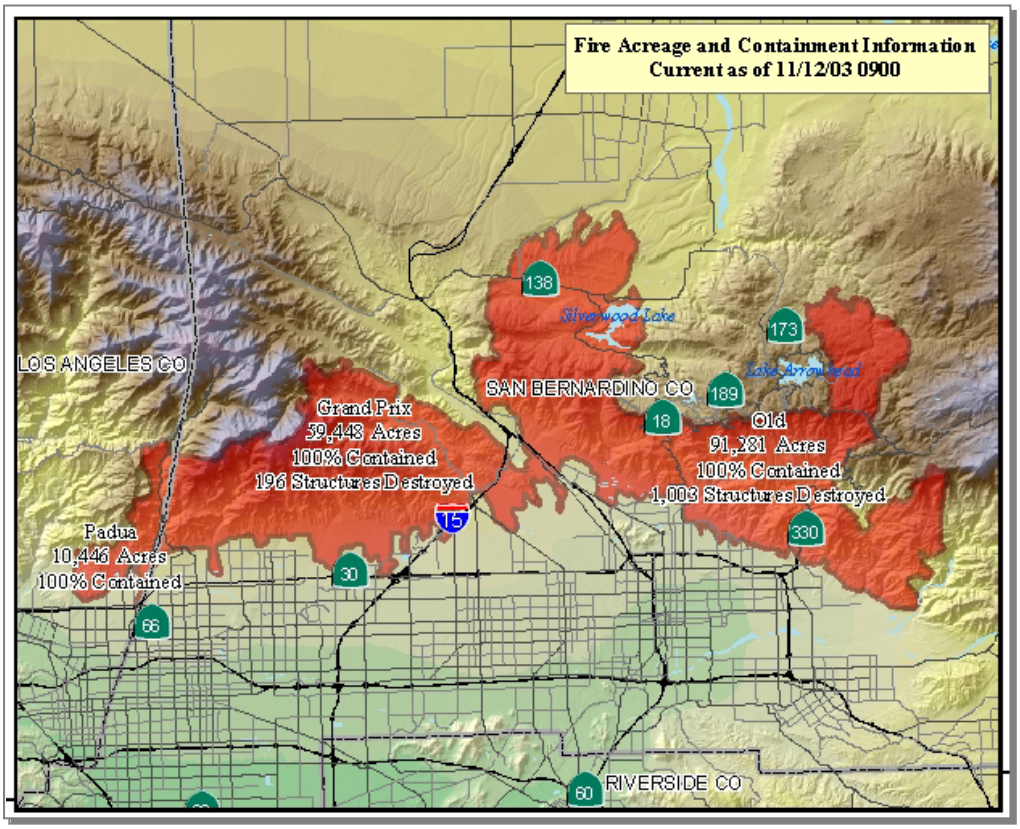
http://osfm.fire.ca.gov/strucfireengineer/pdf/bml/wuiproducts.pdf

To read the entire document go to: http://osfm.fire.ca.gov/strucfireengineer/pdf/bml/wuiproducts.pdf

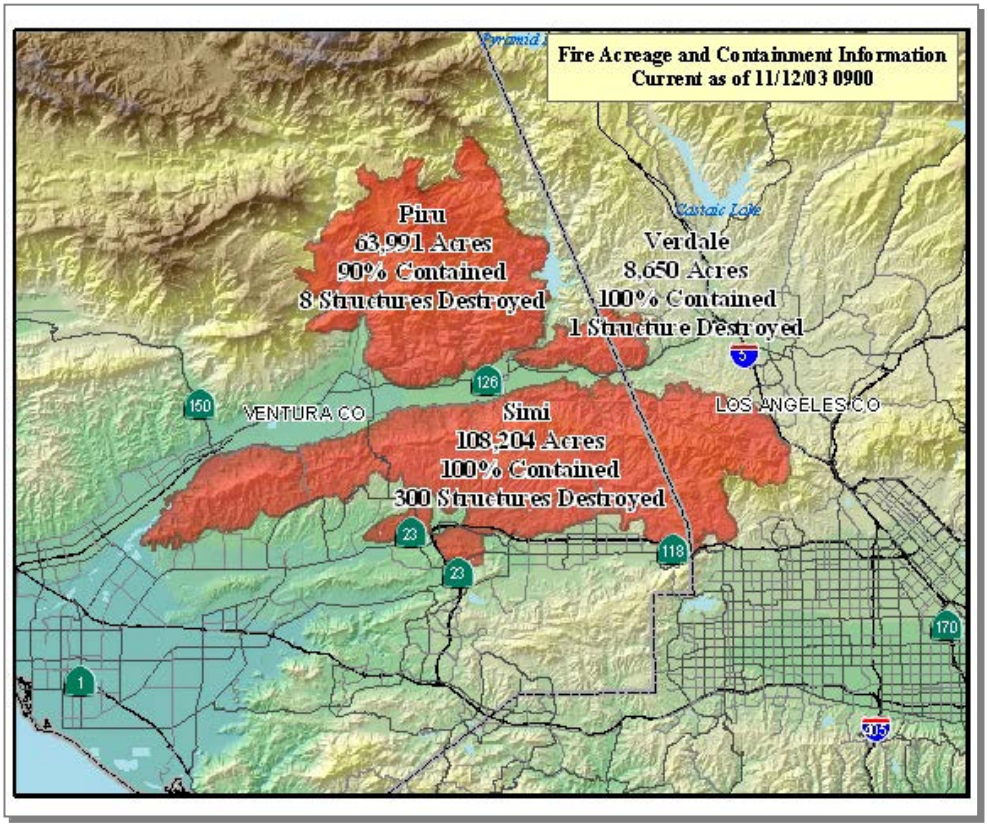
Image 7-1: Station Fire Smoke over the City of Los Angeles



Grand Prix Fire within Los Angeles County (11/2003)



Simi and Verdale Fires within Los Angeles County (11/2003)



The 2007 Southern California Fires

In October 2007, California experienced its second catastrophic wildland firestorm within a four-year period. In the wake of this disaster, the independent Blue Ribbon Task Force, established after the fires of 2003, was asked to provide advice on the critical issues facing the state's fire service.

Twenty-three wildfires driven by powerful Santa Ana winds spread across Southern California from Malibu to San Diego County between Oct. 20 and Oct. 21, 2007. A month later, in the early hours of November 24, another destructive wildfire struck Malibu. These destructive fires eventually claimed 10 lives and injured 292 people. The fires burned 522,398 acres, destroying more than 3,290 structures and damaging 292 others.

FEMA began mobilizing Oct. 21, even as tens of thousands of residents were still evacuating threatened areas. By Oct. 23, President Bush had signed an emergency declaration in support of state and local agencies. The following day, the president signed a major disaster declaration for seven counties: Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, and Ventura.

(Source: http://www.fema.gov/about/regions/regionix/ca_fires.shtm)

CAL FIRE Fire Suppression Cost

(Fiscal Year July 2007 – June 2008): $524 million

Dollar Damage Costs

(CAL FIRE jurisdiction): $254.1 million

Structures Destroyed

(CAL FIRE jurisdiction): 3,079

(Source: http://www.fire.ca.gov/communications/downloads/fact_sheets/2007Summary.pdf)

Top Five Fires In Acreage Burned (CAL FIRE Jurisdiction)

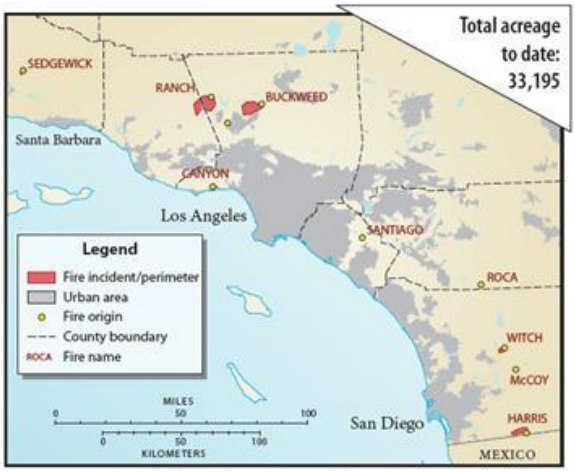
Fire	Start	Contained	County	**Acres**	Structures Destroyed	Cause
Zaca	7/4	9/2	Santa Barbara	**240,207**	1	Human
Witch	10/21	10/31	San Diego	**197,990**	1650	Equip. Use
Harris	10/21	10/31	San Dieog	**90,440**	472	Under Investigation
Poomacha	10/23	11/10	San Diego	**49,410**	217	Under Investigation
Lick	9/3	9/11	Santa Clara	**47,760**	24	Debris

Top Five Fires In Structures Destroyed (CAL FIRE Jurisdiction)

Fire	Start	Contained	County	Acres	**Structures Destroyed**	Cause
Witch	10/21	10/31	San Diego	197,990	**1,650**	Equip. Use
Harris	10/21	10/31	San Diego	9,472	**472**	Misc.
Rice	10/22	10/28	San Diego	90,440	**248**	Under Investigation
Poomacha	10/23	11/10	San Diego	49,410	**217**	Under Investigation
Corral	11/24	11/27	Los Angeles	4,901	**80**	Human

Progression of the 2007 Wildfires

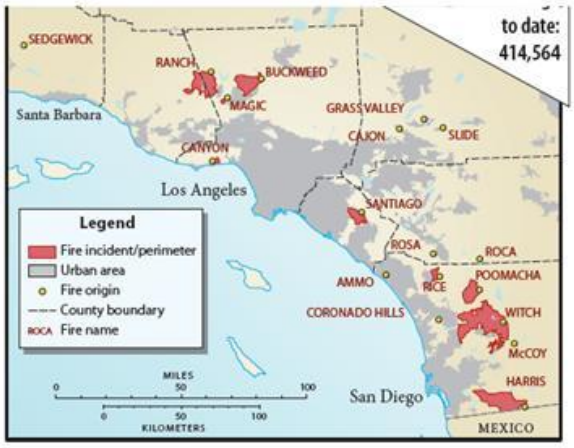
Sunday, October 21, 2007



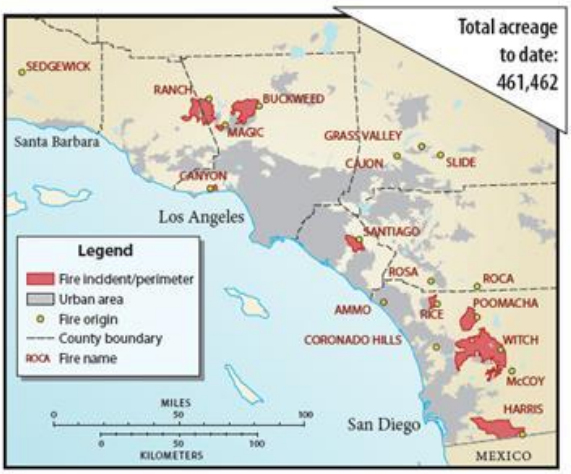
Monday, October 22, 2007



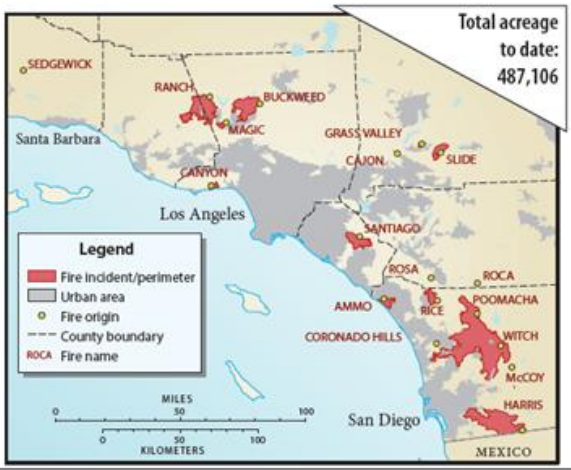
Tuesday, October 23, 2007



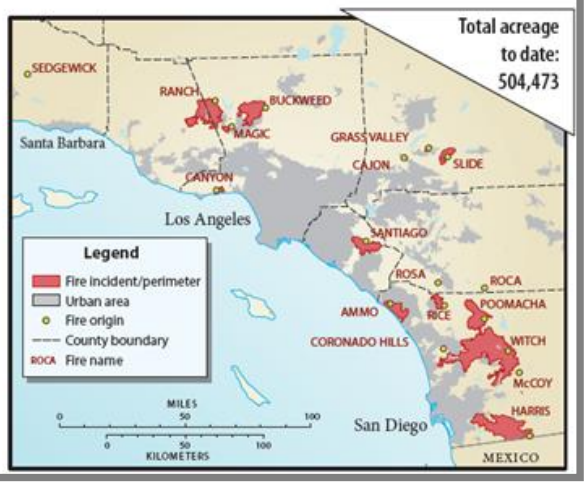
Wednesday, October 24, 2007



Thursday, October 25, 2007



Friday, October 26, 2007



Wildfire Smoke

Characteristics of Wildfire Smoke

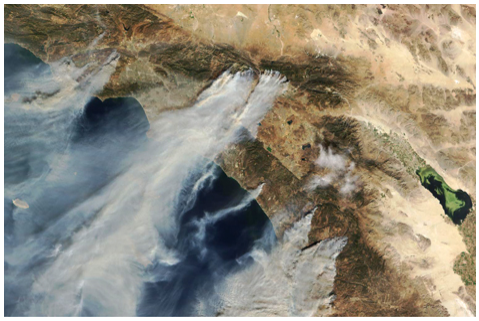


The behavior of smoke depends on many factors, including the fire's size and location, the topography of the area, and the weather. Inversions are common in mountainous terrain. Smoke often fills the valleys, where people usually live. Smoke levels are unpredictable; a wind that usually clears out a valley may simply blow more smoke in, or may fan the fires, causing a worse episode the next day. Smoke concentrations change constantly. By the time public health officials can issue a warning or smoke advisory, the smoke may already have cleared. National Weather Service satellite photos, weather and wind forecasts, and knowledge of the area can all help in predicting how much smoke will come into an area, but predictions are rarely accurate for more than a few hours.

Estimating Particulate Matter Levels

Particulate matter levels are measured in micrograms (mg) of particles per cubic meter of air. Most particle monitoring devices measure particulate matter with a median diameter of 10 micrometers or less (PM10). An increasing number of monitors now measure smaller particles, also known as fine particles, which have median diameters of 2.5 micrometers or less (PM2.5). In wildfire smoke, most particles are less than 1 micrometer, so the values obtained by measuring either PM10 or PM2.5 are virtually interchangeable, and are treated as such in this document.

Communities with established air quality programs may issue public alerts based on predicted 24-hour average concentrations of particulate matter. Smoke emergencies need to be handled differently, however, as smoke concentrations generally tend to be very high for only a few hours at a time. These short-term peaks may cause some of the most deleterious health effects.



Another factor is public perception. Since smoke is so effective at scattering light, visibility changes drastically as smoke concentrations increase. Even without being told, the public can tell when the smoke is getting worse, and they want authorities to respond to changes as they are happening. Many communities don't have continuous PM monitoring, and therefore need to estimate particle levels. Continuous PM monitors give an instant reading of particulate matter concentrations. However, visibility can sometimes serve as a good surrogate. Even in areas with monitors, this index can be useful, since smoke levels change constantly and can vary dramatically—even between monitors that are near one another. A visibility index gives members of the public a quick way to assess smoke levels for themselves.

Table 7-5: Estimating Particulate Matter Concentrations from Visibility Assessment

Categories	Visibility in Miles	Particulate matter levels* (1-hour average, $\mu g/m^3$)
Good	10 miles and up	0 - 40
Moderate	6 to 9	41 - 80
Unhealthy for Sensitive Groups	3 to 5	81 - 175
Unhealthy	1 1/2 to 2 1/2	176 - 300
Very Unhealthy	1 to 1 1/4	301 - 500
Hazardous	3/4 mile or less	over 500

*In wildfire smoke, most particles are less than one micrometer, so the values obtained by measuring either PM_{10} or $PM_{2.5}$ are virtually interchangeable, and are treated as such in this document. Therefore, in the table above, the different particle levels can be measured using either PM_{10} or $PM_{2.5}$ monitors.

Smoke Hazards as a Result of Wildland Fires

Smoke is composed primarily of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons and other organic chemicals, nitrogen oxides, trace minerals, and several thousand other compounds. The actual composition of smoke depends on the fuel type, the temperature of the fire, and the wind conditions. Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenolics, oils, fats, resins, waxes, and starches, all of which produce different compounds when burned.

Particulate matter is the principal pollutant of concern from wildfire smoke for the relatively short-term exposures (hours to weeks) typically experienced by the public. Particulate matter is a generic term for particles suspended in the air, typically as a mixture of both solid particles and liquid droplets. Particles from smoke tend to be very small—less than 1 micrometer in diameter. For purposes of comparison, a human hair is about 60 micrometers in diameter. Particulate matter in wood smoke has a size range near the wavelength of visible light (0.4–0.7 micrometers). Thus, smoke particles efficiently scatter light and reduce visibility. Moreover, such small particles can be inhaled into the deepest recesses of the lung, and are thought to represent a greater health concern than larger particles.

Another pollutant of concern during smoke events is carbon monoxide. Carbon monoxide is a colorless, odorless gas produced by incomplete combustion of wood or other organic materials. Carbon monoxide levels are highest during the smoldering stages of a fire. Other air pollutants such as acrolein, benzene, and formaldehyde are present in smoke, but in much lower concentrations than particulate matter and carbon monoxide.

The effects of smoke range from eye and respiratory tract irritation to more serious disorders, including reduced lung function, bronchitis, exacerbation of asthma, and premature death. Studies have found that fine particles are linked (alone or with other pollutants) with increased mortality and aggravation of preexisting respiratory and cardiovascular disease. In addition, particles are respiratory irritants, and exposures to high concentrations of particulate matter can cause persistent cough, phlegm, wheezing, and difficulty breathing. Particles can also affect healthy people, causing respiratory symptoms, transient reductions in lung function, and pulmonary inflammation.

Particulate matter can also affect the body's immune system and make it more difficult to remove inhaled foreign materials from the lung, such as pollen and bacteria. The principal public health threat from short-term exposure to smoke is considered to come from exposure to particulate matter.

Wildfire smoke also contains significant quantities of respiratory irritants. Formaldehyde and acrolein are two of the principal irritant chemicals that add to the cumulative irritant properties of smoke, even though the concentrations of these chemicals individually may be below levels of public health concern.

Sensitive Populations

Most healthy adults and children will recover quickly from smoke exposures, and will not suffer long-term consequences. However, certain sensitive populations may experience more severe short-term and chronic symptoms from smoke exposure. Much of the information about how particulate matter affects these groups has come from studies involving airborne particles in cities, though a few studies examining the effects of exposure to smoke suggest that the health effects of wildfire smoke are likely to be similar. More research is needed to determine whether particles from wildfires affect susceptible subpopulations differently.

Individuals with asthma and other respiratory diseases: Levels of pollutants that may not affect healthy people could cause breathing difficulties for people with asthma or other chronic lung diseases. Asthma (a term derived from the Greek word for panting) is a condition characterized by chronic inflammation of the airways, with intermittent bronchial constriction and airflow obstruction, causing shortness of breath, wheezing, chest tightness, and coughing, sometimes accompanied by excess phlegm production. During an asthma attack, the muscles tighten around the airways and the lining of the airways becomes inflamed and swollen, constricting the free flow of air. Because children's airways are narrower than those of adults, irritation that would create minor problems for an adult may result in significant obstruction in the airways of a young child. However, the highest mortality rates from asthma occur among older adults. Individuals with chronic obstructive pulmonary disease (COPD), which is generally considered to encompass emphysema and chronic bronchitis, may also experience a worsening of their conditions because of exposure to wildfire smoke. Patients with COPD often have an asthmatic component to their condition, which may result in their experiencing asthma-like symptoms. However, because their pulmonary reserve has typically been seriously compromised, additional bronchial constriction in individuals with COPD may result in symptoms requiring medical attention. Epidemiological studies have indicated that individuals with COPD run an increased risk of requiring emergency medical care after exposure to particulate matter or forest fire smoke. Exposure to smoke may also depress the lung's ability to fight infection. People with COPD may develop lower respiratory infections after exposure to wildfire smoke, which may require urgent medical care as well. In addition, because COPD is usually the result of many years of smoking, individuals with this condition may also have heart disease, and are potentially at risk from both conditions.

Individuals with airway hyper-responsiveness: A significant fraction of the population may have airway hyper-responsiveness, an exaggerated tendency of the bronchi and bronchioles to constrict in response to respiratory irritants and other stimuli. While airway hyper-responsiveness is considered a hallmark of asthma, this tendency may also be found in many non-asthmatics as well (for example, during and following a lower respiratory tract infection). In such individuals, smoke exposure may cause bronchial spasms and asthma-like symptoms.

Individuals with cardiovascular disease: Diseases of the circulatory system include, among others, high blood pressure; cardiovascular diseases, such as coronary artery disease and congestive heart failure; and cerebro-vascular conditions, such as atherosclerosis of the arteries bringing blood to the brain. These chronic conditions can render individuals susceptible to attacks of angina pectoris, heart attacks, sudden death due to a cardiac arrhythmia, acute congestive heart failure, or stroke.

Cardiovascular diseases represent the leading cause of death in the United States, responsible for about 30% to 40% of all deaths each year. The vast majority of these deaths are in people over the age of 65. Studies have linked urban particulate matter to increased risks of heart attacks, cardiac arrhythmias, and other adverse effects in those with cardiovascular disease. People with chronic lung or heart disease may experience one or more of the following symptoms: shortness of breath; chest tightness; pain in the chest, neck, shoulder, or arm; palpitations; or unusual fatigue or lightheadedness. Chemical messengers released into the blood because of particle-related lung inflammation may increase the risk of blood clot formation, angina episodes, heart attacks, and strokes.

The elderly: In several studies, researchers have estimated that tens of thousands of elderly people die prematurely each year from exposure to particulate air pollution. This is probably because the elderly are more likely to have preexisting lung and heart diseases, and therefore are more susceptible to particle-associated effects. The elderly may also be more affected than younger people because important respiratory defense mechanisms may decline with age. Particulate air pollution can compromise the function of alveolar macrophages (cells involved in immune defenses in the lungs), potentially increasing susceptibility to bacterial or viral respiratory infections.

Children: Children, even those without any preexisting illness or chronic conditions, are considered a sensitive population because their lungs are still developing, making them more susceptible to air pollution than healthy adults. Several factors lead to increased exposure in children compared with adults: they tend to spend more time outside; they engage in more vigorous activity; and they inhale more air (and therefore more particles) per pound of body weight. Studies have shown that particulate pollution is associated with increased respiratory symptoms and decreased lung function in children, including symptoms such as episodes of coughing and difficulty breathing. These can result in school absences and limitations of normal childhood activities.

Pregnant women: While there have not been studies of the effects of exposure to wildfire smoke on pregnancy outcomes, there is substantial evidence of adverse effects of repeated exposures to cigarette smoke, including both active and passive smoking. Wildfire smoke contains many of the same compounds as cigarette smoke. In addition, recent data suggest that exposures to ambient air pollution in cities may result in low birth weight and possibly other, more serious adverse reproductive effects. Therefore, it would be prudent to consider pregnant women as a potentially susceptible population as well.

Smokers: People who smoke, especially those who have smoked for many years, have already compromised their lung function. However, due to adaptation of their lungs to ongoing irritation, smokers are less likely to report symptoms from exposure to irritant chemicals than are nonsmokers. However, they may still be injured by wildfire smoke. Therefore, some smokers may unwittingly put themselves at greater risk of potentially harmful wildfire smoke exposures, believing that they are not being affected.

Hazards Associated with Cleanup of Wildland Fires

Heat sources may remain as a result of smoldering wood or other debris that could reignite if contact is made with a combustible material, or if oxygen becomes available. Workers and employers must therefore take extra precautions.



Cleanup activities may involve walking on unstable surfaces such as construction debris, trees, and other vegetation. Piles of debris and other unstable work surfaces create a risk for traumatic injury from slips, falls, puncture wounds from nails and sharp objects, and collapsing materials. Extreme caution is necessary when working on these surfaces. Protective equipment, such as hard hats, safety glasses, leather gloves, and steel-toe boots should be considered to minimize the risk of injury.

Cleanup workers are at risk of developing serious musculoskeletal injuries to the hands, back, knees, and shoulders. Special attention is needed to avoid back injuries associated with manual lifting and handling of debris and building materials.

Cleanup workers are also at serious risk of developing heat stress. Excessive exposure to hot environments can cause a variety of heat-related problems, including heat stroke, heat exhaustion, heat cramps, and fainting.

Image 7-2: Fire Cleanup Crew



Fires can rearrange and damage natural walkways, as well as sidewalks, parking lots, roads, and buildings. Never assume that fire-damaged structures or ground are stable. Buildings that have been burned may have suffered structural damage, and could be particularly dangerous.

Fires to commercial and residential buildings, and the water used to fight the fire, can dislodge tanks, drums, pipes, and equipment—which may contain hazardous materials such as pesticides or propane. Containers may also be damaged by fire and heat.

Los Angeles County Fire Plan

The Forestry Division's Fire Plan Unit is in charge of implementing the California fire plan in Los Angeles County. The State Board of Forestry and CAL FIRE have drafted a comprehensive document for wildland fire protection in California. The planning process defines a level of service measurement, considers assets at risk, incorporates the cooperative interdependent relationships of wildland fire protection providers, provides for public stakeholder involvement, and creates a fiscal framework for policy analysis. The County of Los Angeles, through its fire department, is one of six contract counties that maintain a contractual relationship with CAL FIRE, and the county utilizes the *California Fire Plan* within Los Angeles County as the primary wildland fire protection plan.

The most effective way to limit damage and loss due to wildfire is to prevent all but the most blatant ignitions due to arson or unforeseeable circumstances. The focus of the entire department is on prevention through educational programs; development and enforcement of fire codes and building codes in the very high fire hazard severity zones; pre-fire planning; vegetation management; brush clearance; environmental review; and fuel modification programs. These programs are focused on awareness and mitigation of fire causes, fire spread potential, and the total costs and effects of fire damage associated with the protection of life, property, and the environment.

The department's Fire Plan Unit coordinates the efforts and activities of these programs with the intent of creating efficient and timely pre-fire management projects.

The fire plan framework identifies for state, federal, and local officials, and for the public, those areas of concentrated assets and high risk. Its specific goals are as follows:

- Allow the Los Angeles County Fire Department to create a more efficient fire protection system focused on meaningful solutions for identified problem areas.
- Give citizens an opportunity to identify public and private assets to design and carry out projects to protect those assets.
- Identify, before fires start, where cost-effective pre-fire management investments can be made to reduce taxpayer cost and citizen losses from wildfires.
- Encourage an integrated intergovernmental approach to reducing costs and losses.
- Enable policymakers and the public to focus on what can be done to reduce the future costs of and losses from wildfire.

Los Angeles County Fire Department

The history of the Los Angeles County Fire Department started in the early 1900s with the formation of two separate departments. The County Forester was in charge of protecting forest lands and responsible for planting and maintaining the landscape, and the county fish and game warden was assigned the additional position of county fire warden.

In 1919, over 135,000 acres of wildland fires blackened the County of Los Angeles, prompting the merging of these two separate departments and resulting in a greater emphasis on fire suppression. Between September 1923 and 1925, 31 separate fire districts were formed, with the first two being in Signal Hill and Santa Monica Canyon.

In 1956, the late Fire Chief Emeritus Keith E. Klinger created the visionary Lakewood Plan, allowing incorporated cities within the county to contract with the department for fire protection services. Today, 57 cities contract with the County of Los Angeles Fire Department, which staffs a total of 163 engine companies, 31 truck companies, 79 paramedic units, and numerous other pieces of specialized apparatus.

The Los Angeles County Fire Department is credited with the creation of the nation's second firefighter paramedic program and the nation's first 911 emergency calling system. Throughout its history, the department has emerged as a leader in the fire service on local, regional, and national levels, growing to become the nation's second largest fire protection agency.

The Los Angeles County Fire Department operates with 9 divisions, 21 battalions, 159 fire stations, and 10 fire suppression camps, and answers over 234,000 emergency calls annually. The department has several divisions (Planning, Information Management, Fire Prevention, Air and Wildland, Lifeguard, Forestry, and Health Hazardous Materials) that provide valuable services to the more than 3.5 million people who reside in the 1.1 million housing units located throughout the department's 2,278–square mile area.

The Los Angeles County Fire Department currently has 159 fire stations, 235 fire engines, 21 ladder trucks, 20 grass units, 85 paramedic squads, 11 wildland fire suppression camps, 8 bulldozers, 7 helicopters, 23 prevention offices, 12 forestry units, and numerous other response vehicles and facilities.

The department serves 57 incorporated cities, as well as the unincorporated areas of the county. (Source: http://fire.lacounty.gov/)

Wildland Fire Protection Strategy

Prevention



The most effective way to limit damage and loss due to wildfire is to prevent all but the most blatant ignitions that arise due to arson or unforeseeable circumstances. The focus of the entire department is on prevention through educational programs' development and enforcement of fire codes and building codes in the very high fire hazard severity zones; pre-fire planning; vegetation management; brush clearance; environmental review; and fuel modification programs. These programs are focused on awareness and mitigation of fire causes, fire spread potential, and the total costs and effects of fire damage associated with the protection of life, property, and the environment. The department's Fire Plan Unit coordinates the efforts and activities of these programs with the intent of creating efficient and timely pre-fire management projects.

Vegetation Management

The Forestry Division's Vegetation Management Unit samples vegetation and produces a bimonthly live fuel moisture report for Los Angeles County. Fuel moisture content describes the moisture content within the vegetation/fuel. Moisture content is the single most important factor that determines how much of the total fuel is available for burning, and ultimately, how much is consumed. Fuel moisture determines if certain fuels will burn, how quickly and completely they will burn, and what phases of combustion the fuels will support. Fuels with a higher moisture content reduce the rate of energy release during a fire. This is due to absorption of heat by the moisture in the vegetation, making it less available to preheat fuel particles to ignition temperature (Burgan and Rothermel 1984). Ignition will not occur if the heat required to evaporate the moisture in the fuels is more than the amount available in the firebrand (Simard 1968).

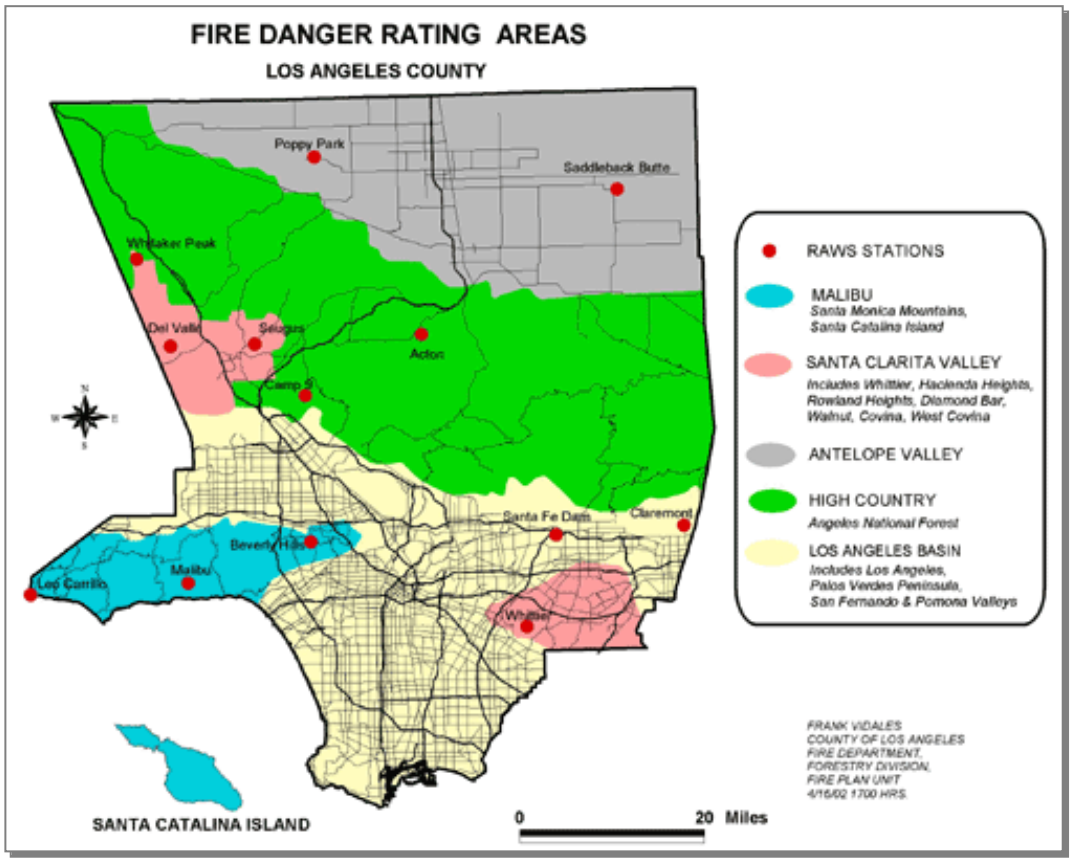
Fuel moisture content is the percentage of the fuel weight represented by water, based on the dry weight of the fuel. The equation can be stated as follows: percent moisture content = weight of water/oven-dry weight of fuel x 100. Moisture content can be greater than 100% because the water in a fuel particle may weigh considerably more than the dry fuel itself. For example, a green leaf may contain three times as much water as there is dry material, leading to a moisture content of 300%. Moisture content of duff and organic soil can be over 100%.

Vegetation management, as it relates to wildland fire, refers to the total or partial removal of high fire hazard grasses, shrubs, or trees. This includes thinning to reduce the amount of fuel, and modification of the vegetation arrangement and distribution to disrupt fire progress. In addition to fire hazard reduction, vegetation management has other benefits. These include increased water yields, improved habitat for wildlife, reduction of invasive exotic plant species, and open access for recreational purposes.

The Vegetation Management Program (VMP) is a cost-sharing program that focuses on the use of prescribed fire, mechanical, biological, and chemical means for addressing wildland fire fuel hazards and other resource management issues on state responsibility area (SRA) and local responsibility area (LRA) lands. The use of prescribed fire mimics natural processes, restores fire to its historic role in wildland ecosystems, and provides significant fire hazard reduction benefits that enhance public and firefighter safety.

VMP allows private landowners to enter into a contract with CAL FIRE to use prescribed fires to accomplish a combination of fire protection and resource management goals. The Forestry Division's Vegetation Management Unit and the Air and Wildland Division's Prescribed Fire Office implement the VMP projects that fit within the department's priority areas (i.e., those identified through the fire plan) and that are considered to be of most value to the county. The Vegetation Management Program typically treats about 40,000 acres each year statewide.

Map7-15: Fire Danger Rating Areas in Los Angeles County
(Source: http://fire.lacounty.gov/forestry/FireWeatherDangerMap.asp)



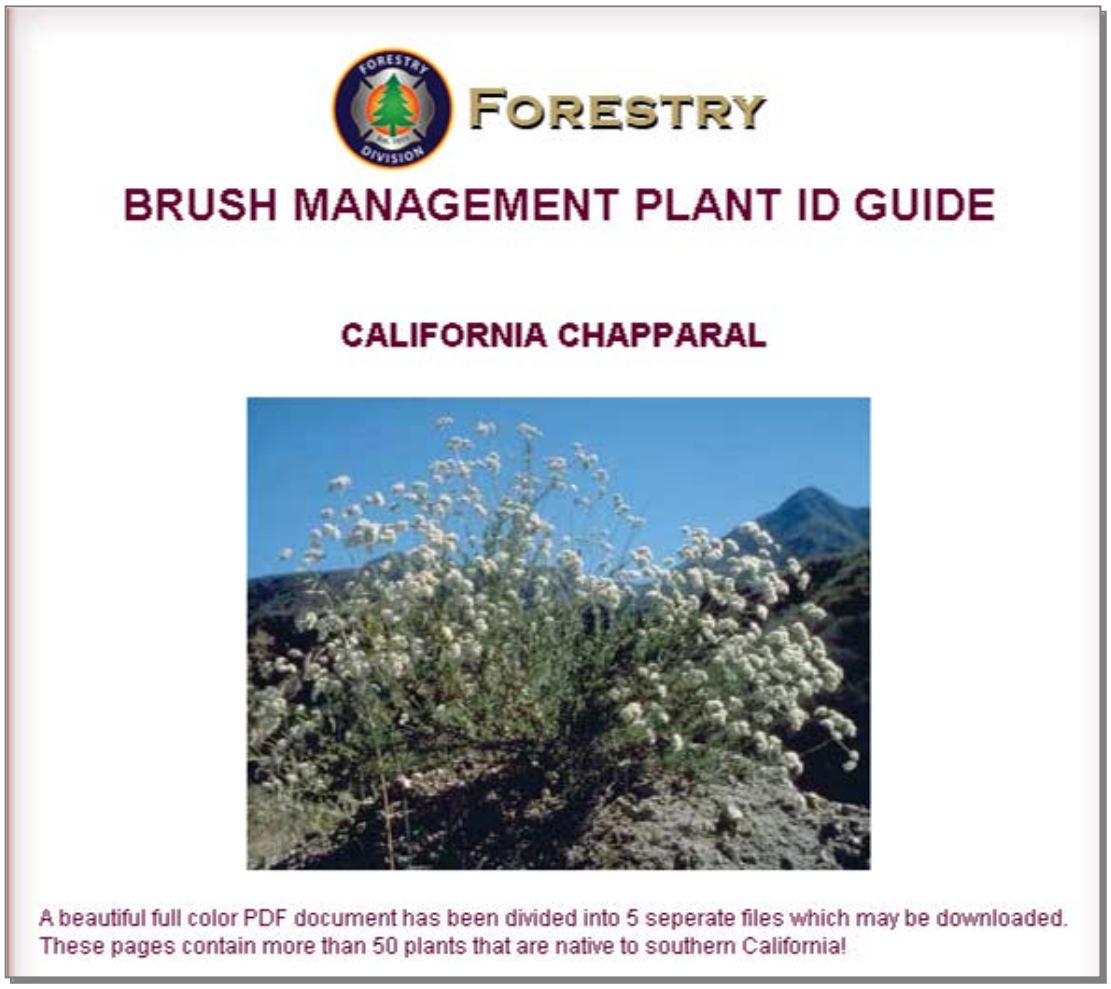
Brush Clearance

The Brush Clearance Program is a joint effort between the Los Angeles County Fire Department and the County of Los Angeles Department of Agricultural Commissioner/Weights and Measures, Weed Hazard and Pest Abatement Bureau (Weed Abatement Division). This unified enforcement unit legally declares both improved and unimproved properties a public nuisance, and, where necessary, requires the clearance of hazardous vegetation. These measures create "defensible space" for effective fire protection of property, life, and the environment. The department's Brush Clearance Unit enforces the fire codes as they relate to brush clearance on improved parcels; coordinates inspections and compliance efforts with fire station personnel; and provides annual brush clearance training to fire station personnel.

The brush clearance guide can be found at:
http://fire.lacounty.gov/forestry/BrushManagementPlantIDGuide.asp.

This guide describes the types of plants and brush in the area, along with the proper maintenance recommendations.

Image 7-3: Brush Management Plant ID Guide
(Source: http://fire.lacounty.gov/forestry/BrushManagementPlantIDGuide.asp)



Fuel Modification

The objective of the Fuel Modification Program is to create the defensible space necessary for effective fire protection in newly constructed and remodeled homes within the department's very high fire hazard severity zones (VHFHSZ). Fuel modification reduces radiant and convective heat, and provides valuable defensible space that enables firefighters to make an effective stand against an approaching fire front. Fuel modification zones are strategically placed as a buffer to open space or areas of natural vegetation, and generally would occur surrounding the perimeter of a subdivision, commercial development, or isolated development of a single-family dwelling.

The fuel modification plan identifies specific zones within a property that are subject to fuel modification. A fuel modification zone is a strip of land where combustible native or ornamental vegetation has been modified or partially or totally replaced with drought-tolerant, low-fuel-volume plants.

The Fuel Modification Unit provides guidelines and reviews the landscape and irrigation plans submitted by the property owner for approval before construction or remodeling of a structure. The fuel modification plans vary in complexity, and reflect the fire history, the amount and type of vegetation, the arrangement of the fuels, topography, local weather patterns, and the construction, design, and placement of structures.

Environmental Review

The Environmental Review Unit works with the County of Los Angeles Department of Regional Planning in implementing environmental ordinances. The unit personnel review all county oak tree permit applications submitted to the Department of Regional Planning and develop recommendations for implementation. Additionally, the unit personnel produce environmental documentation and recommendations such as non-significant impact documents, negative declarations, and mitigation measures consistent with the California Environmental Quality Act (CEQA) mandates for construction projects and developments. The Environmental Review Unit ensures that the statutory responsibilities of the fire department's Forestry Division are addressed in the project planning phase.

Passive Protection

When the inevitable wildfire does occur, the primary protection of life, property, and the environment will come from passive protection such as defensible space (fuel reduction/brush clearance), fire-resistive landscaping, fire-resistive construction, and good housekeeping. Sufficient firefighting water sources must be on site for use by the property owner and the fire department. Moreover, residents must have the means of self-evacuating and escaping danger through safe and sufficient egress routes, while appropriate ingress routes are kept available for responding fire equipment. The sum effect of passive protection is a force multiplier for active firefighting resources. A single firefighting resource may protect many more structures when passive protection is properly employed. In some cases, firefighting resources may not be necessary at all—thus freeing them for other uses.

Environmental Review Oak Tree Care and Maintenance

The *Oak Tree Care and Maintenance Guide* offers basic information and practical guidelines aimed at the preservation and continued health and survival of oak trees in the residential landscape. Increasing pressure for development is changing the oak woodland of Los Angeles County. Heritage oaks that once survived in open rolling hills are now being preserved or replanted and incorporated into the community. How do we protect these trees during the planning and development process, and ensure their survival once they are in the home garden? Oak trees in the residential landscape often suffer decline and early death due to conditions that are easily preventable. Damage can often take years to become evident, and by the time the trees show obvious signs of disease it is usually too late to help. Improper watering (especially during the hot summer months) and disturbance to critical root areas are most often the causes. This section provides guidelines on where these critical areas lie, ways to avoid disturbing oak trees, and information on long-term care and maintenance of both natural and planted oaks. Lists of additional resources for more information and demonstration areas to visit are also included.

The Los Angeles County Oak Tree Ordinance has been established to recognize oak trees as significant historical, aesthetic, and ecological resources. The goal of the ordinance is to create favorable conditions for the preservation and propagation of this unique and threatened plant heritage. By making this part of the development process, healthy oak trees will be preserved and maintained. The Los Angeles County Oak Tree Ordinance applies to all unincorporated areas of the county. Individual cities may have their own ordinances, and their requirements may be different.

Permit requirements: Under the Los Angeles County Oak Tree Ordinance, a person shall not cut, destroy, remove, relocate, inflict damage, or encroach into the protected zone (see text) of any ordinance-sized tree of the oak tree genus without first obtaining a permit. Damage includes but is not limited to the following:

- Burning
- Application of toxic substances
- Pruning or cutting
- Trenching
- Excavating
- Paving
- Operation of machinery or equipment
- Changing the natural grade
- Chapter 22.56.2050: Oak Tree Permit

Regulations, Los Angeles County, Adopted:
August 20, 1982. Amended: September 13, 1988.

For more information about the County Oak Tree Ordinance, visit the Forestry Division's Web site at: http://lacofd.org/Forestry.asp

or contact:

Department of Regional Planning
320 W. Temple Street, 13th floor
Los Angeles, CA 90012-3284
(213) 974-6411
TDD: (213) 617-2292
http://planning.co.la.ca.us

Types of oaks commonly found in Los Angeles County: Many kinds of oak trees are native to Los Angeles County. A few of the more common ones are shown below, but all oak trees are covered by the Oak Tree Ordinance. Older oaks that have thrived under the natural rainfall patterns of dry summers and wet winters often can't handle the extra water of a garden setting. These trees must be treated with special care if they are to survive. Those oaks that have been planted into the landscape or sprouted naturally tend to be more tolerant of watered landscapes. These vigorous young trees may grow 1½ to 4 feet a year in height under good conditions. Once established, these trees would benefit from the same special care outlined in the guide.

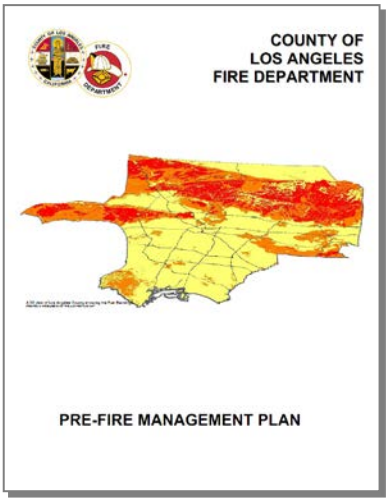
(Source: http://fire.lacounty.gov/Forestry/EnvironmentalReview_OakTreeCareAndMaint.asp)

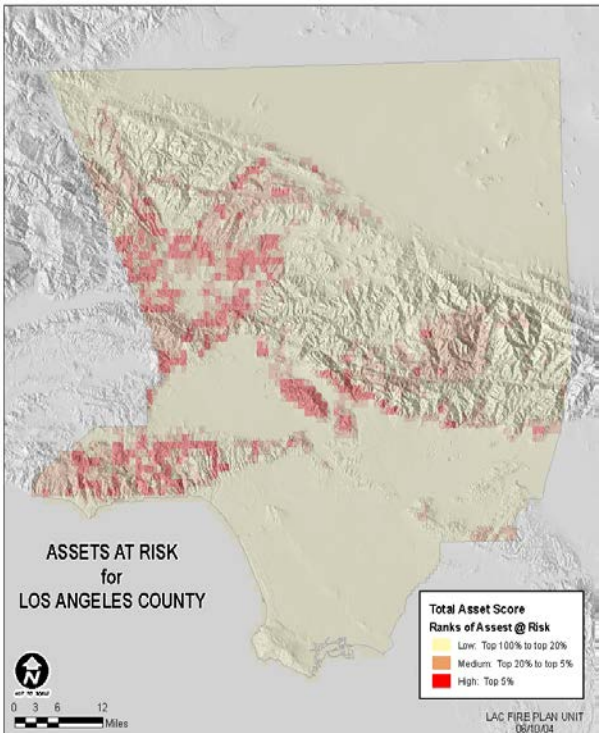
Fire Suppression

The most effective time to control a wildfire is in the incipient stages, when intensities are lower and the perimeter is small. The combined resource attack is a coordinated suppression effort that includes ground assets (engines, crews, and bulldozers), aviation assets (fixed and rotary wing), passive fire protection measures, and command elements. Using in-place passive fire protection systems, incident commanders weave the varied active fire suppression assets into an aggressive and coordinated firefighting effort.

Stakeholders

A "stakeholder" can be defined as any person, agency or organization with a particular interest or stake in fire safety and the protection of assets from wildfires. The stakeholders already identified include federal, state, local, and private agencies, as well as other interest groups with assets at risk from wildfire. The Los Angeles County Fire Department is constantly attempting to involve as many stakeholders as possible in the development of the Department's *Pre-Fire Management Plan* (http://fire.lacounty.gov/Forestry/PDF/LACoFDPre-FireMgmt.pdf 6-23-04 ([updated 2011]). Identifying stakeholders and their interests is an ongoing process, and will be evaluated continuously through the evolution of future pre-fire management plans. It is the goal of the Department to participate with as many stakeholders as is possible, and to continually update planning efforts involving stakeholder input.





This asset-at-risk map was calculated based on seven critical assets found in Los Angeles County: infrastructure, water supply, fire/flood potential, soils, air quality, scenic values, recreation, structure densities, and ecosystems.

Assets at Risk

The assets addressed in the fire plan are citizen and firefighter safety, watersheds and water, timber, wildlife and habitat (including rare and endangered species), unique areas (scenic, cultural, and historic), recreation areas, range, structures, and air quality. As part of the overall fire plan process, assets will be addressed at two levels. First, generalized assets at risk need to be identified within the county to indicate what areas contain highly valuable assets. The areas with the highest combined asset values and fire risk are then targeted for pre-fire management projects, particularly where such projects will reduce damage should a fire start in the project area during high fire hazard weather.

Second, as potential projects are identified, a subjective analysis will determine the degree to which the projects will reduce potential suppression costs and damage to assets. The asset framework and validation process will be refined as new stakeholders are identified and begin participating in the fire plan process. Diverse agencies have played a vital role in identifying the assets within Los Angeles County. Knowledge of the types and magnitudes of assets at risk of wildland fire, as well as their locations, is critical to fire protection planning.

Given the limits on fire protection resources, they should be allocated, in part, based on the magnitude of the assets being protected.

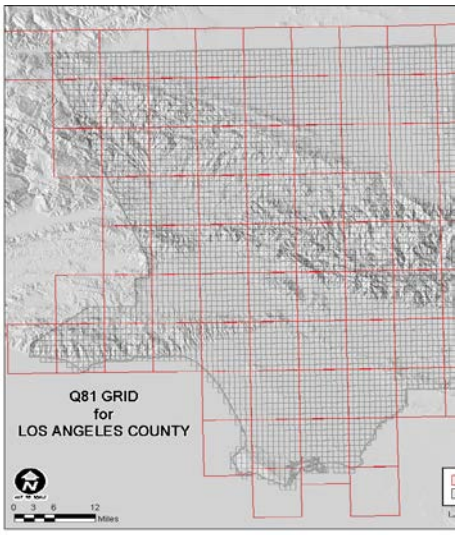
Knowledge of assets at risk is necessary to choose those pre-fire management projects that will provide the greatest benefit for a given amount of investment.

At this stage of development of the *Pre-Fire Management Plan*, the Fire Department's primary concern is reducing the fire risk and potential loss of the various assets described herein to provide for the safety and protection of life, property, and the environment—while reducing suppression costs.

Table 7-6: Assets-at-Risk Table

Asset at risk	Public issue category	Location and ranking method
Fire flood watersheds	Public safety, public welfare	Watershed with a history of problems or proper conditions for future problems. Ranks are based on affected downstream populations.
Soil	Environment	Watershed ranked based on erosion potential.
Water supply	Public health	(1) Watershed area up to 20 miles from water supply facility (high rank); (2) Grid cells containing domestic water diversions, ranked based on number of connections; (3) Cells containing ditches that contribute to the water supply systems (high rank).
Scenic value	Public welfare	Four-mile view shed around scenic highways, ranked based on potential impact to vegetation types (tree versus non-tree types).
Air quality	Public welfare, public health, environment	Potential damages to health, materials, vegetation and visibility; rank based on vegetation type and air basin.
Historic building	Public welfare	From State Office of Historic Preservation; ranked based on fire susceptibility.
Recreation	Public welfare	Unique recreation areas of areas with potential damage to facilities, with rank based on fire susceptibility.
Structures	Public welfare, public safety	Rank based on housing density and fire susceptibility.
Non-game wildlife	Public welfare, environment	Critical habitats and species location based on input from California Dept. of Fish and Game and other stakeholders.
Game wildlife	Public welfare, environment	Critical habitats and species location based on input from California Dept. of Fish and Game and other stakeholders.
Infrastructure	Public welfare, public safety	Infrastructure for delivery of emergency and other critical services (e.g., repeater sites, transmission lines).

General Description of Current Fire Situation



Determining the wildfire problem in Los Angeles County involves assessing the interrelated results of chaparral-covered, fire-dependent ecosystems; the effects of a Mediterranean climate; the values at risk; and the fire protection system's ability to deal with the occurrence of wildfires (levels of service). A major element of the California Fire Plan is its extensive assessment process, which graphically depicts fuels, weather, levels of service, and assets-at-risk data in a computer-based geographic information system (GIS). The GIS thematic layers are then continually field-validated and used to identify the wildland urban-interface/intermix fire problem. CAL FIRE's Fire and Resource Assessment Program (FRAP) has built a method for assigning fire hazard ranks to the diverse landscapes of California, using United States Geological Survey (USGS) 7.5-minute quadrangle maps, which are partitioned, nine by nine, into 81 cells. Each cell encompasses approximately 450 acres, and is referred to as a Q81st cell.

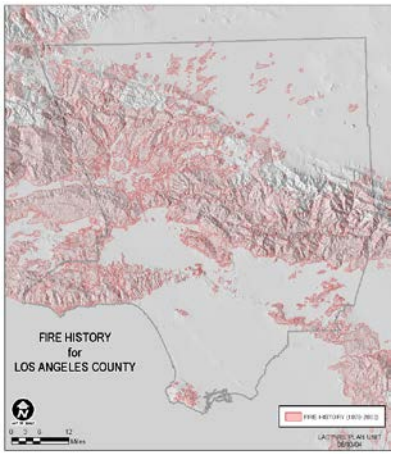
It is a commonly accepted concept that fire is a necessary part of the natural life cycle of the chaparral ecosystem in Los Angeles County. Without fire, the chaparral-covered terrain of Los Angeles County reaches an unhealthy state where the ratio of dead material to live plant structure becomes unbalanced. As the chaparral ages, more and more decadent growth adds to the fuel load (expressed in tons per acre), which contributes to the high-intensity, costly, large-loss wildfires. Historically fires occurred naturally as a result of lightning, and some were started by native inhabitants. Native Americans, during the late 18th century, were said to have purposefully burned the native vegetation to promote the growth of certain plant resources.



The occurrence of fire on a regular basis—whether natural or introduced—tended to promote ecosystem health and reduced the number of large-acreage, high-intensity fires. As the county continues to grow in population, values at risk are encroaching on and intermixing with the wildlands. Consequently, wildfires threaten the values at risk and are seen as "bad" occurrences that should be extinguished promptly. Suppression efforts are quite successful, but result in the eventual, unnatural buildup of fuel for fire, making wildfires more intense and more destructive. Although the fire protection system has become more efficient, those fires that do escape initial attack efforts can quickly overwhelm the available suppression resources. Under certain severe fire weather conditions, such as a Santa Ana wind event, wildfires can prevent initial attack resources from suppressing the fire while it is still small. The fire can spread so quickly and threaten so many values at risk that suppression resources cannot arrive quickly enough to prevent the bulk of the damage.

Fire History

The County of Los Angeles and the State of California have experienced many large, damaging, and costly wildfires. A historical look at those wildfires indicates that all other threats to life, property, and the economy pale in comparison. In one wildfire incident, the "Paint Fire" in Santa Barbara, more structures were lost, at a higher cost, than were lost in individual structure fires occurring in a 10-year period (1991–2000). Considering that the county has experienced many catastrophic fires of this nature, it is evident that addressing the wildfire problem needs to be a top priority of the Los Angeles County Fire Department.



The Wildfire Environment

A cursory understanding of the wildfire environment is helpful in understanding the fire problem in the county, and what projects and programs are most effective in preventing large-loss incidents. The wildfire environment can be regarded as the conditions, influences, and modifying forces that control fire behavior. Firefighters become skilled at recognizing the status of the three components that make up the wildfire environment. The nature and condition of fuels, weather, and topography dictate the likelihood of a fire starting, the direction and rate of spread a fire takes, and the intensity at which a fire burns.

Fuel

Wildland fuel is the vegetation layer that covers the topography. Fuel provides the thermal energy source upon which fire behavior relies.

Weather

Weather is the most variable component of the fire environment, and it can change rapidly in space and time. Weather represents such elements as temperature, wind, relative humidity, cloud cover, precipitation, and atmospheric stability.

Topography

Topography includes such elements as slope, aspect, elevation, and configuration (or “lay of the land”). In relation to time, topography can be considered static, for the forces that change it generally work very slowly. In horizontal space, however, topography can change quickly, particularly in mountainous country.

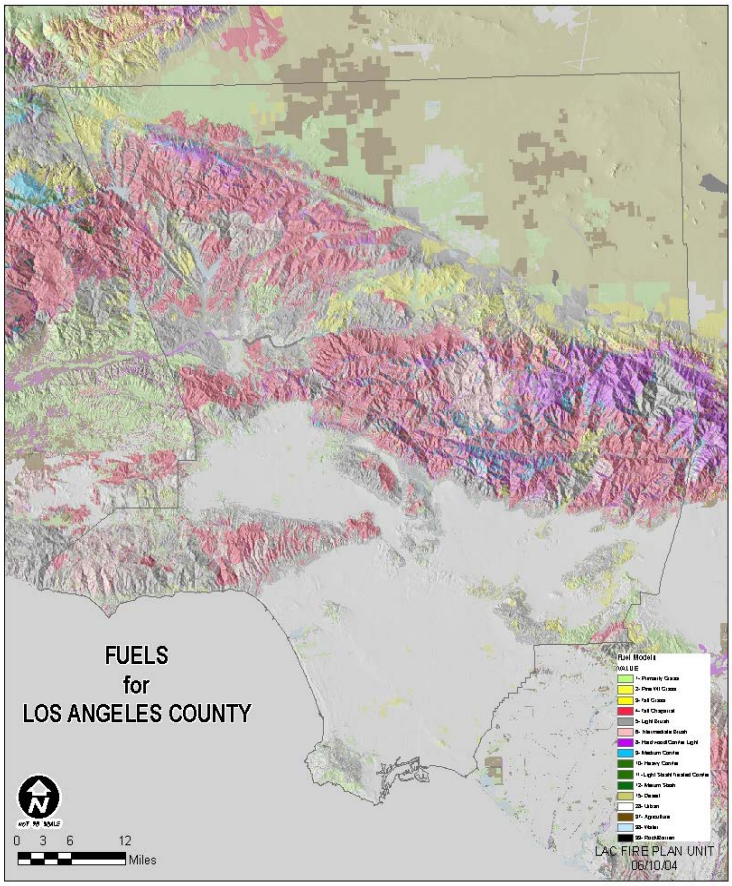
Hazardous Fuels

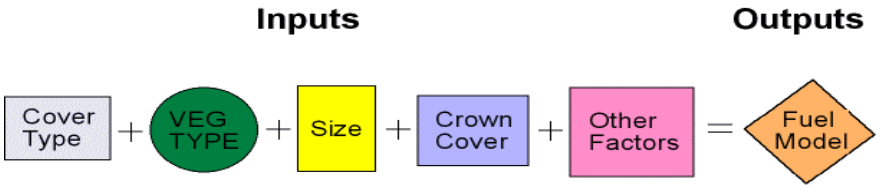
Los Angeles County has 515,817 acres of state responsibility area, the bulk of which is covered with fire-prone vegetation. Additionally, there are 778,427 acres of federal responsibility area (FRA) and 847,768 acres of local responsibility area (LRA) within the county.

Chaparral provides the most widespread wildland threat in Los Angeles County. It can be found on the slopes of the Santa Monica Mountains and throughout the San Gabriel Mountains. This chaparral community is characterized by woody shrubs of chamise, ceanothus, and sugar bush, which dominate dry rocky slopes and provide erosion control and watershed protection. Numerous grasslands and fields are found throughout the county, especially in the Antelope Valley, and present the potential for fast-moving wildland fires that can transition into heavier fuel and tree canopies.

The first step in the hazard assessment process is development of a land/vegetation coverage map for the county, using the most recent and detailed vegetation composition and structure information. Vegetation data from a variety of sources is patched together to provide a complete, albeit heterogeneous, surface fuel coverage map for the county. The various vegetation types (fuels) found in Los Angeles County have specific characteristics that allow them to be categorized according to how they burn.

The surface fuel map is developed by translating the variety of vegetation data into stylized fuel characteristics models that can be used to predict fire behavior. This process, known as "cross walking," translates information on plant species, crown cover, and tree size into 13 standard fuel models. The crosswalk process uses other factors—such as watershed boundaries, slope, aspect, and elevation—to further refine vegetation/fuel model relationships. The system used to categorize these fuels is documented in the National Wildfire Coordinating Group (NWCG) document NFES 1574, "Aids to Determining Fuel Models for Estimating Fire Behavior," by Hal E. Anderson. These fuel models are commonly referred to as the Fire Behavior Prediction System (FBPS) fuel models. The assessment process further creates four additional custom models to represent non-wildland fuels: (28) urban fuels, (97) agricultural lands, (98) water, and (99) barren/rock/ other. This method produces a fine-grained portrayal of surface fuel conditions.





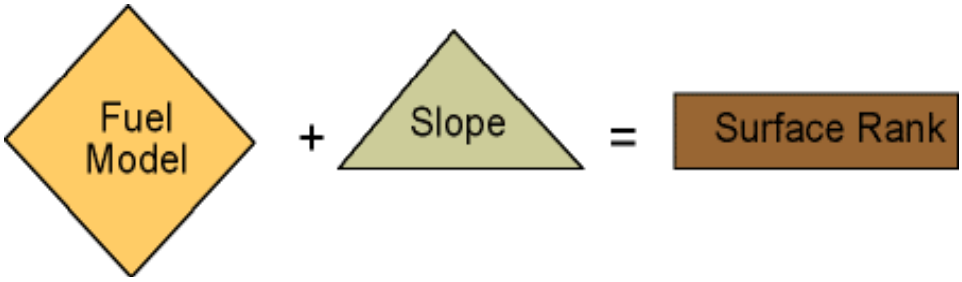
The second step is to assign a surface fuel ranking, which introduces topography into the fuels-ranking equation. The method first calculates the fire behavior to be expected for unique combinations of topography and fuels under a given weather condition. BEHAVE (Fire Behavior Prediction and Fuel Modeling System, Andrews 1986) provided estimates of fire behavior under standard severe fire weather conditions for FBPS fuel models located on six slope classes: on flat ground, and at the midpoints of the five National Fire Danger Rating System (NFDRS) slope classes (USDA Forest Service, 1983). Surface ranks were assigned according to the rate of spread and heat per unit area associated with each unique fuel model–slope combination. The table below shows the surface rank, from moderate to very high, for unique combinations of surface fuel model and six different slope classes (0%–10%, 11%–25%, 26%–40%, 41%–55%, 56%–75%, > 76%) as derived from USGS 7.5-minute digital elevation models (DEM).

Table 7-7: Examples of National Fire Danger Rating System (NFDRS)

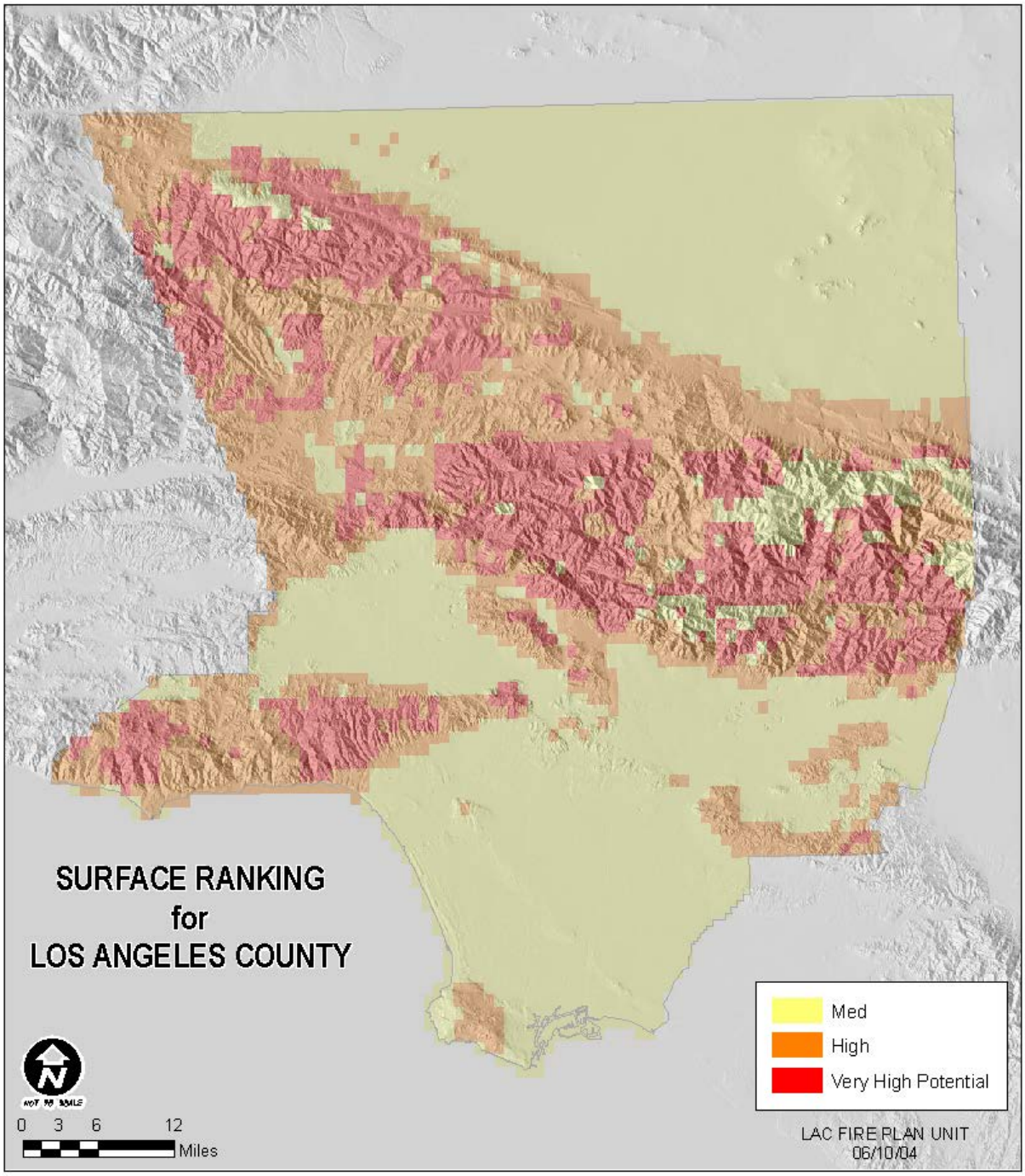
Fuel Model		Slope		Fuel Hazard Ranking
1	Grass	<10%	=	Moderate
1	Grass	>10%	=	High
2	Woodland	<40%	=	High
2	Woodland	>40%	=	Very High
6	Brush	<75%	=	High
6	Brush	>75%	=	Very High

Finally, fire perimeter data are used to update fuel model characteristics based on "time since last burned," to account for both initial changes in fuels resulting from consumption by the fire and for vegetation regrowth. The fuels assessment process includes both current and historic fuel conditions. The historic fuels are those that existed in the climax or mature state before the occurrence of fire or other fuel modification process. After a fuel modification event, such as a fire, the regrowth process goes through a succession of fuel types on its way back to its climax fuel type. This succession is called the "fuel dynamic pathway" (FDP).

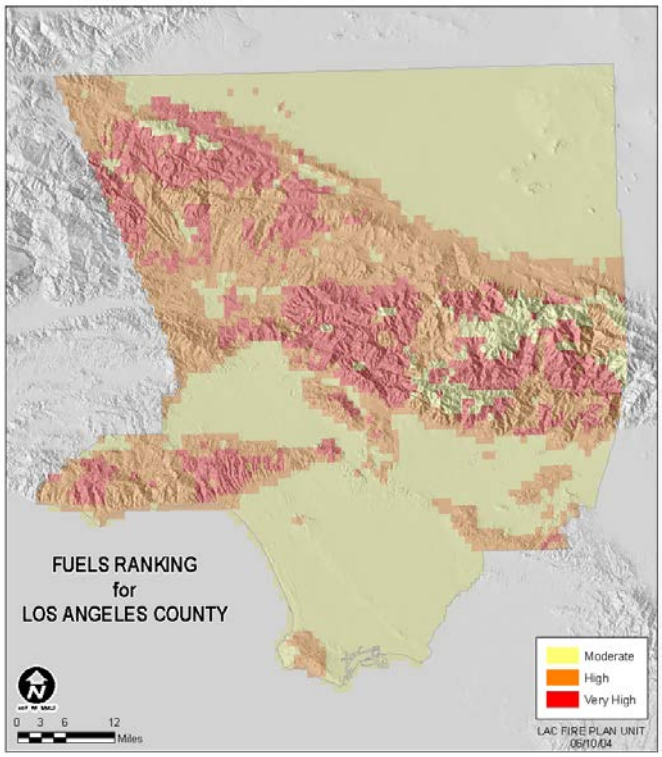
The FDP is intended to account for growth rates, rainfall, elevation, aspect, and other factors that influence an area's rate of growth.



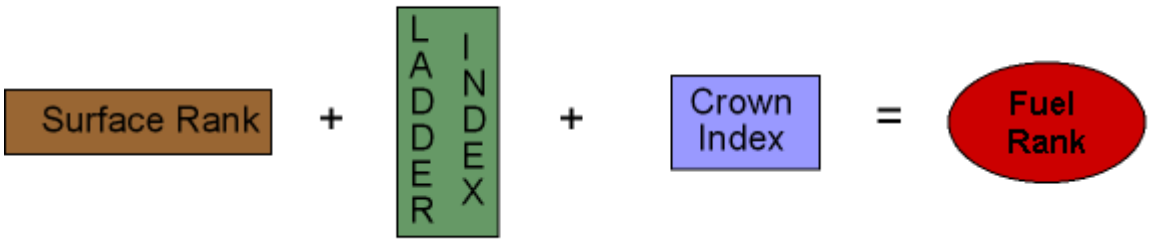
Map 7-16: Los Angeles County Surface Rankings
(Source: Los Angeles County Fire Plan Unit - 06/10/04)



The total fire hazard includes not only the hazard posed by surface fire, but also the hazard posed by involvement of canopy fuels. The hazard ranking method includes this additional hazard component by adjusting the surface hazard rank according to the value of the ladder and crown fuel indices. Specifically, the surface hazard rank increases a maximum of one class in all situations where the sum of the ladder and crown fuel indices is greater than or equal to two. Otherwise the final fuel rank is identical to the initial surface rank.



For instance, lodge pole pine types modeled as fuel model 8 have a moderate surface rank on all slopes. However, the presence of ladder fuels in areas of dense canopy cover would result in a final fuel rank one class higher than the surface rank (high instead of moderate) in such areas. Estimates of ladder and crown fuels support assessment of crown fire potential. The ladder and crown fuel indices estimate the relative abundance of these fuels. These indices measure (in a rough manner) the probability that individual tree torching and/or crown fires would occur if the stand experienced a wildfire during extreme weather conditions. The indices take values ranging from 0 to 2, with 0 indicating "absent," 1 representing "present but spatially limited," and 2 indicating "widespread." CAL FIRE has determined that there are no “low–hazard” fuels in California. Consequently, fuels are ranked medium, high, or very high. Fuel models 4 (mature brush) and 10 (timber) are always ranked very high regardless of slope.



Fuel hazard rankings in Los Angeles County show that 34% of the Q81st cells are ranked moderate, 36% high, and 30% very high. Thus two thirds of the county has high-ranked fuels, and 66% of the county is ranked high to very high due to fuels.

Severe Fire Weather

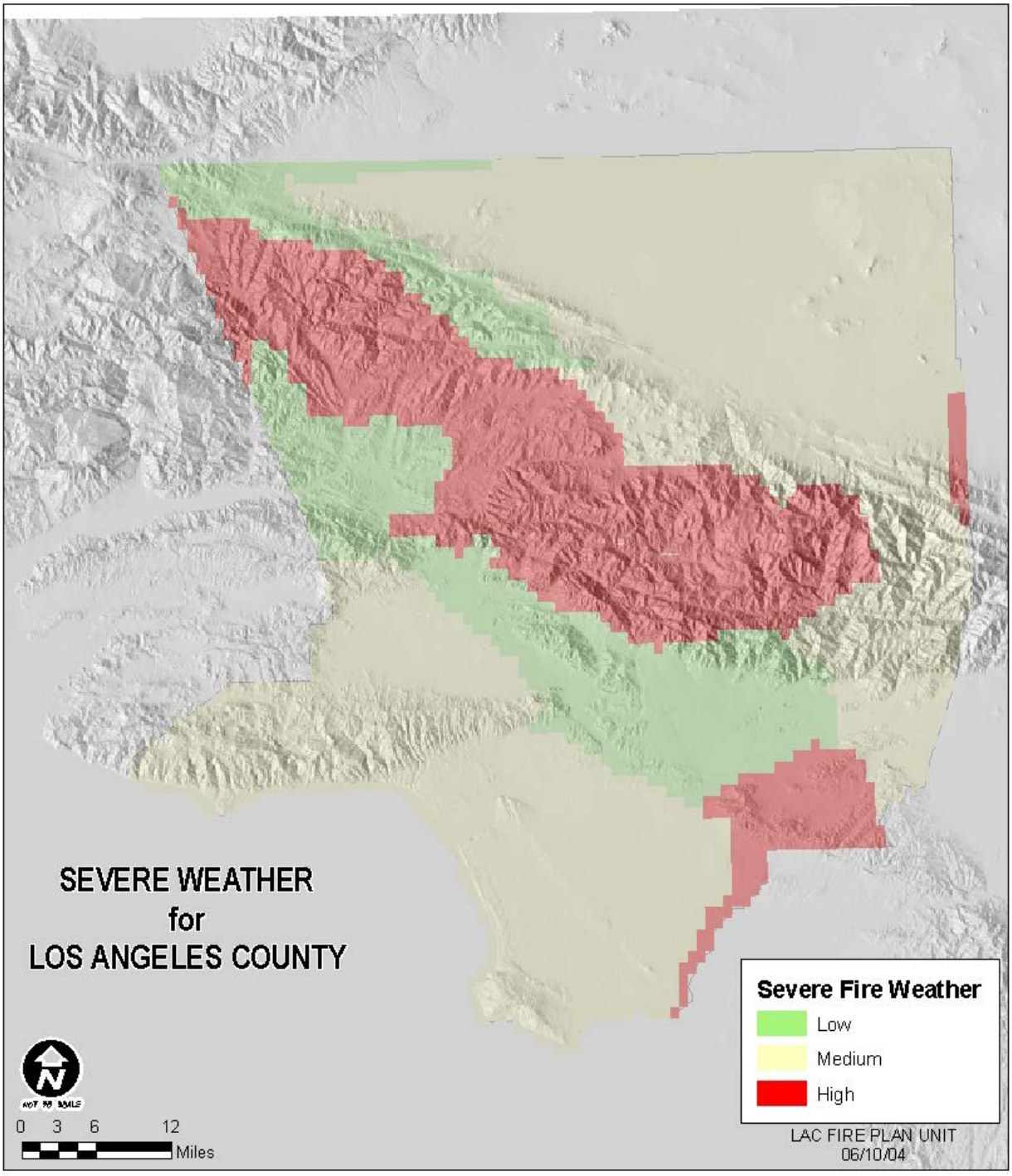
Fire behavior is dramatically influenced by weather conditions. Large, costly fires are frequently associated with severe fire weather conditions. High temperatures, low humidity, and strong surface winds typify fire weather. The weather assessment considers the different climates of the county, from the foggy coastline to the hot, dry interior valleys, to the cooler windy mountains, and to the arid and windy upper deserts. Each of these local climates experiences a different frequency of weather events that lead to severe fire behavior (severe fire weather).

The weather assessment uses a fire weather index (FWI) developed by USDA Forest Service researchers at the Riverside Fire Lab. This index combines air temperature, relative humidity, and wind speed into a single value index. This index can be calculated from hourly weather readings such as those collected in the remote automated weather station (RAWS) data collection system. The FWI does not include fuel moistures or fuel models.

The FWI includes topography only to the extent that RAWS station weather readings are influenced by local topography. Each quad 81st (Q81) in the county has a weather station assignment in order to establish a link between Q81s and weather data. This link enables the calculation of the number of days of severe fire weather for each Q81, and eventually a link will be established between CFIRS/NFIRS ignitions and Q81s; that will in turn be used to determine the burn indices (from weather data) for each CFIRS/NFIRS ignition, which will be used as part of the level of service (LOS) calculation. Weather stations are assigned to Q81s based on local knowledge, completeness of weather data, proximity, and similarities in the weather environment such as elevation, landforms (i.e., within the same basin or ridge), and coastal influence.

Ideally, the best weather station assignment is the closest weather station that (a) is within the same fire weather forecast zone, and (b) has a complete stream of weather data. Because many zones have no weather stations, and some weather stations may have incomplete data, both the amount of data available for each station and the similarity in weather environment of the weather station and Q81s will be considered. To the extent possible, the weather stations that are picked have enough observations to adequately represent ignitions during the peak fire season, and are in a physical setting that experiences similar weather conditions as the Q81s being validated.

Map 7-17: Los Angeles County Severe Weather
(Source: Los Angeles County Fire Plan Unit - 06/10/04)



Fire Protection Level of Service

Ignition/Workload Analysis

Before discussing what constitutes an initial attack success or failure, we must first concede that our fire prevention efforts have failed or a natural event, such as lightning, has occurred. Once a fire starts, success is defined as the ability of the fire protection system to constrain damage and costs within an acceptable level. Determining that acceptable cost or damage amount is ultimately how we define the level of service desired by the stakeholders involved.

Although the Fire Department management, working with stakeholders, must define and provide a particular level of service, the county fire department (as the California Department of Forestry and Fire Protection's agent in Los Angeles County) must, at a minimum, deliver a fire protection system that provides an equal level of protection to lands of similar type in the state responsibility area (SRA). The legislature has charged the State Board of Forestry and CAL FIRE with providing this equal level of protection to lands of similar type (PRC 4130) in the SRA.

To evaluate this, the department is initially using both a performance-based fire protection planning system and a prescription-based fire protection planning system. The performance-based approach is used on a limited basis since the dataset collected from the California Fire Incident Reporting System (CARS) needs to have fire intensity data attached. Another limiting factor is that CAL FIRE uses an agency-specific data collection system—called the Emergency Activity Reporting System (EARS)—that is not consistent with CARS. Consequently, the CARS data will need to be reviewed to categorize low, medium, and high fire intensity, and then the data will need to be exported to EARS. Once this is accomplished, the CAL FIRE LOS calculator can be used.

The performance-based approach uses planning belts that group lands of similar type, along with an LOS rating. The process measures the relative impact of fire on the various assets at risk, and produces an LOS rating that is used to compare one area of the state with another—while recognizing that the assets at risk may be quite different.

The LOS ranking is expressed as the percentage of incidents where the initial attack effort succeeds. A successful initial attack is defined in terms of the amount of resources needed to suppress the fire, and the fire's intensity. It is that effort which contains the fire within an acceptable level of resource commitment, acceptable suppression cost, and minimal damage to assets at risk.

$$\frac{\text{Number of initial attack successes}}{\text{Total initial attack workload}} = \text{Percent LOS rating}$$

A matrix is used to define and display successful initial attacks in this framework (see next page). The matrix axes represents fire sizes and intensities. The body of the matrix contains the fire activity workload for each planning belt. The shaded portion of the matrix indicates fires that would be expected to exceed budgeted suppression costs. The non-shaded portion indicates successful initial attack suppression, fires that are normally contained within an allowable suppression cost. The successful initial attacks represented in the non-shaded portion would also represent wildfires that are managed without either adversely affecting the initial attack system's ability to respond to other incidents, or expending significant unallocated resources.

Assuming that the prescription-based planning fire protection system is properly applied to determine an appropriate and timely response, with properly equipped and trained firefighters (based on fire danger), the matrix can provide wildfire managers with a simple tool to determine where the suppression system would be expected to fail. For example: a medium-size, high-intensity wildfire might overwhelm a "high" level initial attack response, even if an equal level of protection were provided statewide. This might be the threshold where wildfire managers decide to focus intense pre-fire mitigation projects in order to bring initial attack efforts back into the “successful” range. On the other hand, a large fire of low intensity where the initial attack fails may indicate an unequal level of protection or some other weakness in the prescription-based system.

The prescription-based approach focuses primarily on the reasons for the success or failure of an initial attack. Unfortunately, the prescription-based approach makes it difficult to integrate the interrelationships of various fire protection programs, such as the value of fuel reduction programs in reducing the level of fire suppression effort required. The prescription-based approach is useful for establishing initial attack fire suppression standards on those fires that don't exceed expected suppression costs, as identified in the performance-based approach, assuming an appropriate initial attack effort is applied.

Several factors influence the determination of what constitutes an appropriate initial attack effort. Detecting a wildfire in its incipient stage is vital if initial attack resources are to be successful. Response time for the initial attack resources to arrive at and begin taking suppression action on an incident is paramount to success. A response that is tailored to the incident potential increases the degree of success by applying appropriate reinforcement and resource types. For example, engine companies are usually the closest resource dispatched to a wildfire, and are typically the measuring stick for response times.

However, an engine company that encounters an incipient wildfire with intensity beyond its ability might only be successful with resources such as water-dropping helicopters and bulldozers included in the initial attack response. The fire characteristics charts are useful guidelines for understanding initial attack resource capability. Staffing levels, training, and physical fitness are also important elements affecting the success of a wildland fire company.

Table 7-8: Ignitions Workload Analysis Matrix

Ignitions Workload Analysis Matrix

Unit: LAC

Planning Belt: B (brush)

FIRE SIZE

	Spot	Small	Medium	Large	Escape
LOW	186	25	17	3	4
MEDIUM	49	3	0	1	1
HIGH	27	4	1	1	1
UNMATCHED	273	40	17	7	14

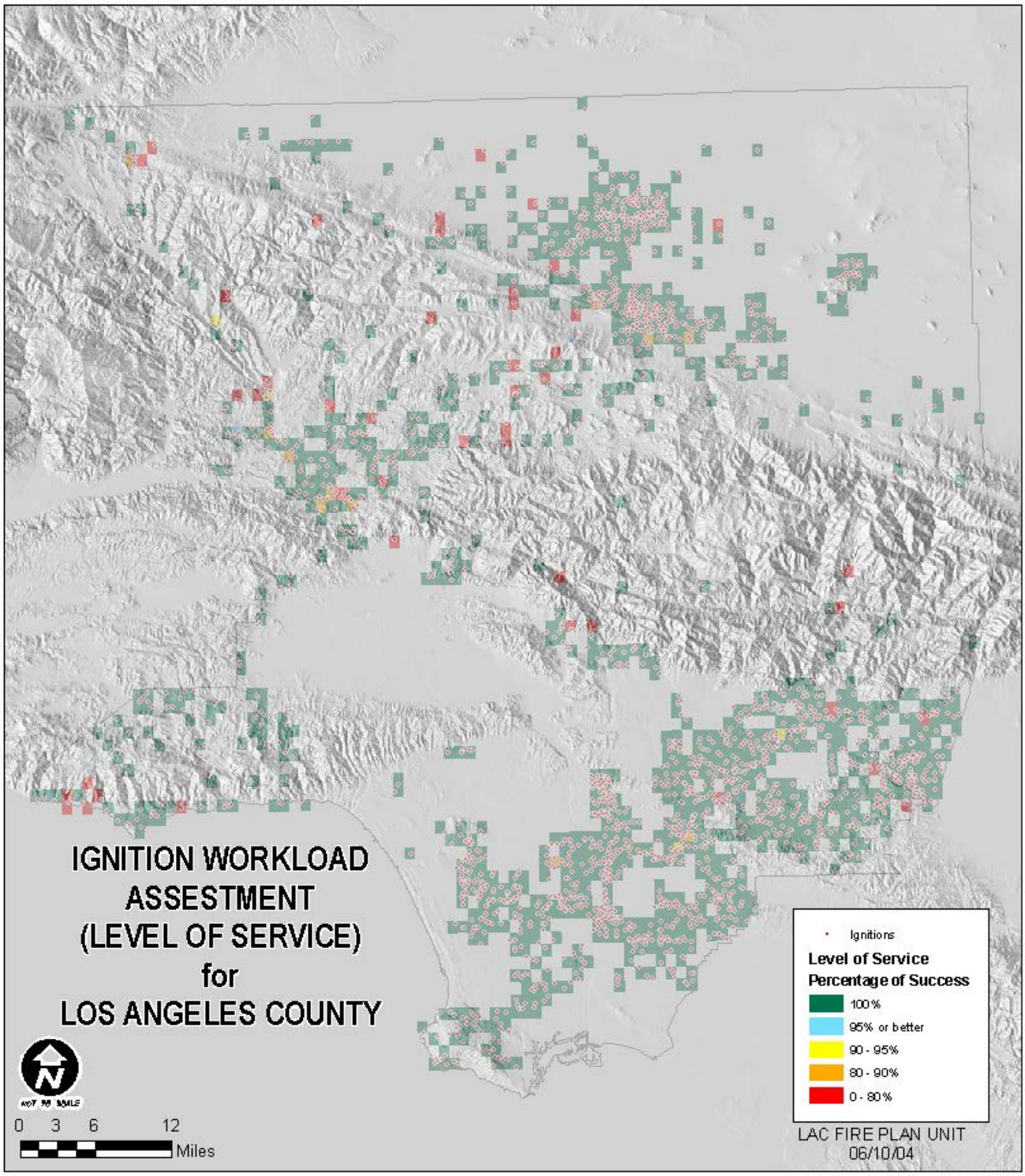
FWI

Planning Belt ID: B (brush) Unit ID: MMU Refresh Matrix

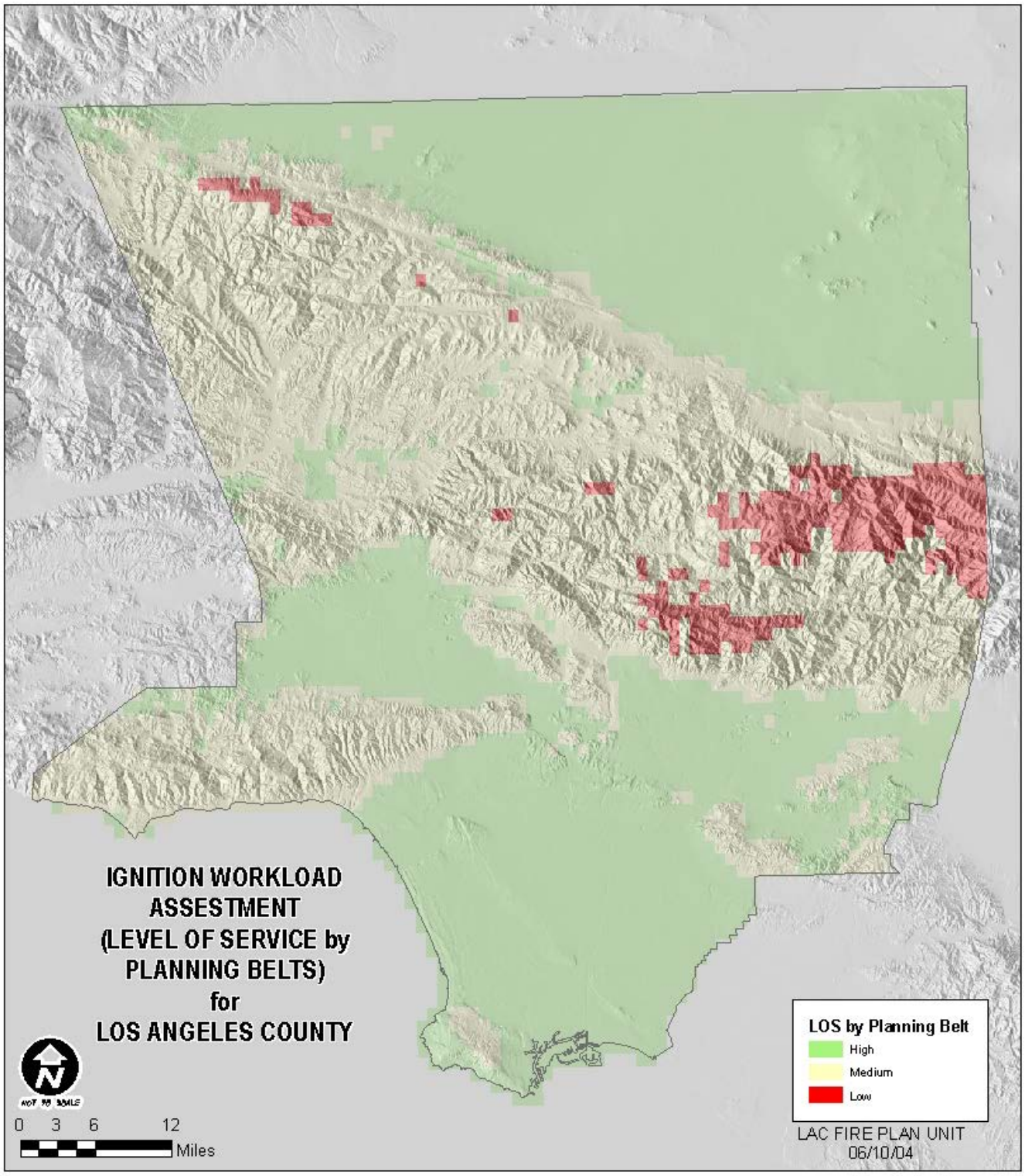
Success: 93%

Fire size class cutoffs for brush planning belt	FWI index intensity cutoffs
Spot: Less than 1 acre	Low: less than 15
Small: 1–5 acres	Medium: 15–30
Medium: 5–25 acres	High: greater than 30
Large: 25–100 acres	Unmatched: no weather observation available
Escape: greater than 100 acres	

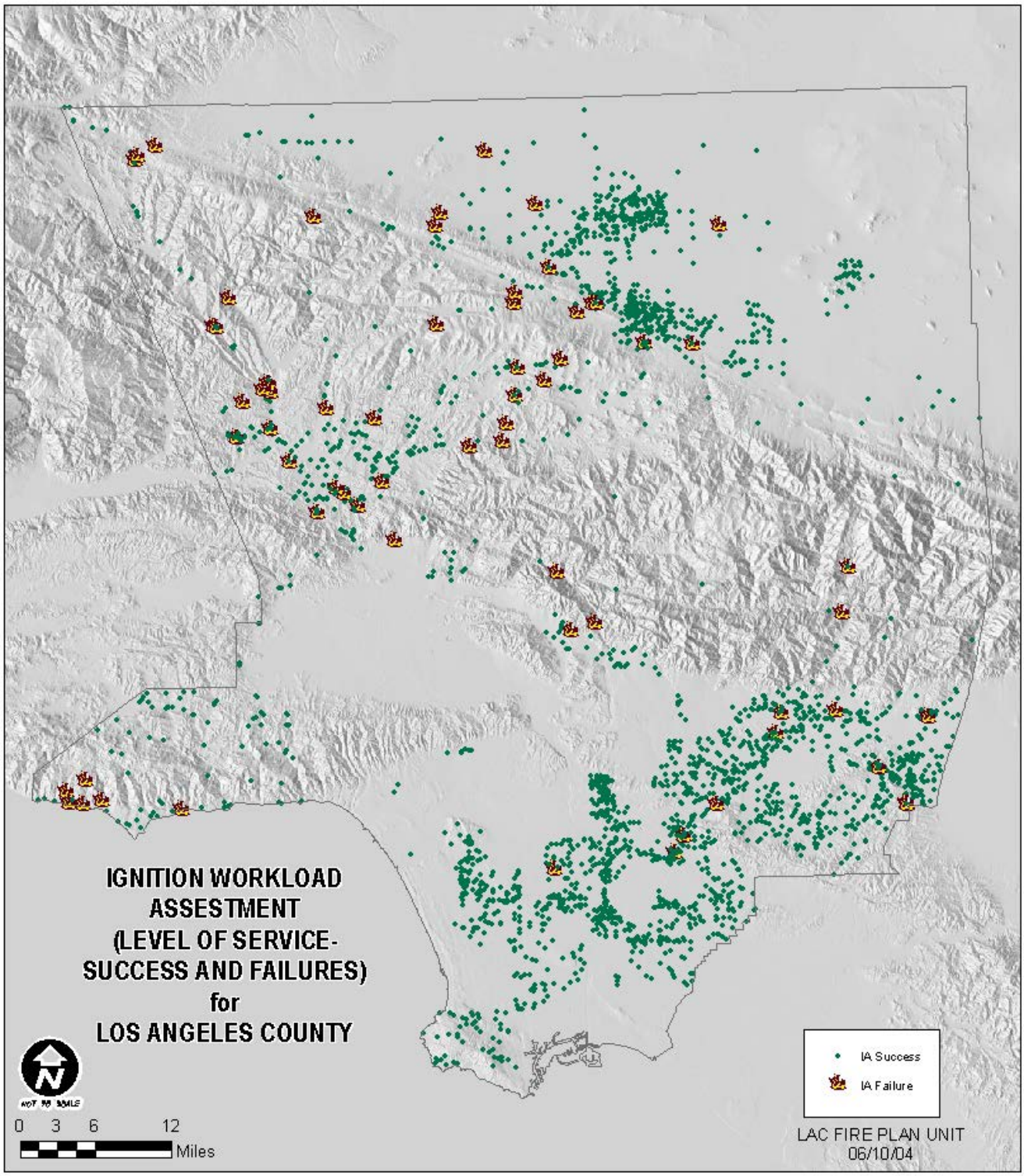
Map 7-18: Los Angeles County Ignition Workload Assessment (Level of Service)
(Source: Los Angeles County Fire Plan Unit - 06/10/04)



Map 7-19: Los Angeles County Ignition Workload Assessment (Level of Service by Planning Belts)
(Source: Los Angeles County Fire Plan Unit - 06/10/04)



Map 7-20: Los Angeles County Ignition Workload Assessment (Level of Service – Success and Failures)
(Source: Los Angeles County Fire Plan Unit - 06/10/04)



Fire Suppression Philosophy

As mentioned in other areas of this document, "initial attack" is the focus of all wildfire suppression activities for the County of Los Angeles Fire Department. With so much emphasis placed on quickly extinguishing all wildfires, it might seem that *all* fire in the wildland is a bad thing. Quite to the contrary, fire is absolutely a necessary element in the County's ecosystem. Since too many assets are at risk to allow the natural occurrence of wildfire, prescribed or controlled burns must take the place of naturally occurring wildfire.

The human element is always the number one priority for all fire suppression efforts. Many rules and guidelines have been developed to stress firefighter and public safety during wildfires. These rules and guidelines can help the layperson understand why firefighters may say or do certain things related to wildfire. Some of these rules and guidelines are The “Ten Standard Firefighting Orders”; “The Eighteen Watch-out Situations”; “Common Denominators of Fire Behavior on Tragedy and Near-miss Forest Fires; “LCES – Lookouts, Communications, Escape Routes, Safety Zones; and “Look Up, Look Down, Look Around.” With all wildfires, certain strategic and tactical actions must take place. From the time of alarm to the abandonment or closure of a wildfire, one single unified entity must be in command of the incident. To accomplish this, all fire agencies in the county—and in the state, for that matter—use the Incident Command System (ICS). Tactically all wildfires must be anchored, which means that a secure starting point is established; all other strategic and tactical decision making can build on that starting point.

Once a wildfire grows beyond the initial attack stage where there are assets at risk, particularly in the wildland/urban interface/intermix, two additional dimensions are added to the already complex nature of wildland firefighting. In addition to anchoring and flanking the fire, to narrow the flame front, firefighting resources must also be committed to protecting assets out in front of the fire, and resources must be left to protect assets from residual embers and fire after the primary fire passes through.

The Fire Protection System

Although fire is a necessary component of the local ecosystem, in most cases, unchecked wildfire is no longer a viable fire/fuel management option in Los Angeles County. Mostly because of population growth, assets at risk have interfaced and intermixed with the wildlands to such an extent that uncontrolled fires must be quickly extinguished. Therefore, at the heart of the wildfire protection system in Los Angeles County is an aggressive initial attack firefighting strategy.

The Fire Department actually has a dual fire protection role. The department provides structural fire protection and rescue services to the County’s unincorporated areas and contract cities. The department is also one of six contract counties that have executed a contract with the State of California to provide wildland fire protection on state responsibility areas (SRA). The SRA within the jurisdiction of the Fire Department is 515,817 acres.

Priority Areas

The fire plan assessment process utilizes a WAFL (weather, assets at risk, fuel, and level of service) calculator to combine the four fire plan assessments into an aggregate score that can be used to help target critical areas and prioritize projects. The WAFL score, however, does not take into consideration subjective factors critical to achieving on–the-ground fuel reduction. Fire plan assessments aside, it is extremely difficult if not impossible to achieve fuel reduction on the ground without community involvement, whether that be in the form of a community fire safe council, a homeowners association, or other organized forum. With that said, the WAFL score, with its science-based approach, is evaluated in conjunction with other intangibles to arrive at a "reasonable" assessment of the needs and likelihood of accomplishing a project.

A simple glance at the WAFL score map below indicates that there is a significant need throughout the foothills, and especially in the urban interface areas of Los Angeles County, for hazardous fuel reduction.

All of the department's battalions are consulted to identify pre-fire projects they consider important to achieving their goals of reducing the potential and impact of catastrophic fire. Projects are assigned a relative ranking by combining the four fire plan assessments, fuel hazard ranking, severe fire weather, level of service (workload), and total assets at risk with subjective factors, including fire history and community involvement. Values are assigned by looking at the fire plan assessment maps and interpolating the assessment output that best represents each project.

Theoretically, the project with the highest score would have the first priority for funding of any given project or other pre-fire program. However, there are a number of circumstances where projects with lower scores might be given preference. Circumstances when this might occur include the following: the department's current commitment to an existing pre-fire project; the presence (or absence) of community participation necessary to complete a project; the preparatory work required, and the ease of instituting the project; project type and match for grant funding; and simply sharing the wealth and commitment to pre-fire projects between the department and communities. The Fire Plan Unit acts to coordinate countywide projects and projects occurring between battalions, and provides direction in the planning of pre-fire projects.

Map 7-21: Los Angeles County W.A.F.L
(Source: Los Angeles County Fire Plan Unit - 06/10/04)

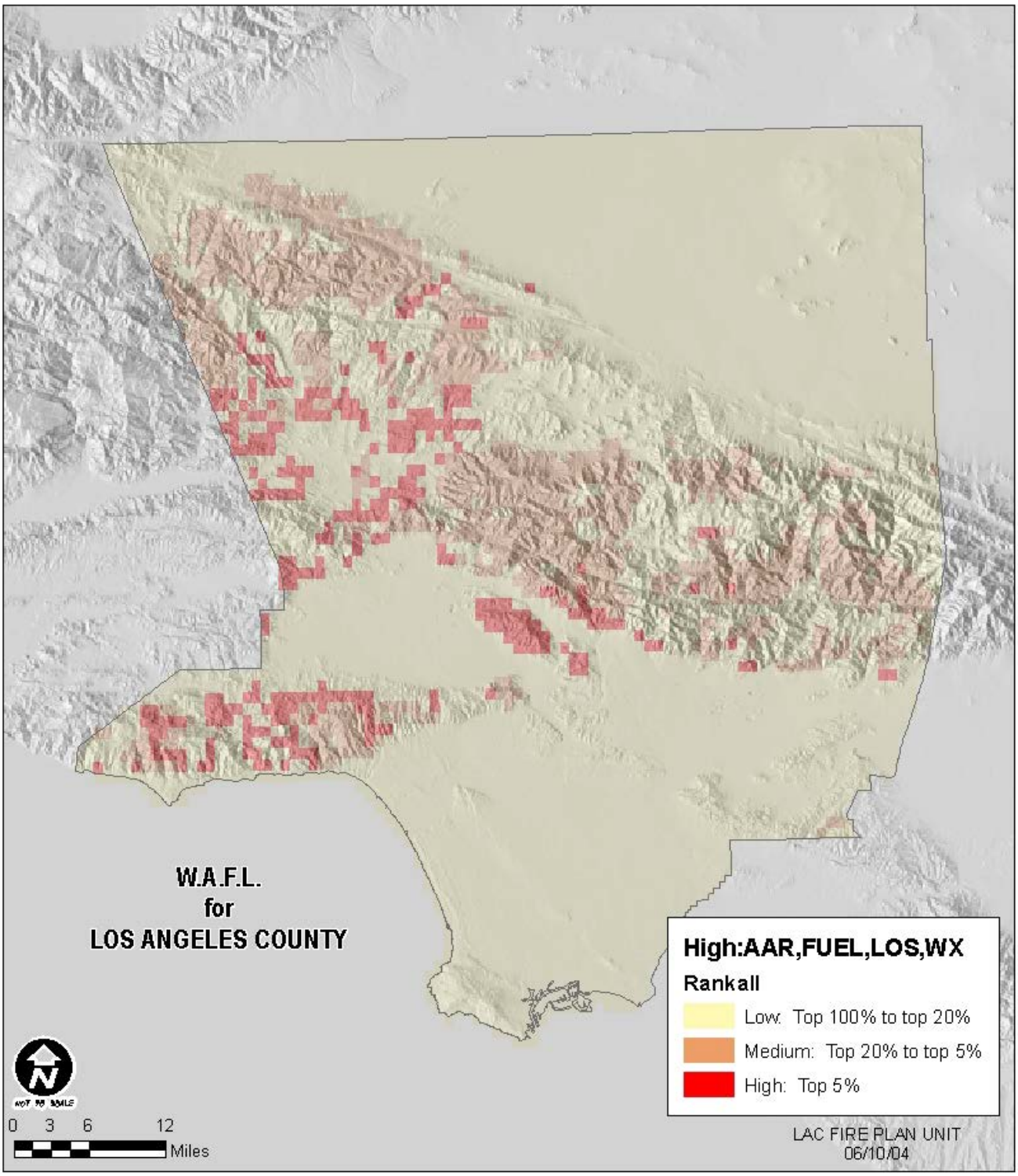
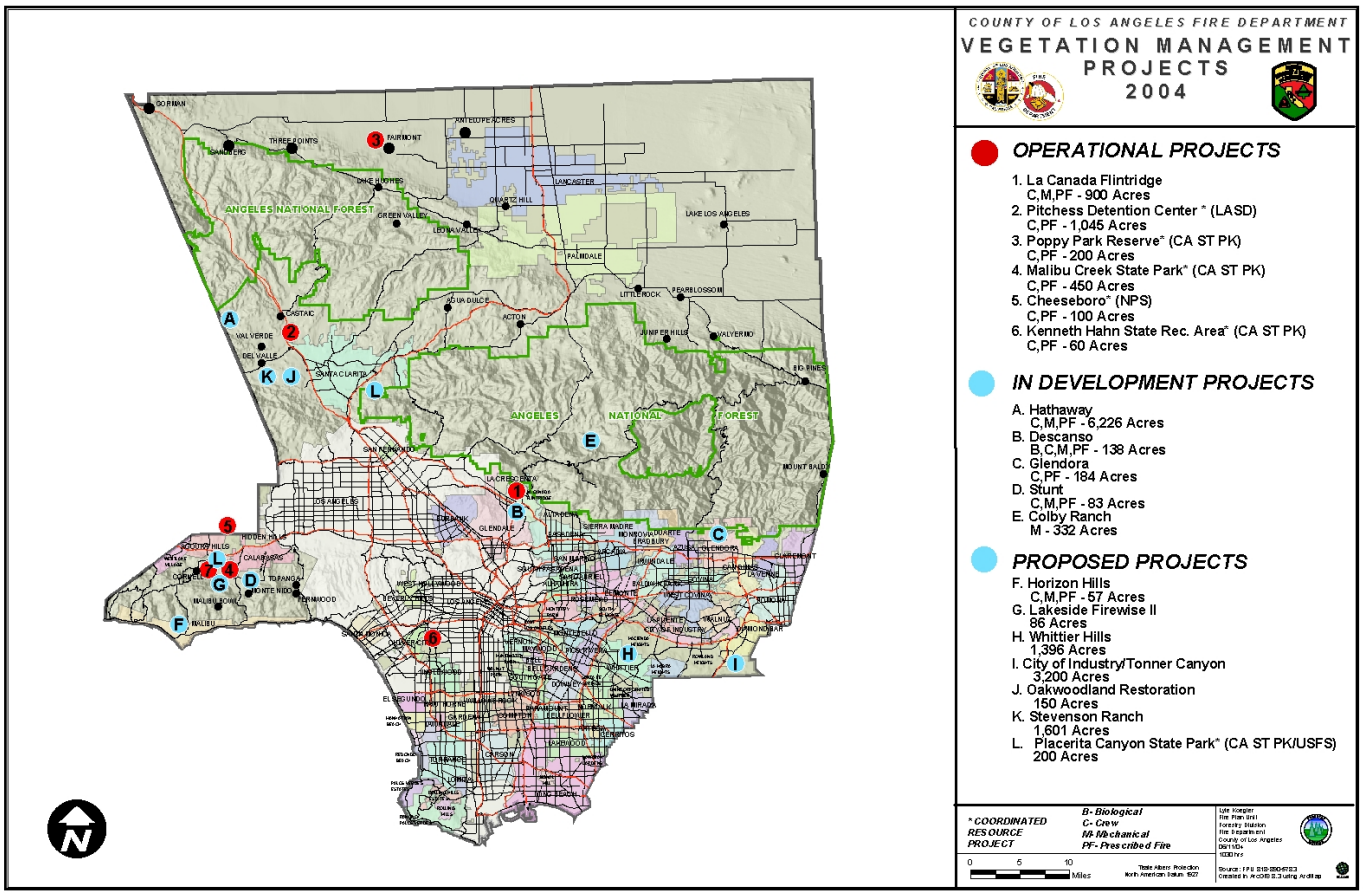


Figure 7-1: Target and Priority Areas - VMP Matrix Map



Vulnerability

Historically, wildfire disasters consist of a series of major wildfires occurring at or near the same time (due to meteorological and vegetation conditions). Many areas of Los Angeles County have proven to be exceptionally vulnerable to damage and destruction from wildland fires. Lands surrounding heavily populated areas are generally safe from disastrous fire consequences, but urban and suburban expansion into fire-prone areas continues at an alarming rate. Expensive homes and associated infrastructure in vulnerable areas could be severely damaged or destroyed or by a disastrous wildfire.

Impact of Wildfires in the County of Los Angeles

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Wildfires and their impacts vary by location and severity of any given wildfire event, and will likely only affect certain areas of the county during specific times. Based on the risk assessment, it is evident that wildfires will have potentially devastating economic impact on certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Wildfire Characteristics

There are three categories of wildland/urban interface fire: The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas; the mixed wildland/urban interface is characterized by isolated homes, subdivisions, and small communities situated predominantly in wildland settings. The occluded wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area. Certain conditions must be present for significant interface fires to occur. The most common conditions include hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel topography, weather, drought, and development.

Southern California has two distinct areas of risk for wildland fires. The foothills and lower mountain areas are most often covered with scrub brush or chaparral. The higher elevations of mountains also have heavily forested terrain. The lower elevations covered with chaparral create one type of exposure.

"Past fire suppression is not to blame for causing large shrub land wildfires, nor has it proven effective in halting them," said Dr. Jon Keeley, a USGS fire researcher who studies both Southern California shrub lands and Sierra Nevada forests. "Under Santa Ana conditions, fires carry through all chaparral regardless of age class. Therefore, prescribed burning programs over large areas to remove old stands and maintain young growth as bands of firebreaks resistant to ignition are futile at stopping these wildfires."

(Source: http://www.usgs.gov/public/press/public_affairs/press_releases/pr1805m.html)

The higher elevations of Southern California's mountains are typically heavily forested. The magnitude of the 2003 fires is the result of three primary factors: (1) severe drought, accompanied by a series of storms that produce thousands of lightning strikes and windy conditions; (2) an infestation of bark beetles that has killed thousands of mature trees; and (3) the effects of wildfire suppression over the past century that has led to buildup of brush and small diameter trees in the forests.

"When Lewis and Clark explored the Northwest, the forests were relatively open, with 20 to 25 mature trees per acre. Periodically, lightning would start fires that would clear out underbrush and small trees, renewing the forests. Today's forests are completely different, with as many as 400 trees crowded onto each acre, along with thick undergrowth. This density of growth makes forests susceptible to disease, drought and severe wildfires. Instead of restoring forests, these wildfires destroy them and it can take decades to recover. This radical change in our forests is the result of nearly a century of well-intentioned but misguided management." (Source: "Overgrown Forests Require Preventive Measures," by Gale A. Norton, Secretary of the Interior, *USA Today* editorial, August 21, 2002)

The Interface

One challenge Southern California faces regarding the wildfire hazard is from the increasing number of houses being built on the urban/wildland interface. Every year the growing population expands further into the hills and mountains, including forest lands. The increased "interface" between urban/suburban areas, and the open spaces created by this expansion, produces a significant increase in threats to life and property from fires, and pushes existing fire protection systems beyond the original or current design and capability. Property owners in the interface are not aware of the problems and fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.

Fuel

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is classified by volume and by type. Volume is described in terms of "fuel loading," or the amount of available vegetative fuel.

The type of fuel also influences wildfires. Chaparral is a primary fuel of Southern California wildfires. Chaparral habitat ranges in elevation from near sea level to over 5,000 feet in Southern California. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Although chaparral is often considered as a single species, there are two distinct types; hard chaparral and soft chaparral. Within these two types are dozens of different plants, each with its own particular characteristics.

"Fire has been important in the life cycle of chaparral communities for over 2 million years; however, the true nature of the 'fire cycle' has been subject to interpretation. In a period of 750 years, it generally thought that fire occurs once every 65 years in coastal drainages and once every 30 to 35 years inland."

"The vegetation of chaparral communities has evolved to a point it requires fire to spawn regeneration. Many species invite fire through the production of plant materials with large surface-to-volume ratios, volatile oils, and through periodic die-back of vegetation. These species have further adapted to possess special reproductive mechanisms following fire. Several species produce vast quantities of seeds which lie dormant until fire triggers germination. The parent plant which produces these seeds defends itself from fire by a thick layer of bark which allows enough of the plant to survive so that the plant can crown sprout following the blaze. In general, chaparral community plants have adapted to fire through the following methods: a) fire induced flowering; b) bud production and sprouting subsequent to fire; c) in-soil seed storage and fire stimulated germination; and d) on plant seed storage and fire stimulated dispersal."

An important element in understanding the danger of wildfire is the availability of diverse fuels in the landscape, such as natural vegetation, manmade structures and combustible materials. A house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread. After decades of fire suppression "dog-hair" thickets have accumulated, which enable high-intensity fires to flare and spread rapidly.

Topography

Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildfire will likely double. Gulches and canyons can funnel air and act as chimneys, which intensify fire behavior and cause the fire to spread faster. Solar heating of dry, south-facing slopes produces upslope drafts that can complicate fire behavior. Unfortunately, hillsides with hazardous topographic characteristics are also desirable residential areas in many communities. This underscores the need for wildfire hazard mitigation and increased education and outreach to homeowners living in interface areas.

Weather

Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible.

High-risk areas in Southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The so-called "Santa Ana" winds, which are heated by compression as they flow down to Southern California from Utah, create a particularly high risk, as they can rapidly spread what might otherwise be a small fire.

Drought

Recent concerns about the effects of climate change, particularly drought, are contributing to concerns about wildfire vulnerability. The term "drought" is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to relatively drier conditions and leave reservoirs and water tables lower. Drought leads to problems with irrigation and contributes to additional fires, or increased difficulty in fighting fires.

California Introduces New Requirement for Residential Fire Sprinklers Click Here for Video



Development

Growth and development in scrubland and forested areas is increasing the number of human-caused structures in Southern California interface areas. Wildfire affects development, yet development can also influence wildfire. Owners often prefer homes that are private with scenic views, are nestled in vegetation, and use natural materials. A private setting is usually far from public roads, or hidden behind a narrow, curving driveway. These conditions, however, make evacuation and firefighting difficult. The scenic views found along mountain ridges can also mean areas of dangerous topography. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel—leading a fire directly to the combustible fuels of the home itself.

Wildfire Hazard Assessment

Hazard Identification

Extreme weather conditions such as high temperature, low humidity, and winds of extraordinary force causes an ordinary fire to expand into one of massive proportions.

Wildfire hazard areas are commonly identified in regions of the wildland/urban interface. Ranges of the wildfire hazard are further determined by the ease of fire ignition due to natural or human conditions and the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression/control, such as the surrounding fuel load, weather, topography, and property characteristics.

Generally, hazard identification rating systems are based on weighted factors of fuels, weather, and topography. In order to determine the “base hazard factor” of specific wildfire hazard sites and interface regions, several factors must be taken into account. Categories used to assess the base hazard factor include the following:

- Topographic location, characteristics, and fuels
- Site/building construction and design
- Site/region fuel profile (landscaping)
- Defensible space
- Accessibility
- Fire protection response
- Water availability

Vulnerability Assessment

The use of GIS technology in recent years has been a great asset to fire hazard assessment, allowing further integration of fuels, weather, and topography data for such ends as fire behavior prediction, watershed evaluation, mitigation strategies, and hazard mapping. Map 7-1: Los Angeles County Very High Fire Hazard Severity Zones incorporates GIS and data from the State of California's Fire and Resource Management Plan (FRAP).

Large facilities (particularly schools and other facilities with vulnerable populations) located near the wildland/urban interface must incorporate adequate evacuation planning into their site emergency plans. Fire drills and fire evacuation routes should be preplanned and practiced, with transportation vehicles and shelter locations preplanned as well.

Risk Analysis

Southern California residents are served by a variety of local fire departments as well as county, state, and federal fire resources. Data that includes the location of interface areas in the county can be used to assess the population and total value of property at risk from wildfires, and to direct these fire agencies in fire prevention and response.

Key factors included in assessing wildfire risk include ignition sources, building materials and design, structural density, slope, vegetative fuel, fire occurrence, and weather, as well as occurrences of drought.

The National Wildland/Urban Fire Protection Program has developed the Wildland/Urban Fire Hazard Assessment Methodology tool for communities to assess their risk to wildfire. For more information on wildfire hazard assessment refer to http://www.Firewise.org.

Fire hazards of concern in the county are those associated with structures and brush, as well as earthquake-induced fires. Fire potential is typically greatest in the months of August, September, and October, when dry vegetation, combined with offshore dry Santa Ana winds, creates a high potential for spontaneous fires. The hillsides and steep slopes facilitate rapid fire spread.

Severity

The primary effects of fire—such as loss of life, injury, and destruction of buildings and wildlife—are generally well known. Fire also has a number of secondary effects, such as strained public utilities, depleted water supplies, downed power lines, disrupted telephone systems, and closed roads. In addition, flood control facilities are overtaxed by the increased flow from bare hillsides, and the resulting debris that washes down. Affected recreation areas may have to restrict operations or close.

Moreover, buildings destroyed by fire are usually eligible for property tax reassessment, which reduces revenue to local government.

A fire is usually extinguished within a few days, but its effects last much longer. Grassland re-sprouts the following spring, a chaparral community regenerate in three to five years, and oak woodland with most of its seedlings and saplings destroyed will start a new crop within 5 to 10 years. Coniferous timber stands are most susceptible to long-term damage, taking as much as 50 to 100 years to reestablish a forest.

Fire destroys surface vegetation, leaving the soil bare and subject to erosion when the rains begin in the fall and winter. Raindrops hit the surface with undiminished impact, splashing particles of soil loose that move downhill and are carried away by running water. Fire also destroys most of the roots that hold the soil in place, allowing running water to wash the soil away. Mudslides and mudflows can result from these processes.

Growth and Development in the Interface

The hills and mountainous areas of Southern California are considered to be interface areas. The development of homes and other structures is encroaching onto the wildlands and expanding the wildland/urban interface. The interface neighborhoods are characterized by a diverse mixture of varying housing structures, development patterns, ornamental and natural vegetation, and natural fuels.

In the event of a wildfire, vegetation, structures, and other flammables can merge into unwieldy and unpredictable events. Factors important to the fighting of such fires include access, firebreaks, proximity of water sources, distance from a fire station, and the availability of firefighting personnel and equipment. Reviewing past wildland/urban interface fires shows that many structures are damaged or destroyed for one or more of the following reasons:

- Combustible roofing material
- Wood construction
- Structures with no defensible space
- Fire department having poor access to structures
- Subdivisions located in heavy natural fuel types
- Structures located on steep slopes covered with flammable vegetation
- Limited water supply
- Winds over 30 miles per hour

Road Access

Road access is a major issue for all emergency service providers. As development encroaches into the rural areas of the county, the number of houses without adequate turn-around space is increasing. In many areas there is not adequate space for emergency vehicle turnarounds in single-family residential neighborhoods, obstructing emergency workers because they cannot access houses. Fire trucks are large, and firefighters are challenged by narrow roads and limited access. When there is inadequate turnaround space, the firefighters can only work to remove the occupants, but cannot safely remain to save the threatened structures.

Water Supply

Firefighters in remote and rural areas are faced by limited water supplies and a lack of hydrant taps. Rural areas are characteristically outfitted with small-diameter-pipe water systems, inadequate for providing sustained fire fighting flows.

Interface Fire Education Programs and Enforcement

Fire protection in urban/wildland interface areas may rely heavily more on the landowner's personal initiative to take measures to protect his or her own property. Therefore, public education and awareness plays a greater role in interface areas. In those areas with strict fire codes, property owners who resist maintaining the minimum brush clearances can be cited for failure to clear brush.

The Need for Mitigation Programs

Continued development into the interface areas has growing impact on the wildland/urban interface. Periodically, the losses from wildfires in Southern California are catastrophic, with historical deadly and expensive fires. The continued growth and development increases the public need for mitigation planning in Southern California.

La Cañada Flintridge Project

Figure 7-2: Past Mitigation Success Projects



This project was located in the center of the county, and consisted of the treatment of 900 acres using manual (crews), biological (goats), mechanical (brush crusher), and prescribed fire measures. The project provided protection to the City of La Cañada Flintridge, La Crescenta, and Pasadena. The project started in 2001, with a total of 183 acres having been burned. The biological treatment continued in 2004, with 30 additional acres burned in 2004 and 2005.

Pitchess Detention Center (No Map)

This project was located in the Santa Clarita area, and consisted of the treatment of 1,045 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the Los Angeles County Sheriff's Department. This project provided fire protection to the Pitchess Ranch Detention Center. A secondary benefit to the project is the annual training of firefighters on firing operations and grass firefighting.

Poppy Park Reserve



This project was located in northern Los Angeles County, and consisted of the treatment of 200 acres using prescribed fire to enhance the growth of California poppies and eliminating non-native vegetation. The project also provided fire protection to the Poppy Park Reserve Visitor Center and the community of Lake Hughes.

Malibu Creek State Park (No Map)

This project was located in the Santa Monica Mountains, and consisted of the treatment of 450 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the California State Parks. This project provided fire protection to the Malibu Creek State Park and the City of Malibu, including enhancing the growth of native vegetation and eliminating non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of grasses and thistle.

Cheeseboro



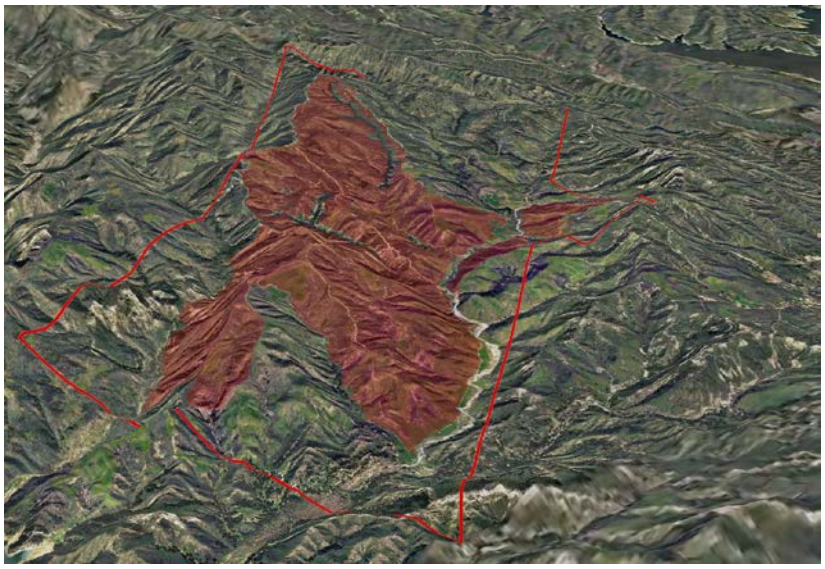
This project was located in the Santa Monica Mountains, and consisted of the treatment of 100 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the National Park Service. This project provided fire protection to Cheeseboro Park and the City of Agoura Hills, and includes enhancing the growth of native vegetation by eliminating non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of grasses and thistle.

Kenneth Hahn State Recreational Area (No Map)

This project was located in the Kenneth Hahn State Recreational Area, and consisted of the treatment of 60 acres using prescribed fire to enhance the growth of native species, and eliminating non-native vegetation. The project also provided fire protection to the park's visitor center; to the cities of Los Angeles, Culver City and Inglewood; and to the unincorporated community of Baldwin Hills.

In-Development Projects

Hathaway



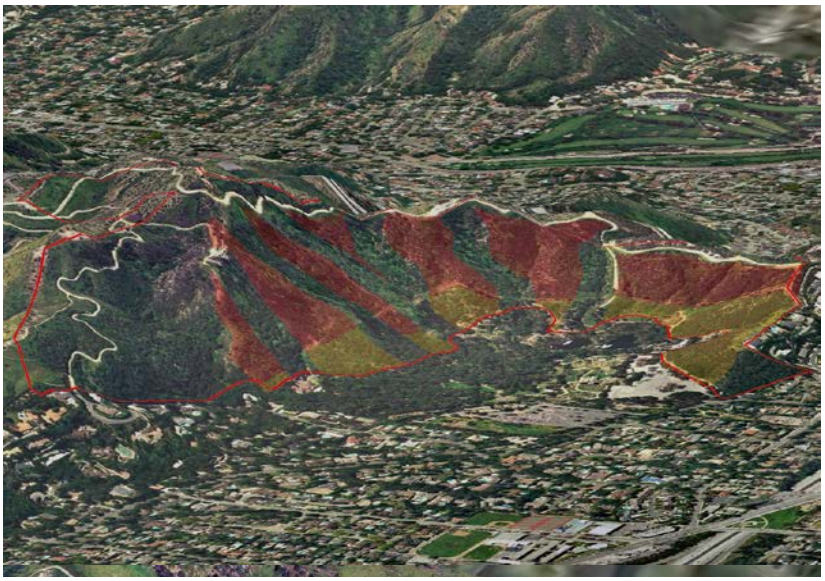
The Hathaway Project was a 6,226-acre area located northwest of the City of Santa Clarita. The Los Angeles County Fire Department has determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities in Hasley and Oak Canyons, and the communities of Castaic, Piru, Del Valle, and Valverde.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the ranch property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Hathaway property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.

Descanso



The Descanso Project encompasses a 138-acre area located in the City of La Cañada Flintridge. The Fire Department, the City of La Cañada Flintridge, and the Descanso Gardens board have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of La Cañada, Montrose, Glendale, and the historical Descanso Gardens.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Gardens property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Descanso Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.

Glendora



The Glendora Project area is a 184-acre area located in the San Gabriel Mountains Conservancy land north of the City of Glendora. The County of Los Angeles Fire Department, the City of Glendora, and the San Gabriel Mountains Conservancy have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the cities of Glendora, San Dimas, and Azusa. The enhancement entails the growth of native vegetation that requires fire for propagation; eliminating non-native vegetation is also a primary goal of this project.

This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Glendora Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.

Stunt



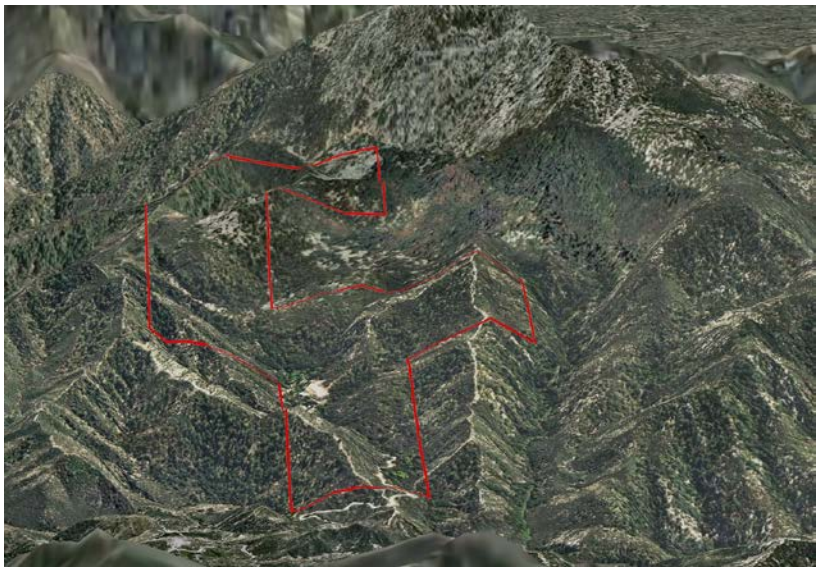
The Stunt Project area is an 83-acre area located in the Santa Monica Mountains, 8 miles north of the City of Malibu. The Fire Department and the National Park Service have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of Monte Nido, El Nido, Calabasas, Agoura Hills, and the City of Malibu.

This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Stunt Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.

Colby Ranch



The Colby Ranch Project area is a 332-acre area nestled in Angeles National Forest north of the City of La Cañada Flintridge. The Fire Department, the U.S. Forest Service, and the Colby Ranch have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the ranch, the Angeles National Forest, and surrounding cities and communities.

The county and the property owner recognize the potential threat of catastrophic wildfires burning in the Angeles National Forest and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Colby Ranch Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling) and manual (clearing, mowing, thinning, and multi-cutting).

Proposed Projects

Horizon Hills



The Horizon Hills Project is a California Fire Safe Council–sponsored vegetation management project. The project area consists of 57 acres located in the City of Malibu. The County of Los Angeles Fire Department, the Horizon Hills Homeowners Association, and the California Fire Safe Council have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of Horizon Hills and the City of Malibu.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Horizon Hills property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Horizon Hills Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); and manual (clearing, mowing, thinning, and multi-cutting).

Lakeside Firewise II



The Lakeside Firewise II Project is a California Fire Safe Council–sponsored vegetation management project. The project area encompasses 86 acres located in the community of Malibu Lake. The Los Angeles County Fire Department, the Malibu Lakeside Homeowners Association, and the California Fire Safe Council have determined the need for a vegetation management plan to provide a long-term mitigation for the hazardous wildfire problem affecting the community of Malibu Lake and the cities of Agoura Hills and Malibu.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Malibu Lake property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Law and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Lakeside Firewise II Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing) and manual (clearing, mowing, thinning, multi-cutting).

Whittier Hills



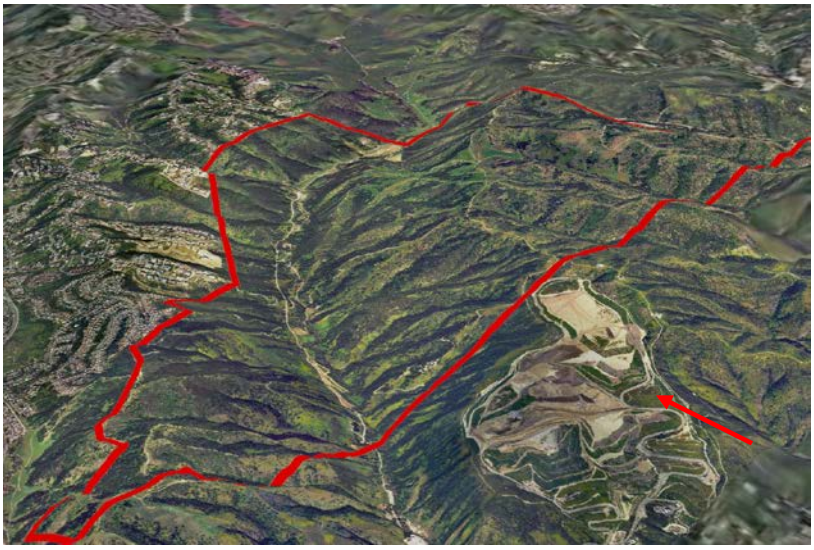
The Whittier Hills Project involves a 1,396-acre area located north of the City of Whittier. The Los Angeles County Fire Department and the Whittier City Council have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the City of Whittier and the community of Hacienda Heights.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Wilderness Park property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Whittier Hill Wilderness Park property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); and prescribed fire.

City of Industry/Tonner Canyon



The Tonner Canyon Project encompasses a 3,200-acre area located south of the City of Diamond Bar. The Los Angeles County Fire Department and the cities of Industry and Diamond Bar have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the City of Diamond Bar, Chino Hills, Brea, La Habra, La Habra Heights, and Industry.

The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Tonner Canyon property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California.

Fuel reduction zones in open-space areas within the Tonner Canyon property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.

The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, multi-cutting); mechanical (brush crusher); and prescribed fire.

Oak Woodland Restoration (No Map)

This project is a parcel dedicated as open space, and located in the City of Santa Clarita. The project consists of the treatment of 150 acres using biological (goats), manual (crews) and prescribed fire methods. This project provided fire protection to the West Ridge Development and the City of Santa Clarita. Additional goals are the enhancement of native vegetation growth by eliminating non-native vegetation, and the annual training of firefighters on fire control of non-native vegetation to facilitate the establishment of native species.

Stevenson Ranch (No Map)

This project was located in the City of Santa Clarita, adjacent to the Oak Woodland Restoration Project, and consisted of the treatment of 1,501 acres using biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); mechanical (brush crusher); and prescribed fire methods. This project provided fire protection to the cities of Santa Clarita and Valencia, and to the community of Stevenson Ranch. An added goal of the project is the annual training of firefighters on fire control of non-native vegetation to facilitate the establishment of native species.

Placerita Canyon State Park (No Map)

This project was located in the Santa Susana Mountains, and consisted of the treatment of 200 acres using biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); mechanical (brush crusher); and prescribed fire methods. This was a coordinated resource project with the California State Parks. This project provided fire protection to the Placerita Canyon State Park, the City of Santa Clarita, and the Angeles National Forest. An additional benefit will be the enhancement of native vegetation growth, and reduction of non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of brush fires.

CAL FIRE Defensible Space Video Click Here



ATTACHMENTS:

Here's How to Get Started: Create a Fire Safe Landscape in Seven Steps

Step One
Evaluate the environment around your home. What will catch on fire? Be on the lookout for those "little things" that can burn your home; this can include lounge cushions, papers or anything flammable outside your home. Also consider slope, prevailing winds, vegetation type and density, and exposure to direct sun.

Step Two
Determine what you need to do. Start with the closest Home Ignition Zone and work toward the Defensible Space Zone and through the Wildland Fuel Reduction Zone.

Step Three
Develop a plan for correcting any fire safe problems identified in steps one and two. Consider completing your work prior to June 1 of each year before fuel conditions become too dry. Make sure your power tools have approved spark arresters and, if working in the summer months, complete all work before 10 a.m. Coordinate with adjacent land owners if possible and incorporate existing formal landscape features.

Step Four
Consider codes and regulations related to *defensible space*, burning, work performed near waterways, and tree removal; comply with federal environmental laws and, if necessary, secure permits such as burn permits.

- The Department of Forestry & Fire Protection (CAL FIRE) should be consulted if any wood products from your property are sold, traded or bartered. Types of regulated wood products include sawmill logs, firewood or wood chips.
- The Department of Fish & Game should be notified and consulted if work occurs near a river, stream, lake, or tributaries. Go to: www.dfg.ca.gov/1600/1600.html
- Before cutting down trees, residents should check local association and special district regulations.

Step Five
Implement the plan. Get help and any needed equipment. Begin work in the Home Ignition Zone and work out from there. Remember: It's the little things—such as patio furniture and cushions, leaves, needles, firewood piles, bark, etc.—that can ignite and cause a fire to your home.

Step Six
Remove all slash and debris generated during the fuel modification process by chipping, burning or disposal at your local vegetative waste site. Contact your local fire department for permit requirements. Contact your local Fire Safe Council about their chipping, home consultation and other programs. Find your local Fire Safe Council at www.FireSafeCouncil.org.

Step Seven
Continue to monitor and evaluate the fire safe condition of your home and landscape. Maintain your home's resistance to fire and the *defensible space* in the surrounding property on a routine basis—annually or more frequently, if needed. For new construction, consider fire resistant materials such as concrete panels, stone, brick or other material that doesn't burn easily.

Design and printing: www.FireSafeHelp.com. To order, call: 530/872-0850
Special thanks to the Butte County Fire Safe Council

Is Your Home a Safe Place to Stay?

You live in an area of natural beauty—but it's also prone to wildfire. In fact, it's not a matter of *IF* the brushlands of California will burn, it's a matter of *WHEN* that will happen.

Fortunately, you can take steps today to dramatically improve your odds of survival by making your property "fire safe."

A fire safe property is one where the home and landscape resist the impact of fire. A fire safe landscape is a beautiful landscape that not only protects your home from fire but can also increase the value of your home and impact your home's insurability.

The Fire Environment

Fire behavior is affected by a variety of factors—some of these you can do something about and others are weather-related and beyond your control. Understanding these terms will help you make your home and the surrounding property fire safe.

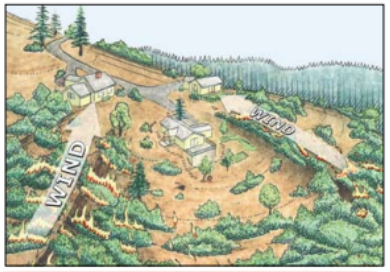
Fuels: Any flammable materials that will burn. This includes everything from the home itself to plants, dried leaves in the rain gutter, brush, wood shingles, patio furniture and decking material. If it will burn, it's a fuel.

Ignition: The point at which a fire starts as a result of fuel contacting with embers, firebrands (hot, flying embers), direct flame, or superheated air.

Topography: Primarily slope or the steepness of the incline on which your house is situated. Also your home's location on the slope and proximity to canyons or ravines.

Weather: Primarily wind, but also air temperature and humidity (moisture content of the air).

Extreme X-Factor: A multiplication factor used to increase the *defensible space* around a home due to extreme fire behavior factors such as slope, and/or constant or unusually strong winds. If your home is located **on or near** the top of a slope and/or **receives constant or unusually strong winds** you must increase the *defensible space* in Zones 2 and 3 by a multiplication of 1.5 (**X-Factor**). For instance, in Zone 2, increase the *defensible space* from 100 feet to 150 feet.



During the summer and fall months, a combination of low humidity, high temperatures and strong winds results in a "red flag" weather warning. During such a condition, the fire danger is very high. The X-Factor explained above helps provide that extra margin of *defensible space* necessary to keep your property fire safe.

California Fire Safe Council
P.O. Box 2106
Glendora, CA 91740
Phone: 626/335-7426
www.FireSafeCouncil.org

FireSafe COUNCIL

For more information:

- www.FireSafeCouncil.org
  California Fire Safe Council
- www.fire.ca.gov
  California Department of Forestry & Fire Protection; includes forest management information

Funding for this brochure was provided by a grant from State Farm Insurance.

A Homeowner's Guide to Fire Safe Landscaping



Brushland

The California Fire Safe Council's mission is to provide leadership and support that mobilizes all Californians to protect their homes, communities and environment from wildfire. We accomplish our mission through broad-based public/private partnerships that create community-wide change via education and action programs because we believe fire prevention and loss reduction are everyone's business.

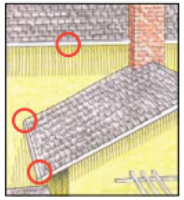
FireSafe COUNCIL

www.FireSafeCouncil.org

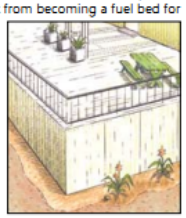
Home Ignition Zone
(The home plus 10 ft distance)

It's the 'little things' that will endanger your home. Just a little ember landing on a little pile of flammable material will burn it. Spend a morning searching out and getting rid of those flammable little things outside and your home will be much safer.

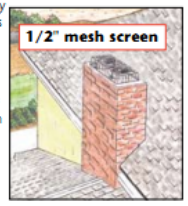
1. Keep your rain gutters and roof clean of all flammable material.



2. Get rid of dry grass, brush and other flammable materials around your home—and don't forget leaves, pine needles and bark walkways. Replace with well maintained (watered) landscape vegetation, green lawn and landscape rocks.
3. Clear all flammable materials from your deck. This includes brooms, stacked wood and easily ignitable patio furniture. Also enclose or board up the area under your deck to keep it from becoming a fuel bed for hot embers.



4. Move woodpiles and garbage cans away from your home. Keep woodpiles away from the home a distance of 2 times the height of the pile—more if lot size allows.
5. Use fine mesh metal screen (1/4" or less) to cover eaves, roof and foundation vents to prevent windblown embers from entering.
6. Inspect and clean your chimney every year. Trim away branches within 10 feet. Install a spark arrester with 1/2" or smaller mesh screen.



7. Got a propane tank? Get rid of any flammable materials within 10 feet of it and, if possible, position it at least 30 feet from any structures.
8. Window screens should be metal, not plastic or other flammable or meltable material.
9. If your home has a pet door, check its seal.

Burning embers landing on wood shake roofs are one of the leading risk factors for losing your home to a wildfire. If possible, replace wood shingle roofs with non-flammable (Class-A) roofing materials, such as asphalt shingles, tile or metal roofing.

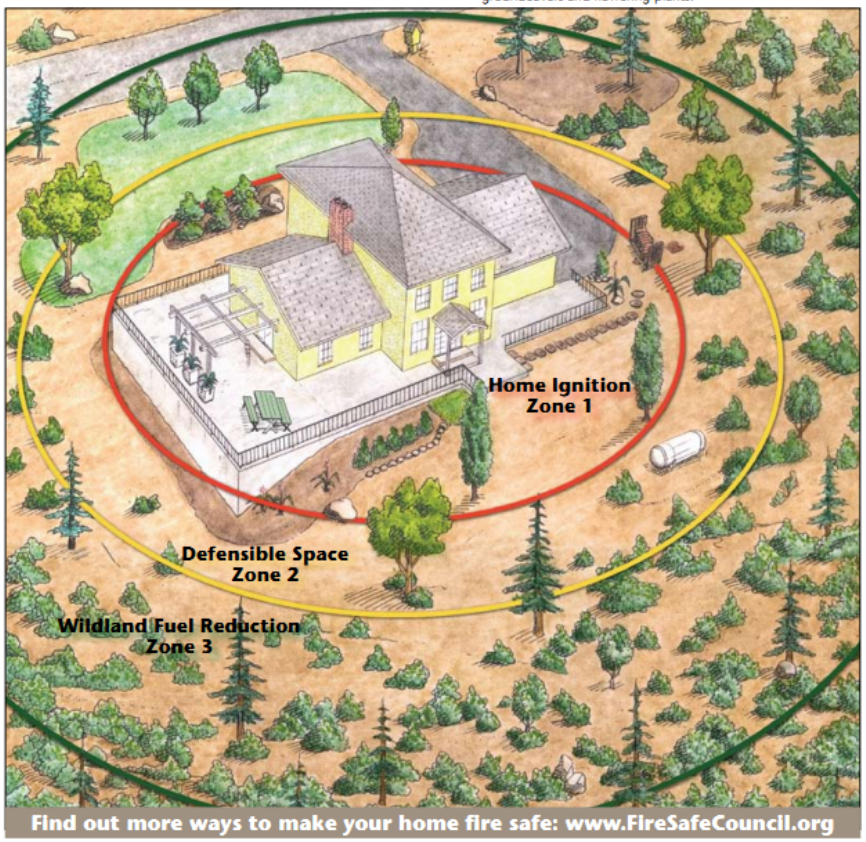
Defensible Space Zone *(100 feet or more distance)* • Keep this area lean and green!

Your "*defensible space*" is the area that is a minimum of 100 feet from your home (as required under State Public Resources Code 4291 or other local ordinances). This is the area where you've modified the landscaping to allow your house to survive on its own—greatly improving the odds for firefighters defending your home.

If your home is on a slope or subject to high winds, extend the distance of this zone based upon the "**X-Factor.**" For instance, this zone may increase to 150 feet (1.5 X 100 feet).

Create a *Defensible Space Zone* by keeping in mind the three R's of defensible space:

- **Remove**—dead and dying grass, shrubs and trees.
- **Reduce**—the density of vegetation (fuel) and ladder fuels, those fuels extending from the ground to the tree canopies.
- **Replace**—hazardous vegetation with less flammable, irrigated landscape vegetation including lawn, or other low growing groundcovers and flowering plants.



Find out more ways to make your home fire safe: www.FireSafeCouncil.org

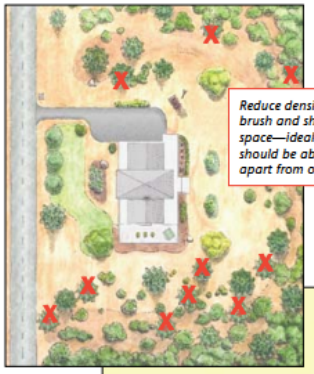
Wildland Fuel Reduction Zone
(Beyond 100 feet distance)

Getting rid of the undergrowth and thinning out densely-crowded smaller trees in this outlying area will reduce fire intensity and slow the spread of a fire moving toward your home. Defensible space increases the odds of your home's survival.

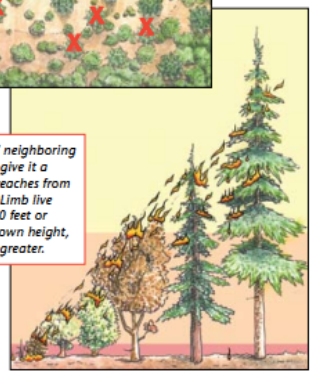
Experts recommend a minimum of 10 feet of spacing between individual trees and shrubs, measured at the crown (widest part) of the tree or shrub. You may need to increase this distance based on your property's **X-Factor**.

Mature trees should also be limbed up 10 feet, or 1/3 of their live crown height, whichever is greater.

It's possible, depending upon the size of your property, that you will be limited by your property boundary and unable to complete the fire safe measures identified in Zones 2 and 3. If this happens, talk with your neighbors and ask for their cooperation. A safer home means a safer neighborhood for everyone.



Reduce density by giving brush and shrubs more space—ideally they should be about 10 feet apart from one another.



Fire "climbs" neighboring trees—don't give it a ladder that reaches from low to high. Limb live trees up to 10 feet or 1/3 of live crown height, whichever is greater.

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Section 8:

Tsunami

Table of Contents

Section 8: Tsunami Hazards 1

Why are Tsunamis a Threat to the County of Los Angeles 1

Local Conditions 2

Impact of Tsunamis in the County of Los Angeles 3

Historic Tsunamis in Southern California 4

Japan-Generated Events Affecting Southern California 4

Tsunami Characteristics 4

What Are Tsunamis? 4

How Fast? 4

How Big? 5

How Frequent? 5

Tsunami Signs 5

What Causes Tsunamis? 18

Plate Tectonics 18

Earthquakes and Tsunamis 18

Tsunami Earthquakes 18

Types of Tsunamis 19

Pacific-Wide and Regional Tsunamis 19

Tsunami Hazard Assessment 20

Hazard Identification 20

Vulnerability Assessment 20

Risk Analysis 21

Tsunami Watches and Warnings 21

Warning System 21

Notifications *21*

Community Tsunami Issues **21**

What is Sucseptible to Tsunmais? *21*

Life and Property *22*

Infrastrcutre *22*

Section 8: Tsunami Hazards

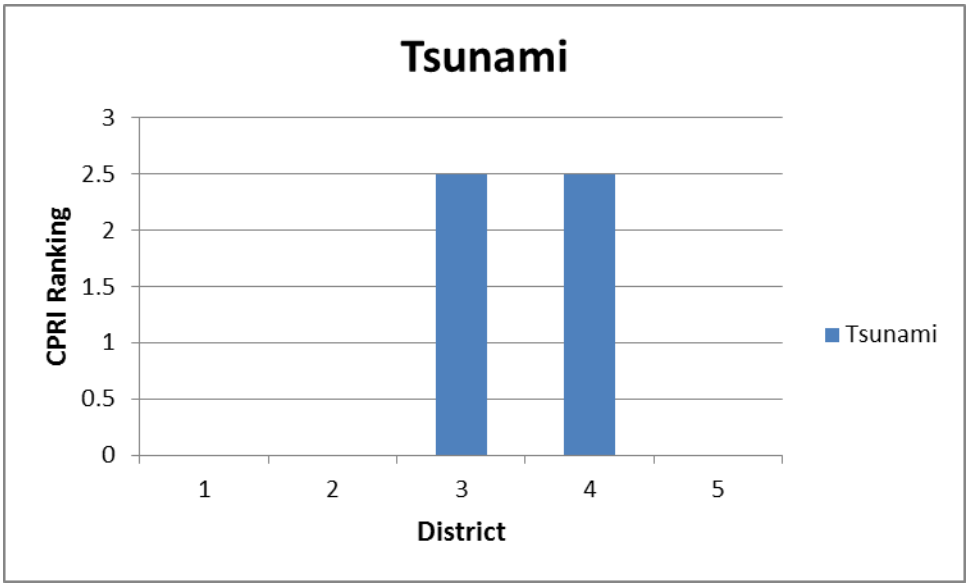
Why Are Tsunamis a Threat to the County of Los Angeles?

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2

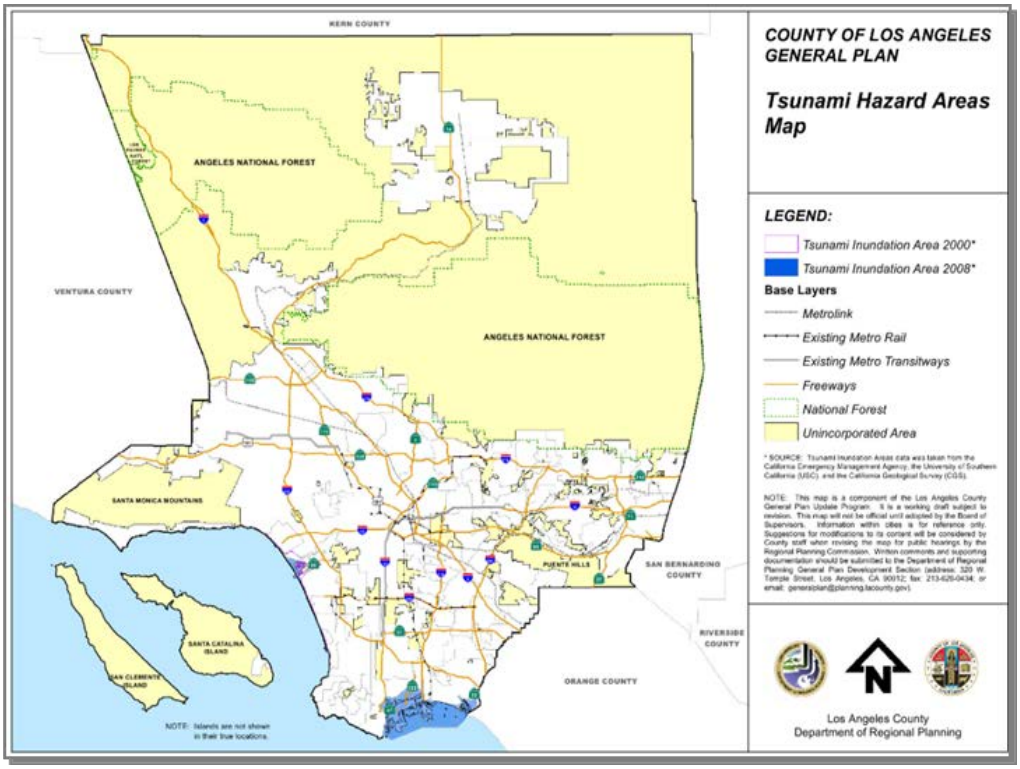
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

The most recent tsunami to strike the County of Los Angeles was the 2011 tsunami caused by the earthquake in Japan. History has shown that the probability of a tsunami in the planning area is extremely low. However, if a tsunami should occur, the consequences could be severe. The impact could cause loss of life, destroy thousands of high-priced homes, and greatly affect the region's downtown and coastal businesses—with a profound secondary impact on tourism. Even if all residents and visitors were safely evacuated, the damage to property in this densely populated, high-property-value area would still be substantial.

Board of Supervisorial District	Tsunami
Board of Supervisorial District 1	0
Board of Supervisorial District 2	0
Board of Supervisorial District 3	2.5
Board of Supervisorial District 4	2.5
Board of Supervisorial District 5	0



Map 8-1: Tsunami Hazard Area Map
(Source: County of Los Angeles General Plan Draft 2014)



Local Conditions

Tsunamis have been documented extensively in California since 1806. Although the majority of tsunamis have occurred in Northern California, Southern California has been affected as well. In the 1930s four tsunamis struck the Los Angeles County, Orange County, and San Diego County coastal areas. In Orange County the tsunami wave reached heights of 20 feet or more above sea level. In 1964, following the Alaska Earthquake (magnitude 8.2), tidal surges of 4 to 5 feet hit the Huntington Harbor area, causing moderate damage.

Table 8-1: Tsunami Events in California, 1930–2010
(Source: Worldwide Tsunami Database, www.ngdc.noaa.gov)

Date	Location	Maximum Run-up*(m)	Earthquake Magnitude
08/31/1930	Redondo Beach	6.10	5.2
08/31/1930	Santa Monica	6.10	5.2
08/31/1930	Venice	6.10	5.2
03/11/1933	La Jolla	0.10	6.3
03/11/1933	Long Beach	0.10	6.3
08/21/1934	Newport Beach	12.00	Unknown
02/09/1941	San Diego	Unknown	6.6
10/18/1989	Monterey	0.40	7.1
10/18/1989	Moss Landing	1.00	7.1
10/18/1989	Santa Cruz	0.10	7.1
04/25/1992	Arena Cove	0.10	7.1
04/25/1992	Monterey	0.10	7.1
09/01/1994	Crescent City	0.14	7.1
11/04/2000	Point Arguello	5.00	
3/11/2011	Crescent City	2.4	9.0

** Maximum run-up (m) is the maximum water height above sea level, in meters. The run-up is the height the tsunami reached above a reference level such as mean sea level. It is not always clear which reference level was used.*

Impact of Tsunamis in the County of Los Angeles

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Based on the risk assessment, it is evident that tsunamis will continue to have potentially devastating economic impacts to certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values

- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Historic Tsunamis in Southern California

"Since 1812, the California coast has had 14 tsunamis with wave heights higher than 3 feet; six of these were destructive. The Channel Islands were hit by a significant tsunami in the early 1800s. The worst tsunami on record resulted from the 1964 Alaskan Earthquake, and caused 12 deaths and at least $17 million in damages in Northern California."
(Source: http://education.sdsc.edu/optiputer/htmlLinks/california_tsunami.html)

Japan-Generated Events Affecting Southern California

A tsunami from the devastating Japan earthquake hit the coast of California on the morning of Friday March 11, 2011, causing significant damage in Crescent City, Santa Cruz, and other parts of Northern California. There were no reports of major damage or flooding in Southern California.

Tsunami Characteristics

What Are Tsunamis?

The phenomenon we call a "tsunami" (soo-NAH-mee) is a series of traveling ocean waves of extremely long length, generated primarily by earthquakes occurring below or near the ocean floor. Underwater volcanic eruptions and landslides can also generate tsunamis. In the deep ocean, the tsunami waves move across the deep ocean with a speed exceeding 500 miles per hour, and a wave height of only a few inches. Tsunami waves are distinguished from ordinary ocean waves by their great length between wave crests—often exceeding 60 miles or more in the deep ocean—and by the time between these crests, ranging from 10 minutes to an hour.

As they reach the shallow waters of the coast, the waves slow down and the water can pile up into a destructive wall of water 30 feet or more in height. The effect can be amplified where a bay, harbor, or lagoon funnels the wave as it moves inland. Large tsunamis have been known to rise over 100 feet. Even a tsunami 1–3 feet high can be very destructive and cause many deaths and injuries.

Tsunamis typically are classified as either local or distant. Tsunamis from local sources usually result from earthquakes occurring off nearby coasts.

Tsunamis from distant sources are the most common type observed along the California coast. Tsunamis generated by earthquakes in South America and the Aleutian-Alaskan region have posed a greater hazard to the West Coast of the United States than locally generated tsunamis. There is a history of Pacific-wide tsunamis occurring every 10 to 20 years (Source: TyCom EIR, 9/2001).

How Fast?

Tsunami waves can travel unnoticed at the speed of a commercial jet plane, over 500 miles per hour. They can move from one side of the Pacific Ocean to the other in less than a day. This great speed makes it important to be aware of a tsunami as soon as it is generated. Scientists can predict when a tsunami will arrive at various places by knowing the source characteristics of the earthquake that generated the tsunami and the characteristics of the sea floor along the paths to those places. Tsunamis travel much slower in more shallow coastal waters, where their wave heights begin to increase dramatically.

How Big?

Offshore and coastal features can determine the size and impact of tsunami waves. Reefs, bays, entrances to rivers, undersea features, and the slope of the beach all tend to modify the tsunami as it approaches the coastline. When a tsunami reaches the coast and moves inland, the water level can rise many feet. In extreme cases, water levels have risen to more than 50 feet for tsunamis of distant origin, and over 100 feet for tsunami waves generated near the earthquake's epicenter. The first wave may not be the largest in the series of waves. One coastal community may see *no* damaging wave activity, while in another nearby community destructive waves can be large and violent. The flooding can extend inland by 1,000 feet or more, covering large expanses of land with water and debris.

How Frequent?

Since scientists cannot predict when earthquakes will occur, they cannot determine exactly when a tsunami will be generated. However, by looking at past historical tsunamis and run-up maps, scientists know where tsunamis are most *likely* to be generated. Past tsunami height measurements are useful in predicting future tsunami impacts and flooding limits at specific coastal locations and communities.

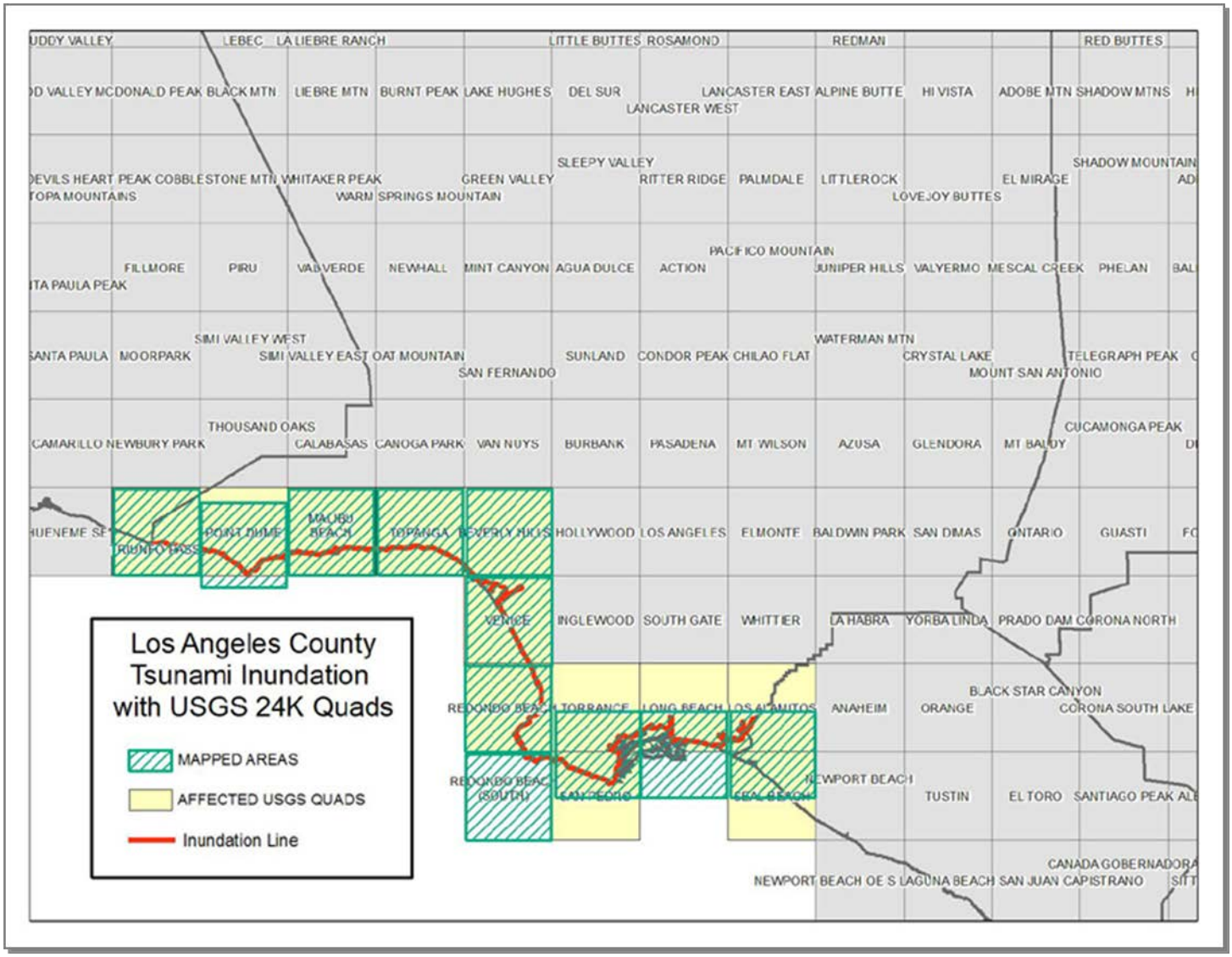
Tsunami Signs

The County of Los Angeles is working with cities and unincorporated communities on posting tsunami signs in populated areas. Additionally the County is actively pursuing designation as a TsunamiReady community. Following are tsunami inundation maps provided by United States Geological Service (USGS).

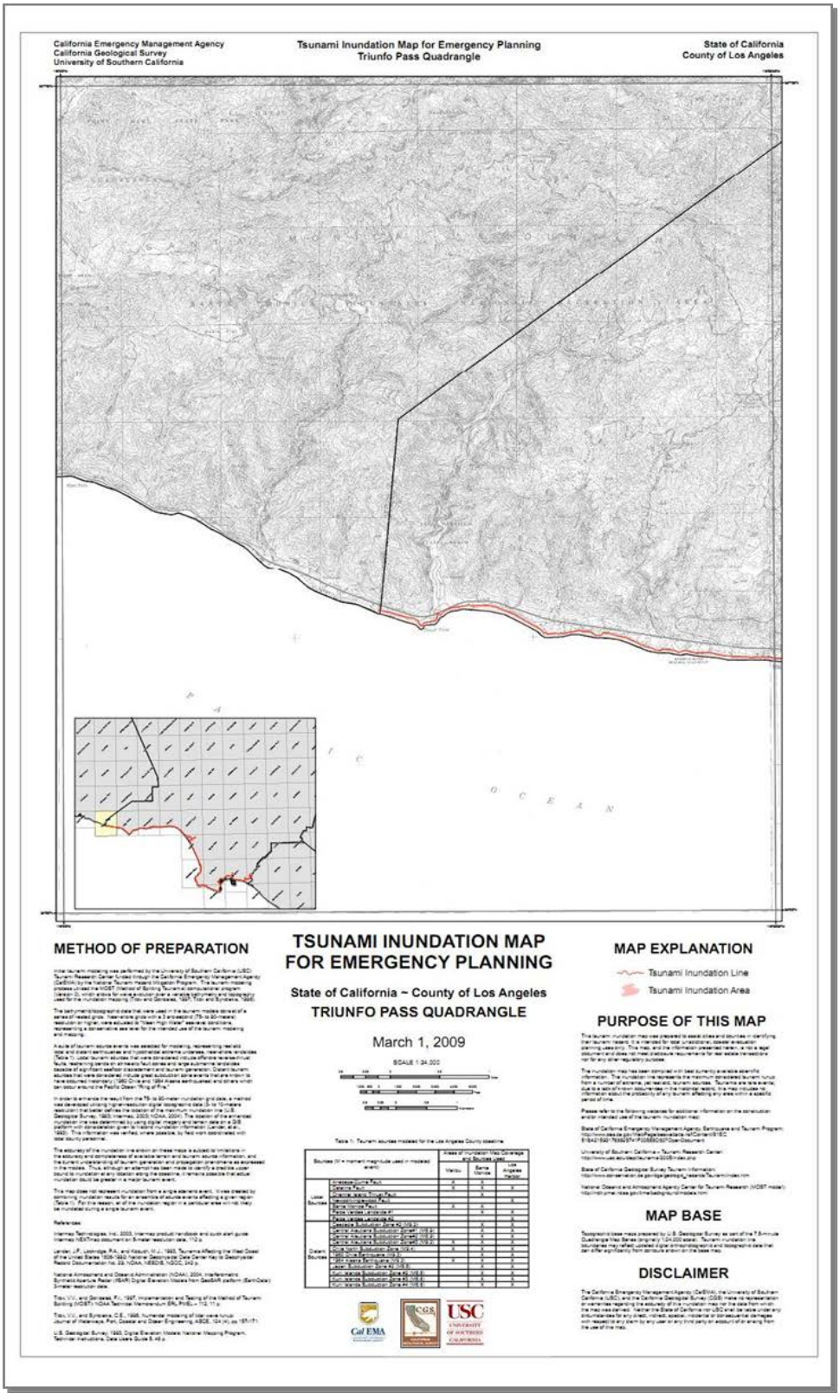




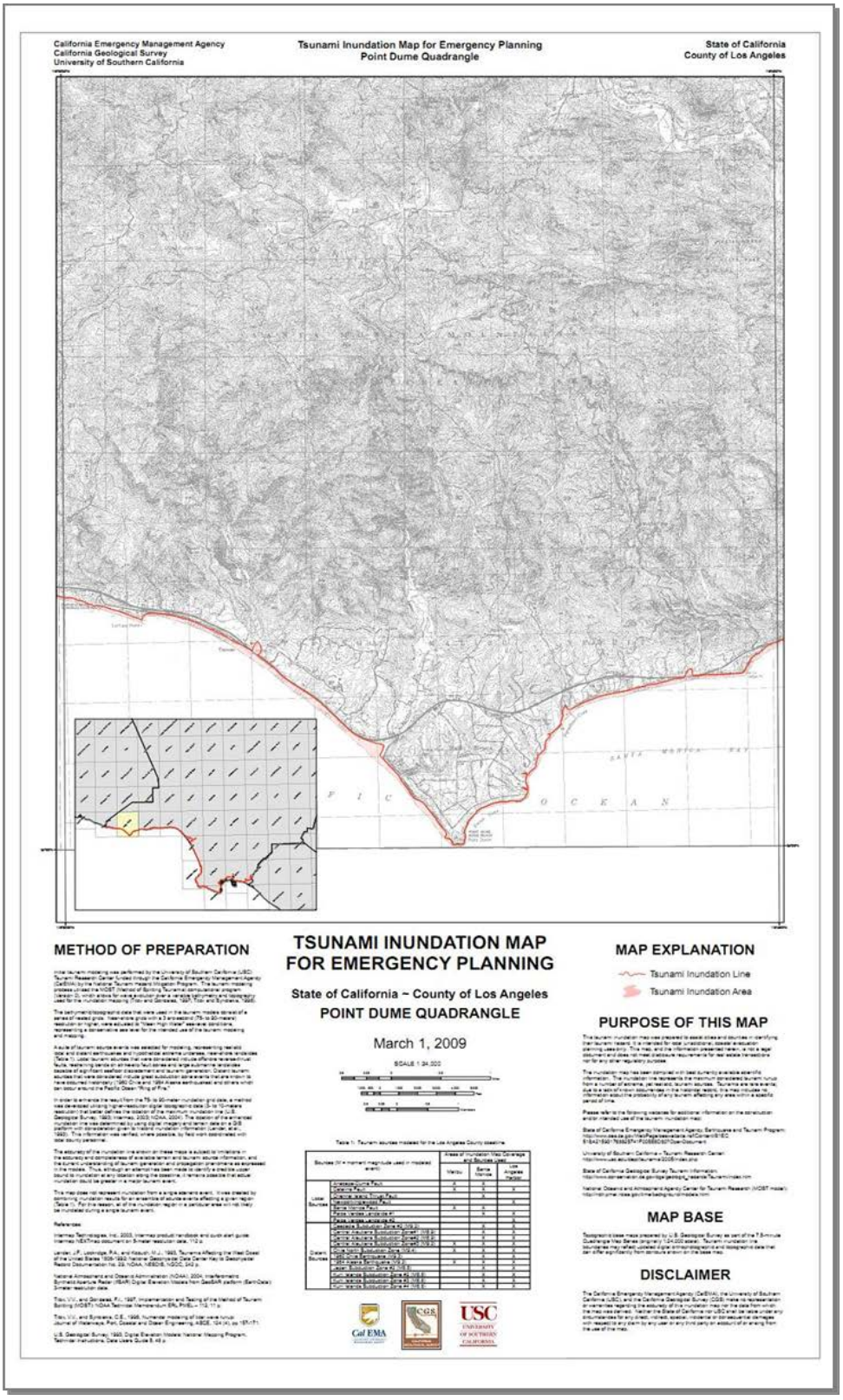
Figure 8-1: Potential Local Source Tsunami Regions along the California Coast
(Source: http://www.consrv.ca.gov)



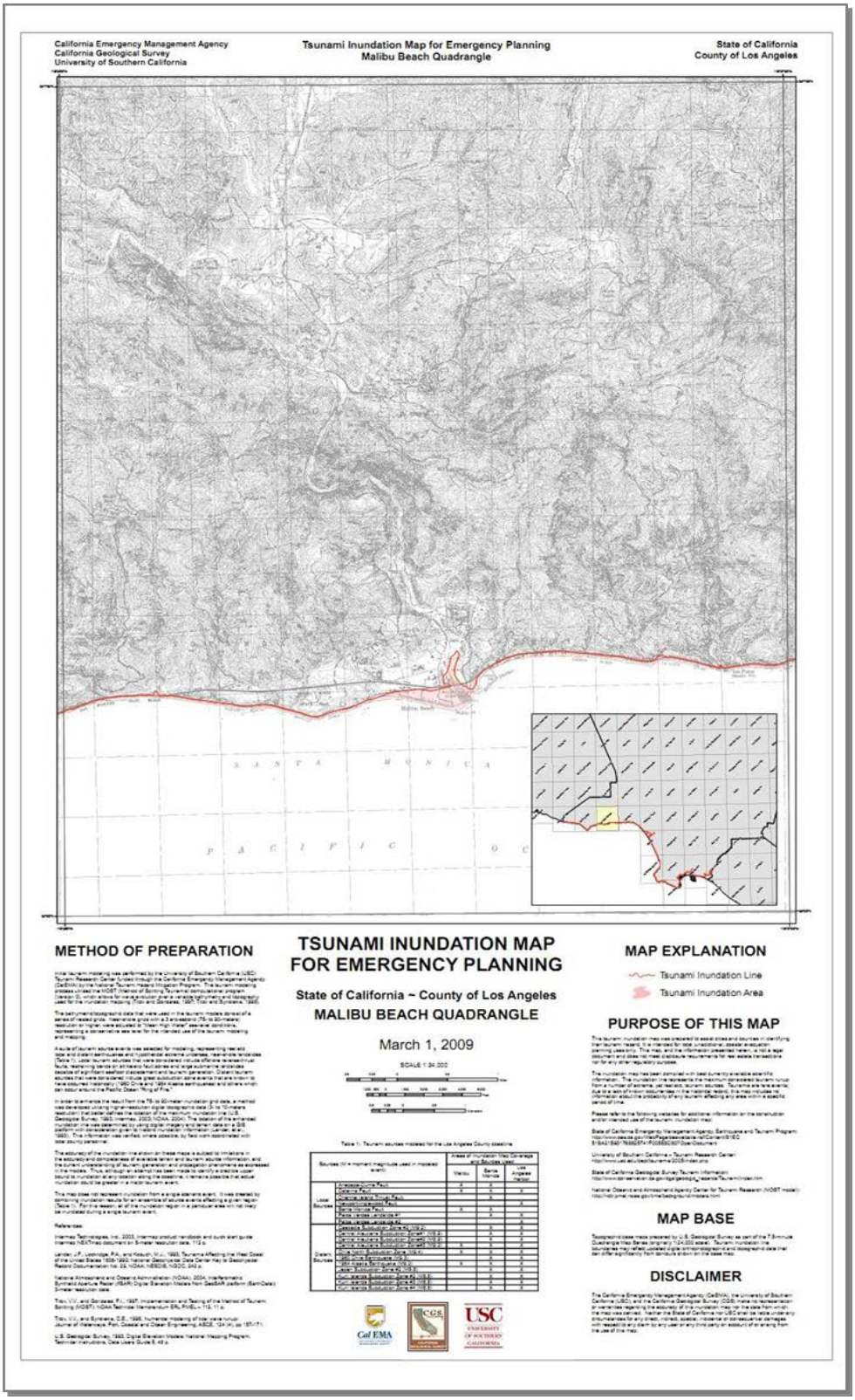
Map 8-2: Triunfo Pass Quadrangle Inundation Map



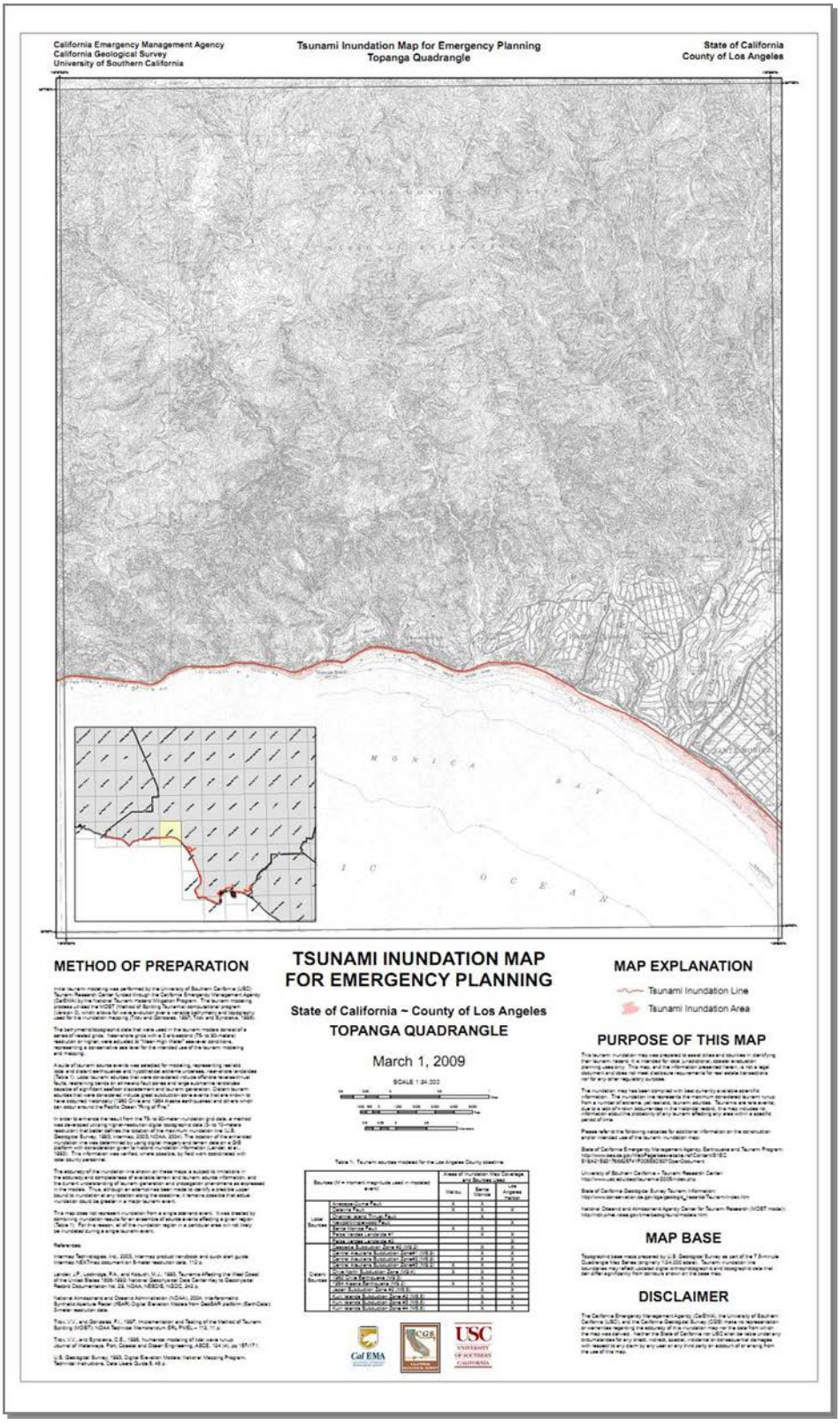
Map 8-3: Point Dume Quadrangle Inundation Map



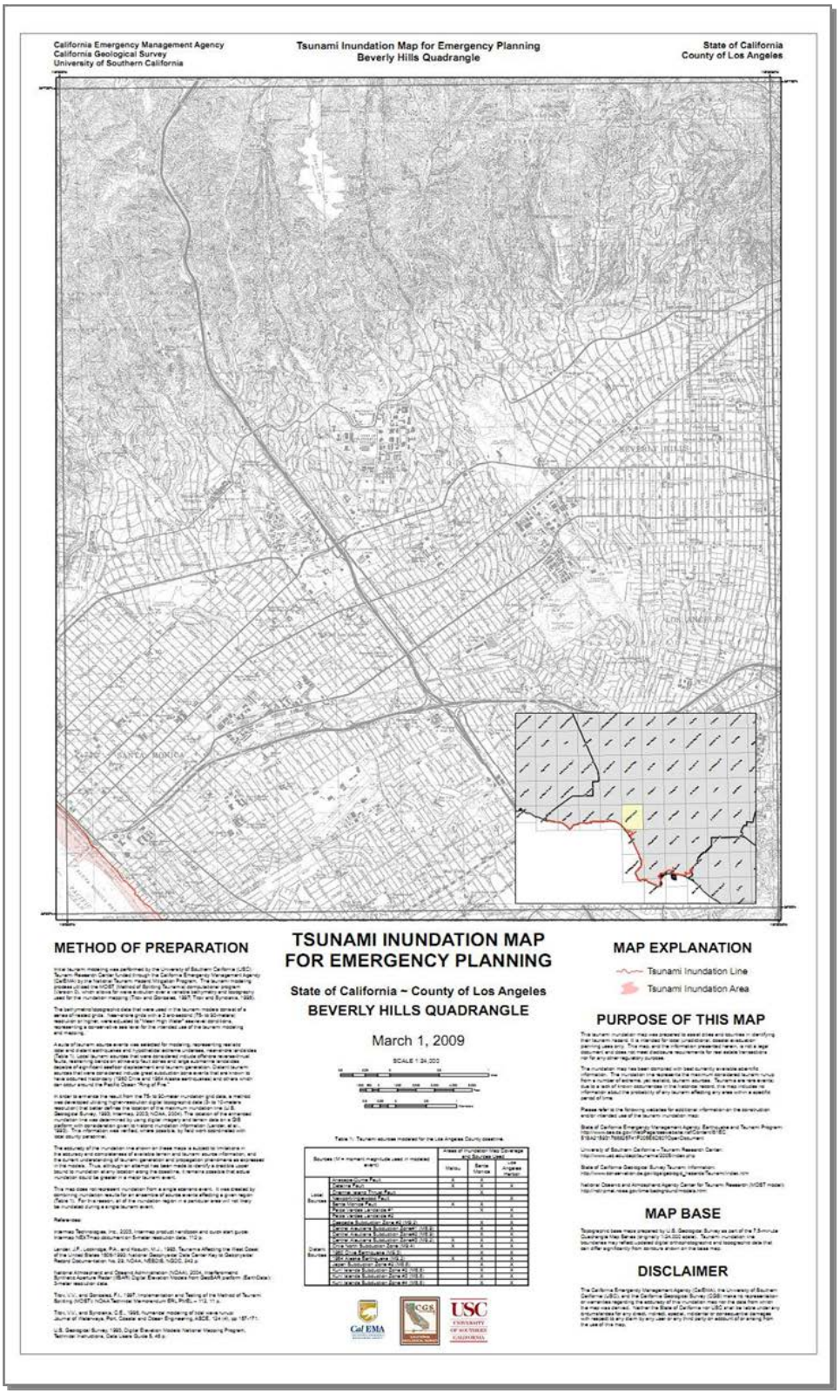
Map 8-4: Malibu Beach Quadrangle Inundation Map



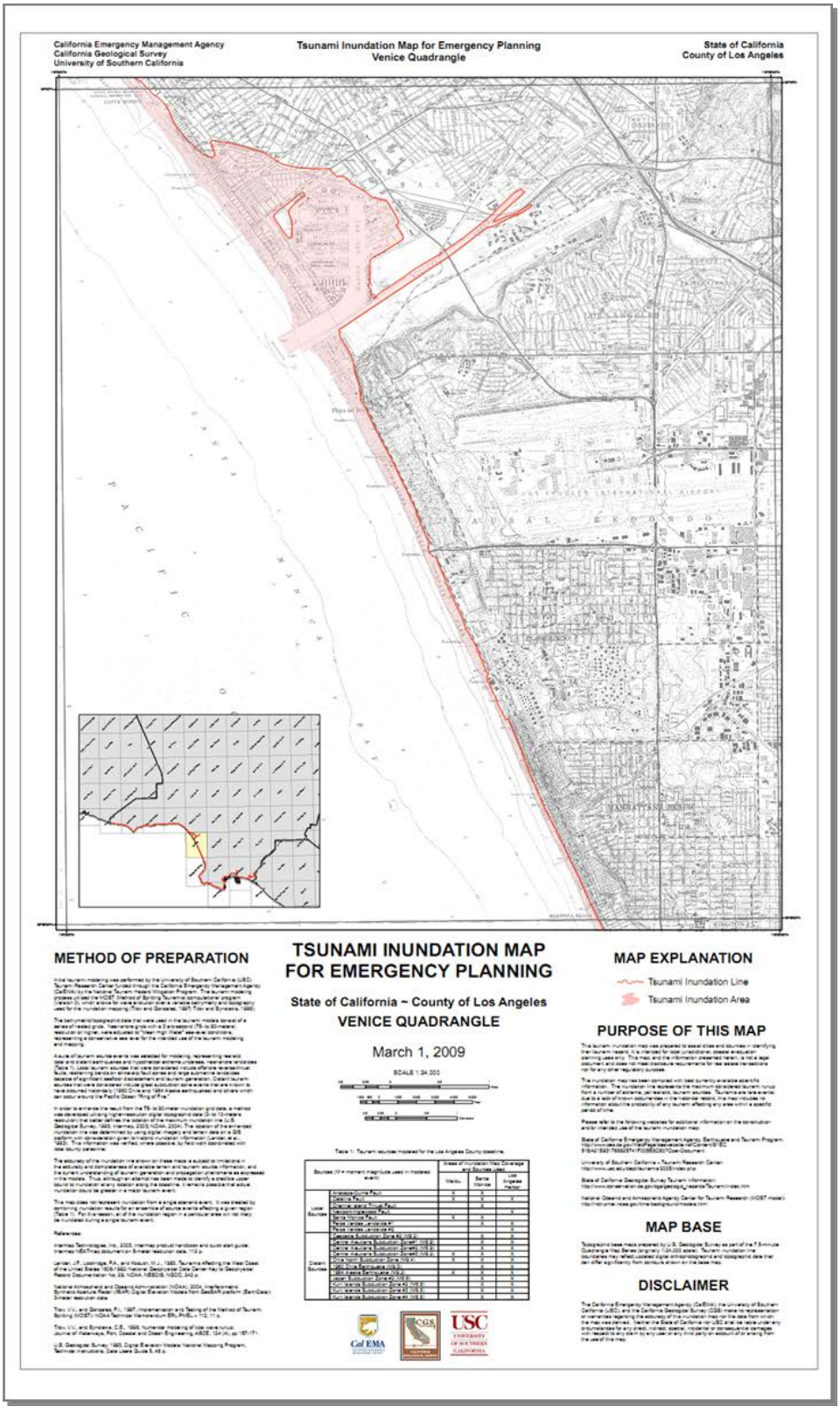
Map 8-5: Topanga Quadrangle Inundation Map



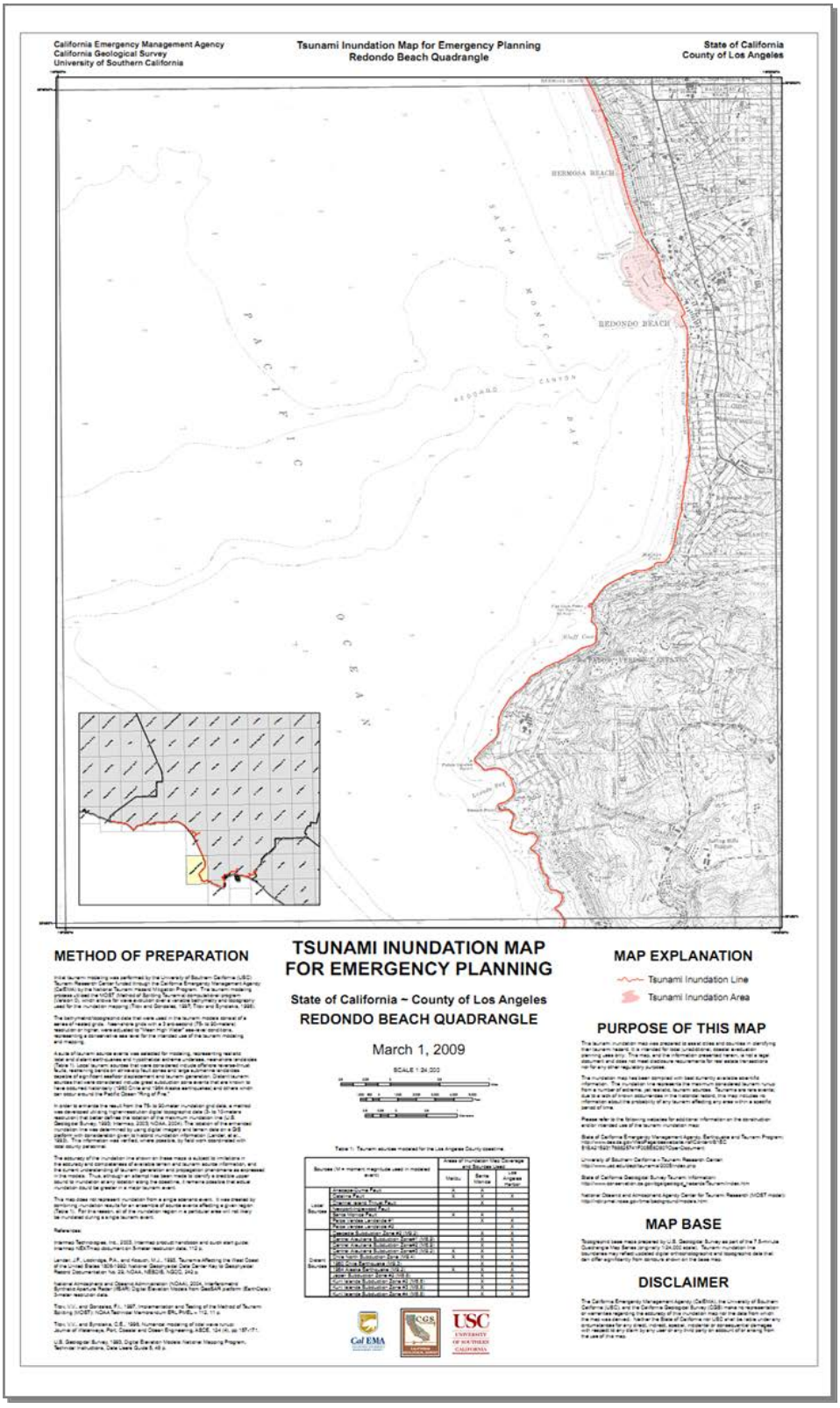
Map 8-6: Beverly Hills Quadrangle Inundation Map



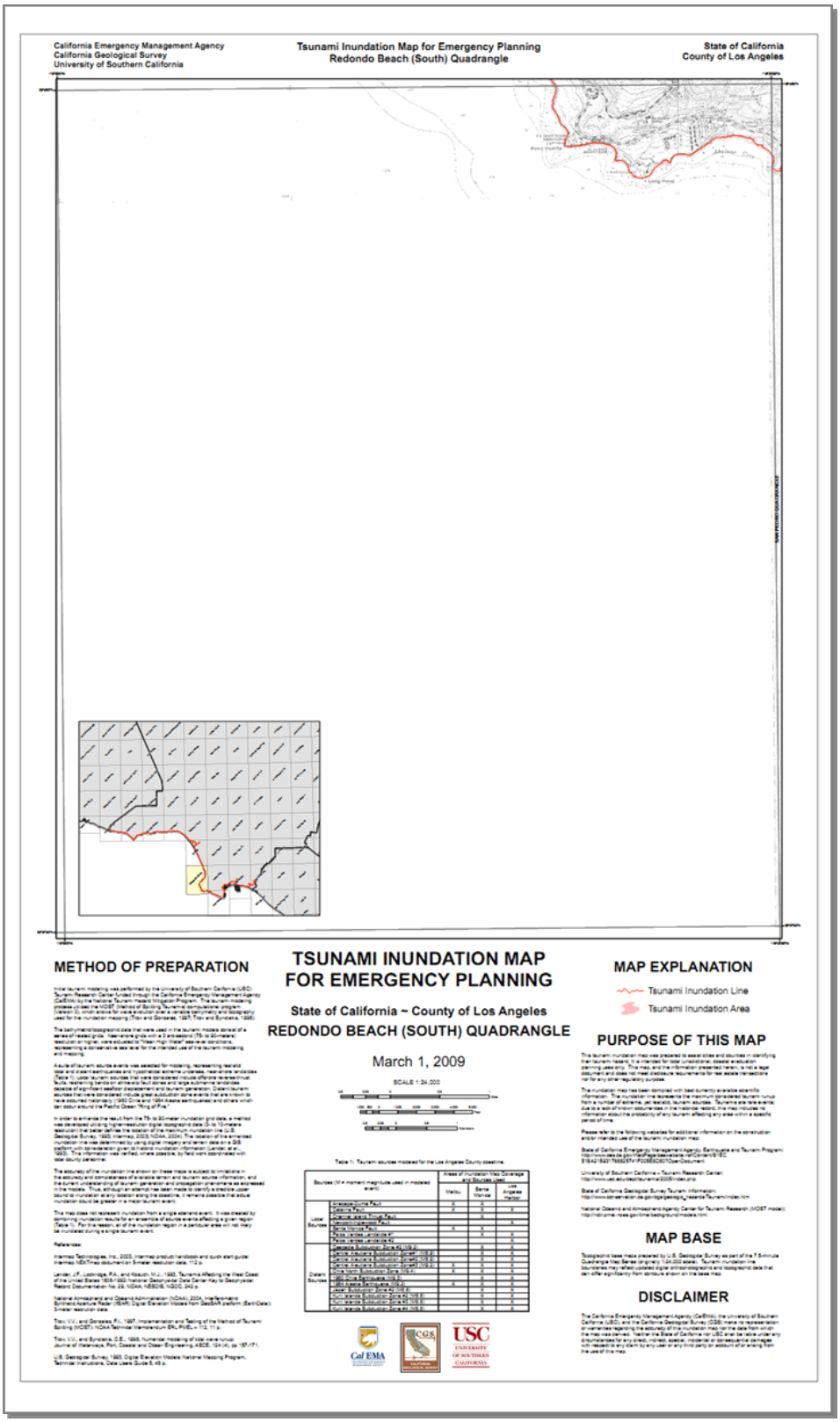
Map 8-7: Venice Quadrangle Inundation Map



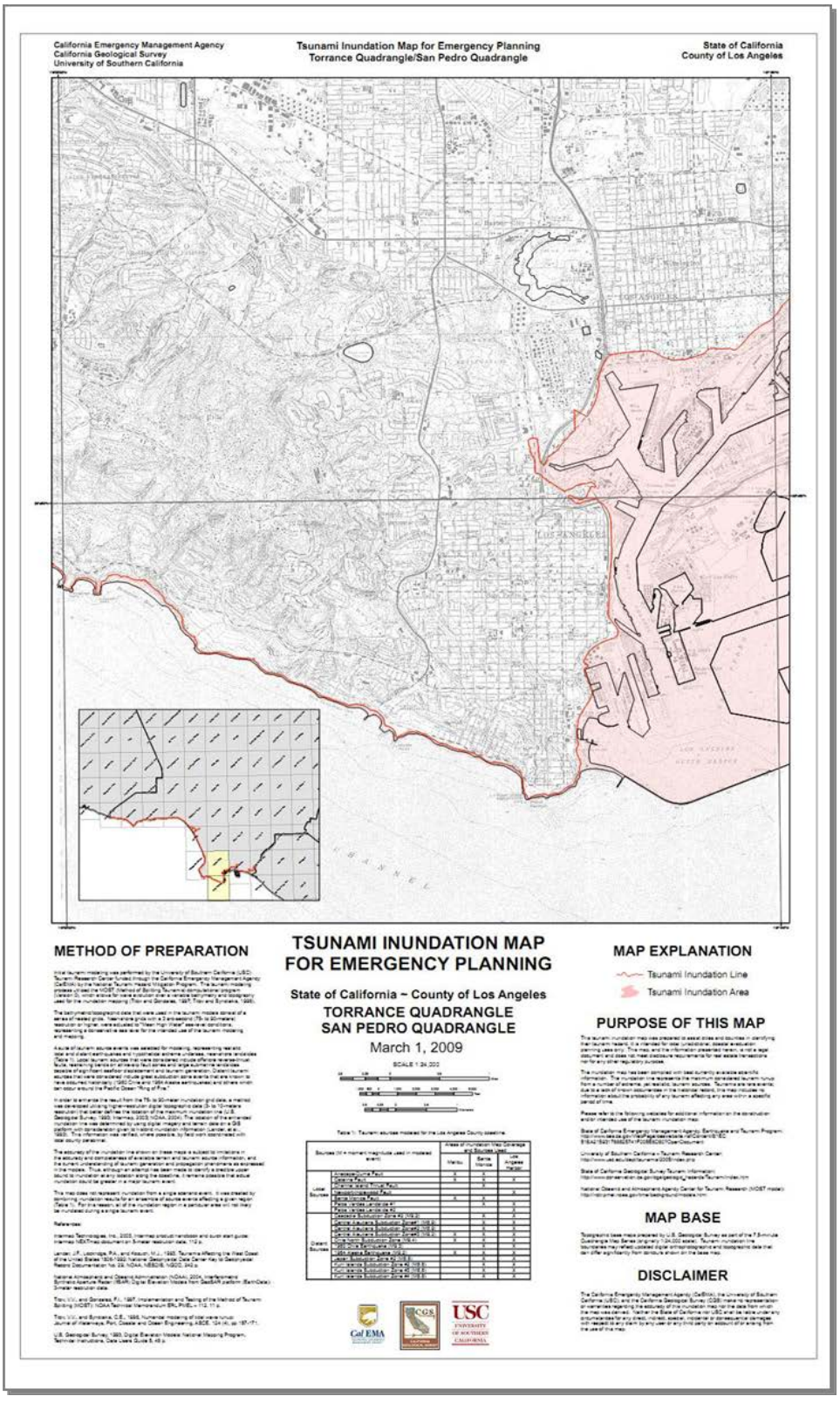
Map 8-8: Redondo Beach Quadrangle Inundation Map



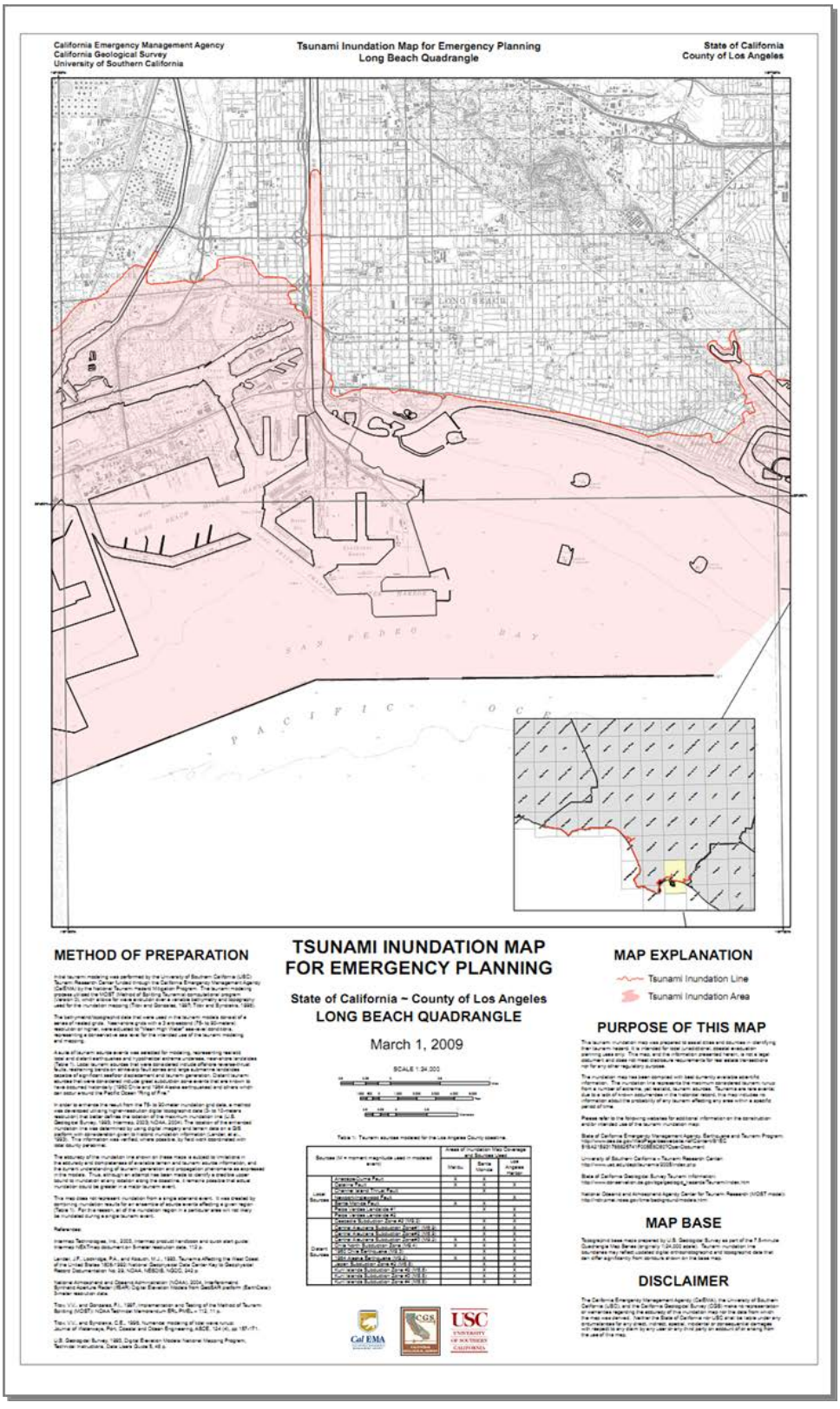
Map 8-9: Redondo Beach South Quadrangle Inundation Map



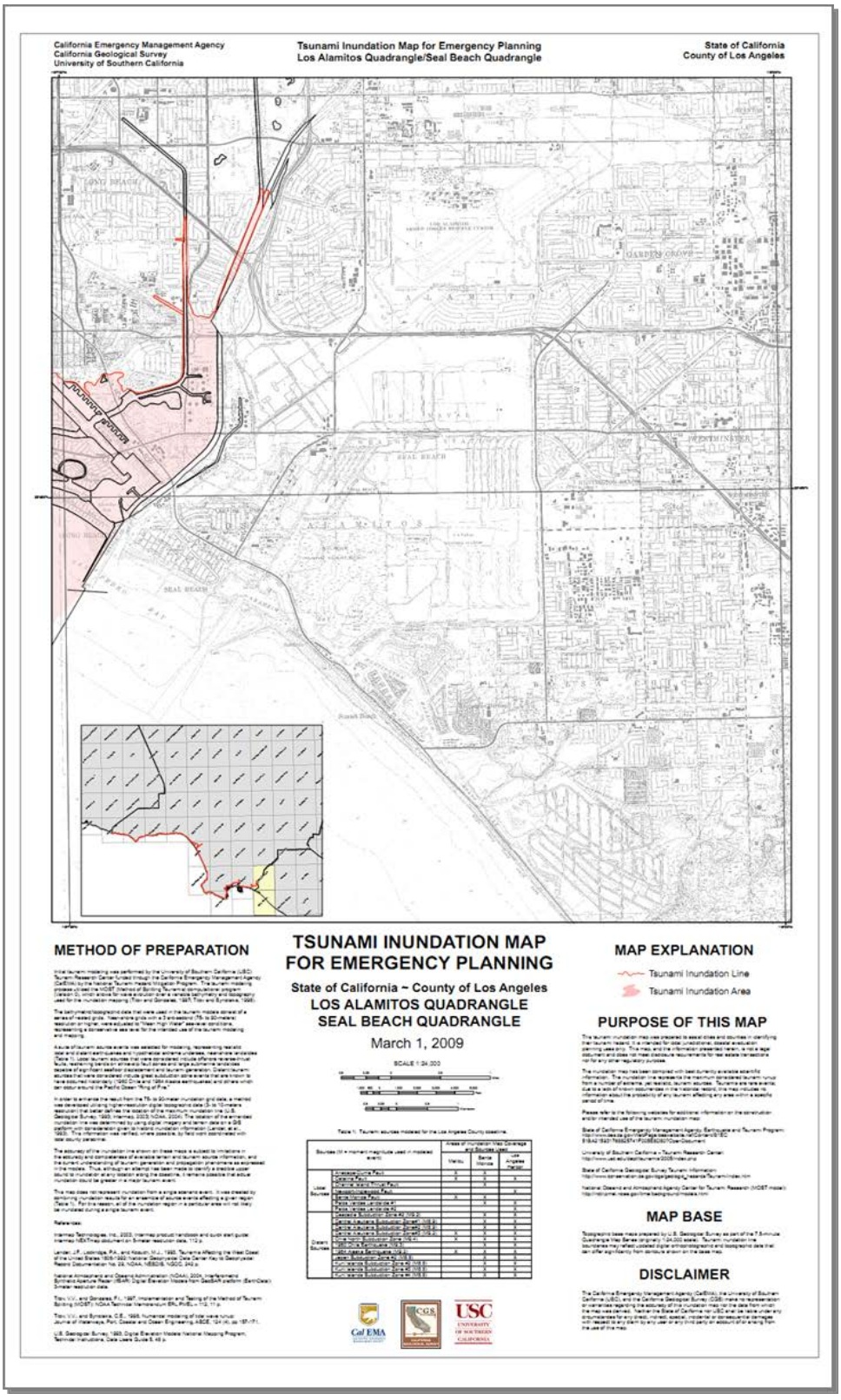
Map 8-10: Torrance–San Pedro Quadrangle Inundation Map



Map 8-11: Long Beach Quadrangle Inundation Map



Map 8-12: Los Alamitos–Seal Beach Quadrangle Inundation Map



What Causes Tsunamis?

There are many causes of tsunamis, but the most prevalent is earthquakes. In addition, landslides, volcanic eruptions, explosions, and even the impact of cosmic bodies (such as meteorites) can generate tsunamis.

Plate Tectonics

Plate tectonic theory is based on an earth model characterized by a small number of lithospheric plates, 40 to 150 miles thick that float on a viscous underlayer called the asthenosphere. These plates, which cover the entire surface of the earth and contain both the continents and sea floor, move relative to each other at rates of up to several inches per year. The region where two plates come in contact is called a plate boundary, and the way in which one plate moves relative to another determines the type of boundary: 1) *spreading*, where the two plates move away from each other; 2) *subduction*, where the two plates move toward each other and one slides beneath the other; and 3) *transform*, where the two plates slide horizontally past each other. Subduction zones are characterized by deep ocean trenches, and the volcanic islands or volcanic mountain chains associated with the many subduction zones around the Pacific Rim are sometimes called the Ring of Fire.

Earthquakes and Tsunamis

Earthquakes can be caused by volcanic activity, but most are generated by movements along fault zones associated with the plate boundaries. Most strong earthquakes, representing 80% of the total energy released worldwide by earthquakes, occur in subduction zones—where an oceanic plate slides under a continental plate or another younger oceanic plate.

Not all earthquakes generate tsunamis. To generate a tsunami, the fault where the earthquake occurs must be underneath or near the ocean, and the earthquake must cause vertical movement of the sea floor over a large area—hundreds or thousands of square miles. "By far, the most destructive tsunamis are generated from large, shallow earthquakes with an epicenter or fault line near or on the ocean floor" (Source: http://ioc3.unesco.org/itic/categories.php?category_no=138).

The amount of vertical and horizontal motion of the sea floor, the area over which it occurs, the simultaneous occurrence of slumping of underwater sediments due to the shaking, and the efficiency with which energy is transferred from the earth's crust to the ocean water are all part of the tsunami-generating mechanism. Sudden vertical displacements over such large areas will disturb the ocean's surface, displace water, and generate destructive tsunami waves. Although all oceanic regions of the world can experience tsunamis, the most destructive and repeated occurrences of tsunamis are in the Pacific Rim region.

Tsunami Earthquakes

A September 2, 1992, earthquake (M7.2) was barely felt by residents along the coast of Nicaragua. Located well offshore, the severity of shaking (on a scale of Modified Mercalli I to XII) was mostly at level II along the coast, and reached a III at only a few places. Twenty to 70 minutes after the earthquake occurred, a tsunami struck the coast of Nicaragua with wave amplitudes up to 13 feet above normal sea level in most places, with a maximum run-up height of 35 feet. The waves caught coastal residents completely by surprise, causing many casualties and considerable property damage.

This tsunami was caused by a tsunami earthquake—an earthquake that produces an unusually large tsunami relative to the earthquake magnitude. Tsunami earthquakes are characterized by a very shallow focus, fault dislocations greater than several meters, and fault surfaces that are smaller than for a normal earthquake.

Tsunami earthquakes are also slow earthquakes, with slippage along the fault beneath the sea floor occurring more slowly than it would in a normal earthquake. The only known method to quickly recognize a tsunami earthquake is to estimate a parameter called the seismic moment, using very long period seismic waves (more than 50 seconds/cycle). Two other destructive and deadly tsunamis from tsunami earthquakes have occurred in recent years: one in Java, Indonesia (June 2, 1994), and the other in Peru (February 21, 1996).

> "Less frequently, tsunami waves can be generated from displacements of water resulting from rock falls, icefalls and sudden submarine landslides or slumps. Such events may be caused impulsively from the instability and sudden failure of submarine slopes, which are sometimes triggered by the ground motions of a strong earthquake. For example, in the 1980s earth moving and construction work of an airport runway along the coast of Southern France triggered an underwater landslide, which generated destructive tsunami waves in the harbor of Thebes."
> (Source: http://ioc3.unesco.org/itic/contents.php?id=160)

Types of Tsunamis

Pacific-Wide and Regional Tsunamis

Tsunamis can be categorized as "local" and Pacific-wide. Typically, a Pacific-wide tsunami is generated by major vertical ocean bottom movement in offshore deep trenches. A "local" tsunami can be a component of the Pacific-wide tsunami in the area of the earthquake, or a wave that is confined to the area of generation within a bay or harbor, and caused by movement of the bay itself (or landslides).

On December 26, 2004, the second biggest earthquake in recorded history occurred off the coast of Indonesia. The magnitude 9.3 earthquake unleashed a devastating tsunami that traveled thousands of kilometers across the Indian Ocean, taking the lives of nearly 300,000 people in countries as far apart as Indonesia, the Maldives, Sri Lanka, and Somalia. The catastrophe was one of the deadliest such events in modern history.

In 1960, a large tsunami that caused widespread death and destruction throughout the Pacific was generated by an earthquake located off the coast of Chile. It caused loss of life and property damage not only along the Chilean coast but also in Hawaii, and as far away as Japan. The Great Alaskan Earthquake of 1964 killed 106 people and produced deadly tsunami waves in Alaska, Oregon, and California.

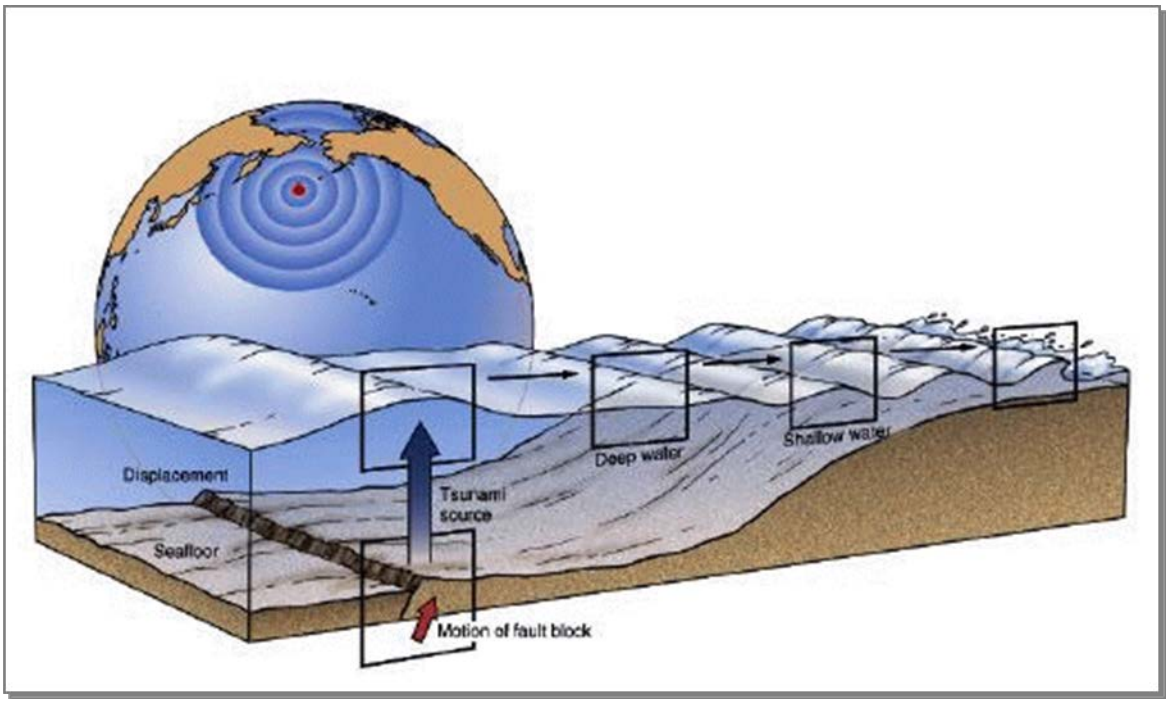
In July 1993, a tsunami generated in the Sea of Japan killed over 120 people in Japan. Damage also occurred in Korea and Russia, but spared other countries since the tsunami wave energy was confined within the Sea of Japan. The 1993 Japan Sea tsunami is known as a "regional event" since its impact was confined to a relatively small area. For people living along the northwestern coast of Japan, the tsunami waves followed the earthquake within a few minutes.

During the 1990s destructive regional tsunamis also occurred in Nicaragua, Indonesia, the Philippines, Papua New Guinea, and Peru, killing thousands of people. Others caused property damage in Chile and Mexico. Some damage also occurred in the far field in the Marquesas Islands (French Polynesia) from the July 30, 1995, Chilean and February 21, 1996, Peruvian tsunamis.

In less than a day, tsunamis can travel from one side of the Pacific to the other. However, people living near areas where large earthquakes occur may find that the tsunami waves will reach their shores within *minutes* of the earthquake.

For these reasons, the tsunami threat to many areas such as Alaska, the Philippines, Japan, and the West Coast of the United States can be immediate (for tsunamis from nearby earthquakes, which take only a few minutes to reach coastal areas), or less urgent (for tsunamis from distant earthquakes, which take from 3 to 22 hours to reach coastal areas).

Figure 8-2: Tsunami Formation



Tsunami Hazard Assessment

Hazard Identification

Large sub-marine landslides have the potential to generate destructive tsunamis along adjacent coastal areas in Southern California. The travel time for a locally generated tsunami, from initiation at the source to arrival at coastal communities, can be 5 to 30 minutes.

The likelihood for the catastrophic inundation of low-lying coastal areas of the County as a result of a tsunami is low. However, the risk of losing vital commerce associated with the Ports of Los Angeles/Long Beach warrants adequate risk reduction measures from tsunamis. The Ports of Long Beach and Los Angeles have completed a Tsunami Hazard Assessment to guide disaster planning and mitigate damage from a potential tsunami at their facilities. (Source: County of Los Angeles General Plan Draft 2012)

Vulnerability Assessment

A local tsunami may be the most serious threat because it strikes suddenly, sometimes even before the earthquake shaking stops. Tsunamis cause damage in three ways: inundation, wave impact on structures, and erosion.

> "Strong, tsunami-induced currents lead to the erosion of foundations and the collapse of bridges and sea walls. Flotation and drag forces move houses and overturn railroad cars. Considerable damage is caused by the resultant floating debris, including boats

and cars that become dangerous projectiles that may crash into buildings, break power lines, and may start fires. Fires from damaged ships in ports or from ruptured coastal oil storage tanks and refinery facilities can cause damage greater than that inflicted directly by the tsunami. Of increasing concern is the potential effect of tsunami drawdown, when receding waters uncover cooling water intakes of nuclear power plants." (Source: http://ioc3.unesco.org/itic/contents.php?id=205)

Risk Analysis

From the analysis of tsunami events depicted in the "Local History" section, it can be deduced that a tsunami could significantly affect life, property, infrastructure, and transportation.

Tsunami Watches and Warnings

Warning System

Operating the tsunami warning system in the United States is a function of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service. Development of the tsunami warning system was spurred by the disastrous waves generated in the 1964 Alaska tsunami, which caught Hawaii and the U.S. West Coast by surprise—taking a heavy toll in life and property.

The disastrous 1964 tsunami resulted in the development of a regional warning system in Alaska. The Alaska Tsunami Warning Center is in Palmer, Alaska. This facility is the nerve center for an elaborate telemetry network of remote seismic stations in Alaska, Washington, California, Colorado, and other locations. Tidal data is also telemetered directly to the ATWC from eight Alaskan locations. Tidal data from Canada, Washington, Oregon, and California is available via telephone, teletype, and computer readout.

Notification

The National Warning System (NAWAS) is an integral part of the Alaska Tsunami Warning Center. Reports of major earthquakes occurring anywhere in the Pacific Basin that may generate seismic sea waves are transmitted to the Honolulu Observatory for evaluation. An Alaska Tsunami Warning Center is also in place for public notification of earthquakes that occur in the Pacific Basin near Alaska, Canada, and Northern California. The observatory staff determines the action to be taken and relays warnings over the NAWAS circuits to inform and warn West Coast states. The state NAWAS circuit is used to relay the information to the Orange County Operational Area warning center, which will in turn relay the information to local warning points in coastal areas. The same information is also transmitted to local jurisdictions over appropriate radio systems, teletype, and telephone circuits to ensure maximum dissemination.

A tsunami *watch bulletin* is issued if an earthquake has occurred in the Pacific Basin and could cause a tsunami. A tsunami *warning bulletin* is issued when an earthquake has occurred and a tsunami is spreading across the Pacific Ocean. When a threat no longer exists, a *cancellation bulletin* is issued.

Community Tsunami Issues

What Is Susceptible to Tsunamis?

Electrical power generator plant and refinery operations are located in the potentially affected areas. Tsunami "maximum run-up" projections were modeled by the University of Southern California and distributed by Cal OES for the purpose of identifying tsunami hazards. The tsunami model was the result of a combination of inundation modeling and on-site surveys; it shows maximum projected inundation levels from tsunamis along the entire coast of Los Angeles County.

The maximum run-up for the maps below is approximately 42 feet. This means that based on the scenario tsunami, the displaced water level would be approximately 42 feet above the normal tide for that day and time.

Life and Property

Based on the local history events and projected "run-up" modeling of tsunamis, it is estimated that less than 2% of the county would be directly affected. Several critical facilities are located in the projected run-up inundation areas (Source: County of Los Angeles CEO - GIS). See Section 6: Flooding for impacted critical facilities maps. In addition to direct impacts, the county would be significantly affected by regional damage to infrastructure.

Even though the risk of tsunami to the region is relatively low, the impacts could be very high. Mitigation measures, including public awareness and posting of signs, could have significant effects on the survivability of the affected sites. It is contemplated that the County of Los Angeles will initiate a tsunami awareness program in the near future to address the potential threats associated with the tsunami hazard.

Infrastructure

Tsunamis (and earthquakes) can damage buildings, power lines, and other property and infrastructure due to flooding. Tsunamis can result in collapsed or damaged buildings or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Damage to public water and sewer systems, transportation networks, and flood channels would greatly affect daily life for residents.

Roads could be blocked by objects during a tsunami, which in turn could have severe consequences for people who are attempting to evacuate or who need emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric services and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. Tsunamis can have direct consequences on the local economy, in terms of both physical damage and interrupted services.

Section 9:

Non-Significant Hazards

Table of Contents

Section 9: Non-Significant Hazards 1

Drought 1

Why Is Drought a Threat to the County of Los Angeles? 1

Local Conditions 1

Vulnerability 2

Impact of Drought in the County of Los Angeles 2

Drought Characteristics 2

Precipitation 3

Types of Drought 4

Measuring Drought 5

Landslides 7

Historical Landslides in Southern California 7

Slope-failure Hazards in Los Angeles County 8

Debris Flows 8

Geologic Considerations 9

Geologic Setting of the Transverse Ranges Province 10

The San Gabriel Mountains 11

Vulnerability 17

Impact 17

Sinkhole and Subsidence 17

Sinkholes 18

Solution Sinkholes 18

Subsidence Sinkholes 18

Collapse Sinkholes *18*

Hydro-Compaction **19**

Windstorm Hazards 20

Why Are Severe Windstorms a Threat to the County of Los Angeles? **20**

Local Conditions **20**

What are Santa Ana Winds? *20*

Impact of Windstorms in the County of Los Angeles **21**

Historic Events in the Region **22**

High Wind Characteristics **30**

What are Tornadoes? **32**

Microbursts **33**

Terrorism and Weapons of Mass Destruction (WMD) 35

Differences between WMD Incidents and Other Incidents **35**

State of California Terrorism Guidance **36**

Los Angeles County Terrorism Early Warning (TEW) Group **37**

Biological and Chemical Terrorism **37**

Background *38*

Terrorism Mitigation **39**

Hardening (construction/retrofitting) *39*

Barriers and Fencing *39*

Redundant Systems *39*

Security Measures *39*

Planning/Studies *40*

Seismic Study *40*

IT Systems *40*

Infrastructure Loss – Utility, Data / Telecommunications 42
The Impact of Loss of Power on Water and Sewer Systems 42
The Effects on Public Health and Safety 42
Power Transmission Lines in California (updated 2011) *43*
California Department of Energy *44*
Mitigation Measures Available for These Systems 45
Computer Security Breaches 46
Cyber Crime *47*
Top Ten Computer Security Breaches 48
Systems affected: All system and network devices *48*
Systems affected: Multiple UNIX and Linux systems *49*
Systems affected: All Web servers *49*
Systems affected: Multiple UNIX and Linux systems *49*
Systems affected: Microsoft Windows NT systems using Internet Information Server *49*
Systems affected: Multiple UNIX and Linux systems *49*
Systems affected: Multiple UNIX and Linux systems; Sadmind: Solaris machines only *49*
Systems affected: UNIX, Windows and Macintosh systems *50*
Systems affected: All systems *50*
Systems affected: Multiple UNIX and Linux systems *50*
Information Technology Security Practices 50
Computer Security Policy *50*
Program Management *50*
Risk Management *50*
Life Cycle Planning *51*
Personnel/User Issues *51*
Preparing for Contingencies and Disasters *51*

Computer Security Incident Handling 51
Awareness and Training 51
Security Considerations in Computer Support and Operations 51
Physical and Environmental Security 51
Identification and Authentication 52
Logical Access Control 52
Audit Trails 52
Cryptography 52
Biological and Health Emergencies 53
Disaster Assessment & Recovery Team (DART) 54
Team Roles 55
Command Structure 56
Public Health Rapid Response Team (PHRRT) 56
PHRRT Team Structure & Response 57
Composition of Team 57
Health Hazards 58
West Nile Virus 58
West Nile Virus Facts 61
Surveillance for Human Cases 63
Recent Experience 63
Vector Control 64
Adult Mosquito Control Recommendations 64
Severe Acute Respiratory Syndrome (SARS) 67
SARS Case Count 67
SARS Surveillance 67
Lessons Learned 68

Mad Cow Disease (Creutzfeldt-Jakob disease [vCJD]) 69
Background *69*
Description *70*
U.S. Surveillance for CJD *70*
California Creutzfeldt-Jakob Disease (CJD) Surveillance Project *71*
Influenza (Flu) 71
Biology of Influenza *71*
Influenza Epidemic *72*
Influenza Pandemic *72*
Influenza Pandemic Start *73*
Influenza Pandemic Impact *73*
Avian Influenza (Bird Flu) 74
Influenza A H5 ..... *74*
Influenza A H7 ..... *74*
Influenza A H9 ..... *74*
Spread of Avian Influenza Viruses among Birds *74*
Avian Influenza Infection in Humans *75*
Smallpox 75
Vaccination *75*
Monkeypox 76
Hoof and Mouth Disease 76
Hepatitis 77
Hepatitis Incidence/Epidemiology *77*
Hepatitis Facts *79*
Other Diseases 82
Plague *82*

Brucellosis 82
Botulism (Food-borne) 82
Botulism (Wound) 82
Water/Wastewater Emergency 83
Water 83
Problems 83
Solutions – Water 84
Solutions – Wastewater 84
Watersheds 85
The Los Angeles River Watershed 87
Sun Valley Watershed 89
San Gabriel River Watershed 90
Ballona Creek Watershed 92
Santa Monica Bay Watershed 94
Dominguez Watershed 96
Santa Clara River Watershed 98
Antelope Valley Watershed 100
The Small Watershed Program in California – PL 83-566 and PL 73-534 101
Background 101
Status of the Program in California 102
Emergency Response Plans 102
Groundwater 103
Definition 103
Groundwater and Surface Water Connection 104
Hydrologic (water) Cycle 104
How Groundwater "Feeds" Surface Water 104

How Groundwater "Feeds" Groundwater *105*

Defining Combined Boundaries *105*

Common Boundaries *105*

Threats to Groundwater *106*

Potential Sources *107*

Groundwater Contaminant Sources *109*

Mitigation **110**

The Watershed Management Approach *110*

Existing Groundwater Programs *110*

Special Issues *111*

Mitigation and Management Tools *111*

Groundwater Protection Tools *113*

Groundwater Management Practices *114*

Sources of Groundwater Contamination *116*

Methyl Tertiary Butyl Ether (MTBE) *117*

Sources of MTBE in Groundwater **119**

Groundwater Protection *120*

Waste Water **120**

Characteristics of Effluents from Large Municipal Wastewater Treatment Facilities *120*

Inherent Danger to Waste Water Systems *121*

Civil Unrest 122

History of Civil Unrest in Los Angeles County **124**

Watts Riot (1965) *124*

Rodney King Riot (1992) *124*

Large Venue Structure Fires (Conflagrations) 127

Large Venue Fires Secondary to Urban Structure Fires **127**

Large Venue Fires Secondary to Wildland-Urban Interface Fires 127
Universal Studios Fire, 2008 128
Transportation Incidents 129
Aircraft Accident 129
Most Recent Accident *130*
Train Accidents 131
Glendale Derailment *132*
Chatsworth Derailment *132*
Highway Incidents 134
Maritime Accidents 134
Hazardous Materials 136
Regulatory Programs 137
Applicable Laws and Regulatory Programs *137*
Hazardous Materials Transportation 139
Air *139*
Water *139*
Ground *140*
Potential Effects of a Hazardous Materials Incident 140
Residential and Business Community *140*
Commuter/Delivery Traffic *141*
Region I Transportation Needs *141*
Site-Specific Information 142
Site Mitigation Units 142
Emergency Response 143
Los Angeles County Area Plan for Hazardous Materials *143*
Containment and Cleanup *144*

Funding Agencies *144*

Radiological Incidents/Accidents 146

Japan **147**

Explosion 148

Explosion Hazards **149**

Explosion Consequences **150**

Agricultural Loss 151

Nursery Products **152**

Fire Ants **155**

Bird Flu **155**

Distribution *155*

Stings *156*

Feeding Habits *156*

Colonies *156*

Regulation *156*

Control *157*

Community Involvement Needed for Successful Abatement *157*

Creutzfeldt-Jakob Disease (Mad Cow Disease) **157**

Description *158*

Preventive Measures *158*

Section 9: Non-Significant Hazards

Drought

Why Is Drought a Threat to the County of Los Angeles?

There is no history of a significant drought affecting Los Angeles County. Drought is a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal." It is also related to the timing (e.g., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (e.g., rainfall intensity, number of rainfall events). Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with drought in many regions of the world, and can significantly aggravate its severity. Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected, resulting from natural climatic variability) and the demand people place on their water supply. Human beings often exacerbate the impact of drought. Recent droughts in both developing and developed countries and the resulting economic and environmental impacts and personal hardships have underscored the vulnerability of all societies to this "natural" hazard.

One dry year does not normally constitute a drought in California, but serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter-regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts on water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

Local Conditions

Drought can have secondary impacts. For example, drought is a major determinant of wildfire hazard, in that it creates greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with a reduced water supply for firefighting purposes. Drought is also an economic hazard. Significant economic impacts on California's agriculture industry can occur as a result of short- and long-term drought conditions; these include hardships to farmers, farm workers, packers, and shippers of agricultural products. In some cases, droughts can also cause significant increases in food prices to the consumer due to shortages.

Past experience with California droughts tells us that drought impacts are felt first by those most dependent on or affected by annual rainfall—agencies fighting forest fires, ranchers engaged in dry-land grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable water source.

Vulnerability

The greatest vulnerability to drought in Los Angeles County is its agricultural economy. Yearly, $280 million is generated as agricultural revenue. These revenues are vulnerable in the case of severe water shortages. Other disastrous drought damage could be sustained by parks, landscaping, and grounds around commercial and residential facilities, as well as by various plant and animal species, which depend on a delicate meteorological balance to survive.

Impact of Drought in the County of Los Angeles

A severe and long-lasting drought could affect the entire population of Los Angeles County (10.2 million) either directly or indirectly, through direct damage and secondary economic impacts of water shortages. It could generate a loss of 14%* or greater to agricultural revenues in Los Angeles County.

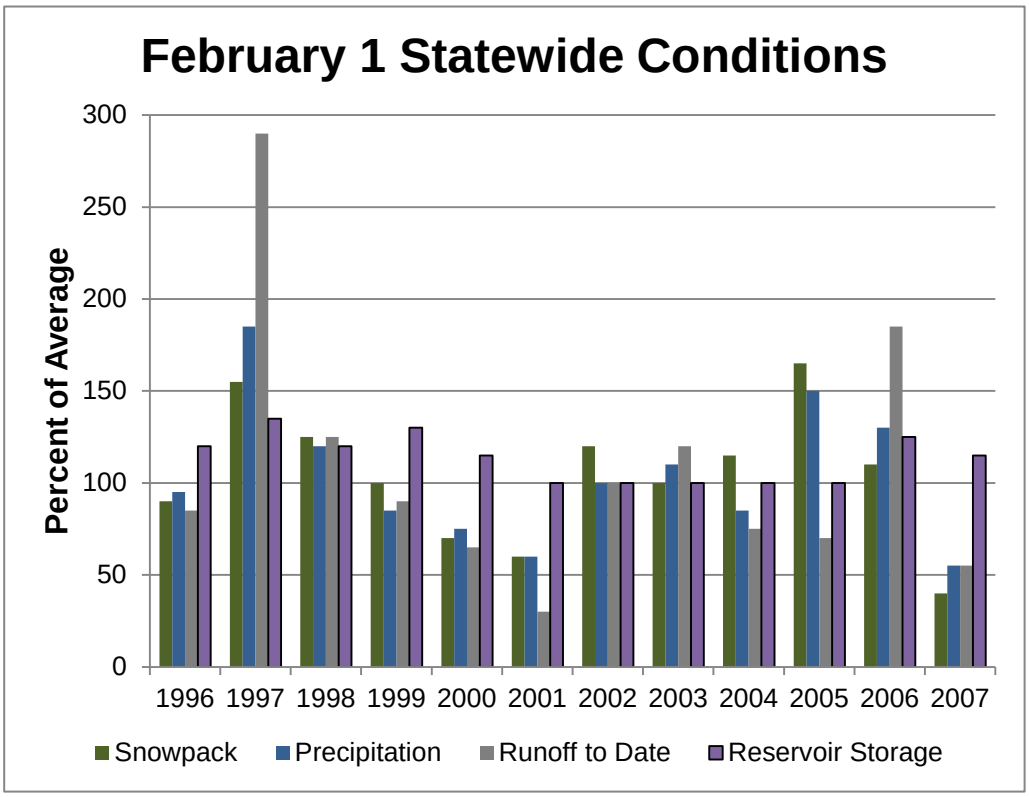
Drought and its impact vary by the time of year and the weather, and will likely only affect certain areas of the county during specific times. Based on the risk assessment, it is evident that drought will have potentially devastating economic impact on certain areas of the county. Impact that is not quantified, but can be anticipated in future events, includes the following:

- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Drought Characteristics

Figure 9-1 illustrates several indicators commonly used to evaluate California water conditions. The percent of average values are determined for measurement sites and reservoirs in each of the state's 10 major hydrologic regions. Snow pack is an important indicator of runoff from Sierra Nevada watersheds, the source of much of California's developed water supply.

Figure 9-1: Water supply conditions



Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multiyear period. There is no universal definition of when a drought begins or ends. Impacts of drought are typically felt first by those most reliant on annual rainfall—ranchers engaged in dry-land grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable source. Criteria used to identify statewide drought conditions do not address these localized impacts. Drought impacts increase with the length of a drought, as carryover supplies in reservoirs are depleted and water levels in groundwater basins decline.

Precipitation

The 2009 Water Year (October 1, 2008, through September 30, 2009) was the third consecutive year of below-average precipitation for the state. Annual statewide precipitation totaled 76%, 72%, and 63% of average for Water Years 2009, 2008, and 2007 respectively. Table 9-1: Average statewide precipitation by month with statewide precipitation values from Water Years 2009 and 2010 compares the average monthly contribution to statewide precipitation to the observed precipitation from Water Years 2009 and 2010. January, April, July, August, September, and November 2009 were exceptionally dry, while February, May, June, and October 2010 were well above average. However, Water Year 2009 finished at 76% of an average water year. Water Year 2010 (through February) stands at 101% of average. An above-average precipitation for the month of January, coupled with a below-average precipitation for the month of February, has brought the WY 2010 average total to normal.

Table 9-1: Average statewide precipitation by month with statewide precipitation values from Water Years 2009 and 2010

(Source: California's Drought Update, March30, 2010. http://www.water.ca.gov/drought/docs/DroughtUpdate-033010.pdf)

Month of Water Year	Avg. CA Precip. (inches)	WY 2009 Observed	Percent of Average	WY 2010 Observed	WY 2010 Percent of Average
October	1.22	0.73	60%	2.07	169%
November	2.8	2.49	89%	0.77	28%
December	3.91	3.05	78%	3.33	85%
January	4.35	1.26	29%	6.55	188%
February	3.66	5.06	138%	3.4	93%
March	3.12	2.13	68%		
April	1.64	0.59	36%		
May	0.89	1.47	165%		
June	0.35	0.46	133%		
July	0.18	0.02	11%		
August	0.28	0.06	20%		
September	0.48	0.09	19%		
Total	22.88	17.4	76%	16.12	101%

Types of Drought

There are four different ways that drought can be defined:

1. Meteorological – a measure of departure of precipitation from normal. Due to climatic differences, what is considered a drought in one location may not be a drought in another location.

2. Agricultural – refers to a situation when the amount of moisture in the soil no longer meets the needs of a particular crop.

3. Hydrological – occurs when surface and subsurface water supplies are below normal.

4. Socioeconomic – refers to the situation that occurs when physical water shortage begins to affect people.

Measuring Drought

Of the many varied indexes used to measure drought, the "Palmer Drought Severity Index" (PDSI) is the most commonly used drought index in the United States. Developed by meteorologist Wayne Palmer, the PDSI is used to measure dryness based on recent temperature compared to the amount of precipitation.

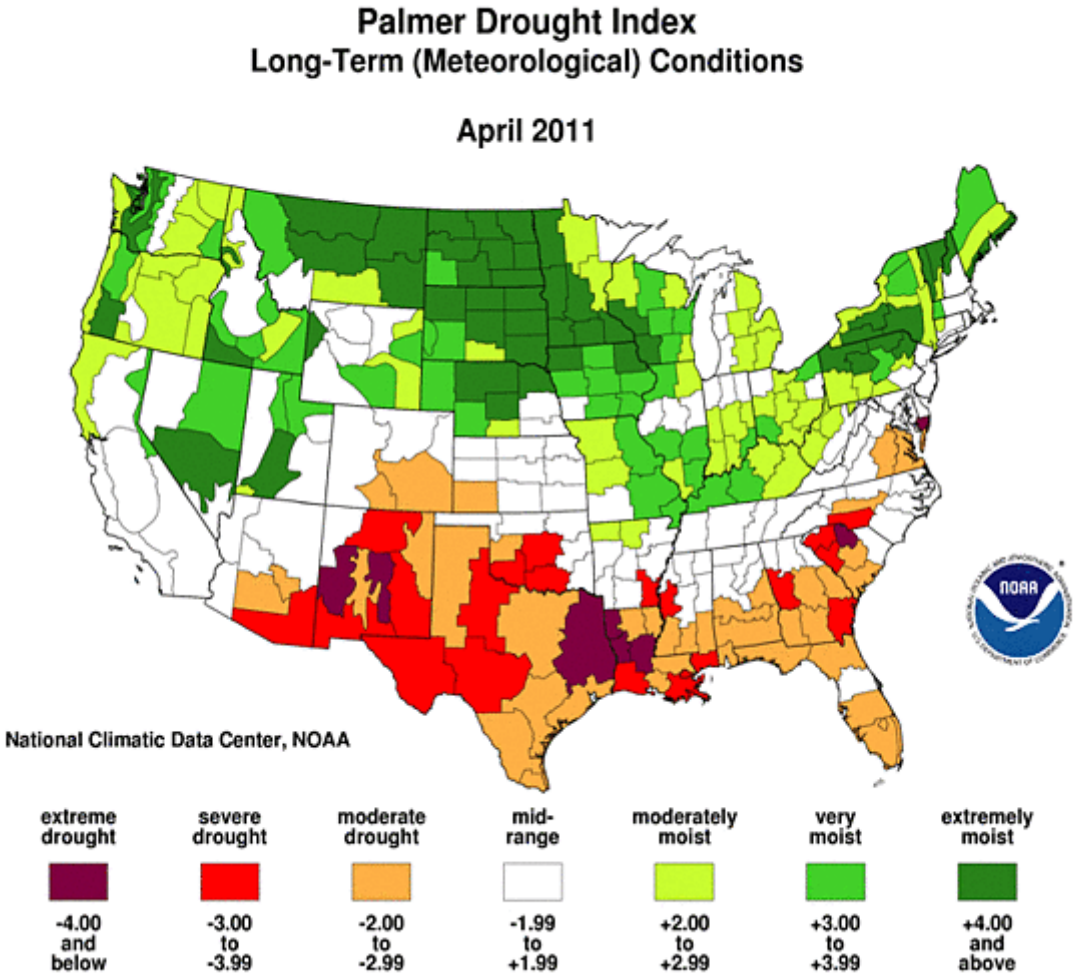
It utilizes a number range, with 0 as normal, drought shown in terms of minus numbers, and wetness shown in positive numbers. The PDSI is most effective at analyzing long-range drought forecasts or predictions. Thus, the PDSI is very effective at evaluating trends in the severity and frequency of prolonged periods of drought, and conversely wet weather. The National Oceanic and Atmospheric Administration (NOAA) publishes weekly Palmer maps, which are also used by other scientists to analyze the long-term trends associated with global warming and how this has affected drought conditions.

The University of Nebraska-Lincoln has published many of these PDSI maps analyzing trends over the past 100 years (National Drought Mitigation Center 2005; Figure I). In coastal Southern California, from 1895 to 1995, severe droughts occurred 10% to 15% of the time. From 1990 to 1995, severe droughts occurred 10% to 20% of the time, and as recently as 1989, a severe drought was documented that lasted for six years. More recently, between 1999 and 2004, a six-year drought on the Colorado River basin has resulted in a drawdown of Colorado River water storage by more than 50%. Based on these trends, severe droughts can readily occur in Southern California. According to the California Natural Resources Conservation Service (NRCS), the current drought in Southern California has caused extensive devastation to forests in the mountains of San Bernardino, in San Jacinto, and in the Palomar Mountains. Drought weakens trees, making them susceptible to infestation by bark-beetles. In turn, dry vegetation and beetle-infested trees are more susceptible to fire than healthy forests are.

Map 9-1 is the most current snapshot of drought conditions across the United States. It was provided by NOAA's Climate Prediction Center.

Map 9-1: Palmer Drought Index Long-Term (Meteorological) Conditions

(Source: NOAA Climate Prediction Center, http://lwf.ncdc.noaa.gov/oa/climate/research/2009/sep/drought-indicators.html)



Landslides

Historical Landslides in Southern California



Image 9-1: La Conchita

Sandwiched between a steep, unstable hillside (with the La Conchita Ranch Company situated on the plateau directly over the community) and the Pacific Ocean, La Conchita has been the site of recent major mudslides:

- On March 4, 1995, at 2:03 pm, a mudslide buried or damaged seven homes, injuring no one. After the main failure, the weather forecast predicted more rain for the following week.
- On March 10, 1995, a debris flow occurred in the canyon west of the March 4 slide, damaging four or five more residences and a banana plantation.
- On January 10, 2005, at 12:30 pm, a massive mudslide buried four blocks of the town in over 30 feet (9 m) of earth. Ten people were killed by the slide and 14 were injured. Of the 166 homes in the community, 15 were destroyed and 16 more were tagged by the county as uninhabitable.

There are four categories of active and dormant landslides. They are debris slides, translational/rotational slides, earth flows, and debris flows and torrent tracks. Debris slide amphitheaters and slopes and inner gorges are not technically landslides, but features formed by landslide processes. In some places, complex landsliding causes irregular ground surfaces. Generally, on landslide maps, such areas are depicted as disrupted ground or areas of extreme, high, moderate, and low relative stability.

Slope-failure Hazards in Los Angeles County

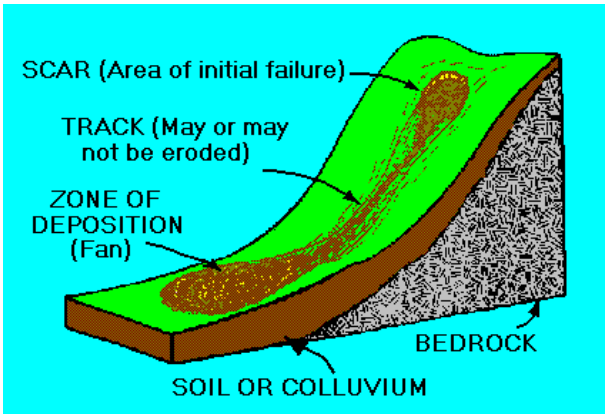


The geologic setting of Los Angeles County is conducive to localized slope failures and slope-failure deposits (landslides) that can be a hazard to human life and property. These hazards are created when geologic materials are displaced down a topographic slope under the influence of gravity. Factors that determine slope-failure occurrence include the following:

- Slope angle
- Geologic materials (substrate)
- Climatic conditions
- Earthquake shaking

Debris Flows

Sudden "mudslides" gushing down rain-sodden slopes and gullies are widely recognized by geologists as a hazard to human life and property. Most mudslides are localized in small gullies, threatening only those buildings in their direct path. They can burst out of the soil on almost any rain-saturated hill when rainfall is heavy enough. Often they occur without warning in localities where they have never been seen before.



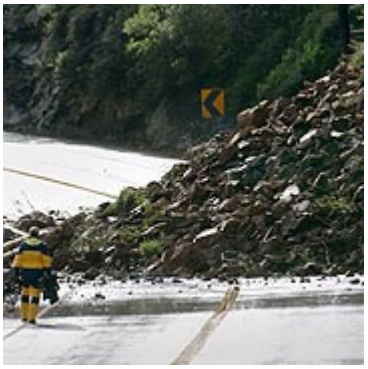
Sketch of a typical debris avalanche scar and track. Although this figure shows the "zone of deposition" as quite near the source, debris avalanches can travel thousands of feet or, in exceptional cases, miles from the point of origin. (Source: Drawing by Janet K. Smith).

The ashy slopes left denuded by wildfires in California are especially susceptible to mudslides during and immediately after major rainstorms. Those who live downslope of a wildfire area should be aware of this potential for slope failure that is present until new vegetation rebinds the soil.

Debris avalanches and debris flows (both popularly called "mudslides") are shallow landslides, saturated with water, that travel rapidly down slope as muddy slurries. The flowing mud carries rocks, bushes, and other debris as it pours down the slopes.

A debris avalanche is a fast-moving debris flow that travels faster than about 10 mph, or approximately 25 yards in about 5 seconds. Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, do occur locally.

Debris avalanches pose hazards that are often overlooked. Houses in the path of debris avalanches can be severely damaged or demolished. Persons in these structures can be severely injured or killed.



Most rainstorms are of such low intensity that they do not trigger debris avalanches. Some intense storms may trigger only a few debris avalanches. However, when the ground is already saturated from previous rain, even relatively short high-intensity rainstorms may trigger debris avalanches.

The most common cause of debris avalanches and debris flows is the combination of heavy rainfall, steep slopes, and loose soil. Most fairly steep slopes have enough soil and loose rock for potential landslides. Although "stable" when dry, such slopes can produce local debris flows, often without warning.

Normally the source of the excess water is intense rainfall, although broken water pipes or misdirected runoff concentrated by roads, roofs, or large paved areas may trigger, or help to trigger, debris avalanches and debris flows. In California, most debris flows occur during wet winters.

Debris avalanches occur all over the world. They are particularly common in mountainous areas underlain by rocks that produce sandy soils. Debris avalanches have been noted in Southern California during at least nine rainy seasons since 1915.

Debris flows are known to start on slopes as shallow as 15 degrees, but the more dangerous, faster-moving flows (debris avalanches) are more likely to develop on steeper slopes. About two-thirds of all debris avalanches start in hollows or troughs at the heads of small drainage courses. Typically, a debris avalanche bursts out of a hillside and flows quickly downslope, inundating anything in its path. Because the path of a debris flow is controlled by the local topography just like flowing water, debris avalanches and debris flows generally follow stream courses.

Slopes burned by range and forest fires are especially susceptible to debris avalanches and debris flows because of the absence of vegetation and roots to bind the soil. The areas directly downslope are especially subject to damage from debris flows.

Geologic Considerations

Los Angeles County's geologic setting and geologic history are as dynamic as the more than 20 million people that inhabit its landscape. The region has been shaped by restless earth forces that not only have created the mountains, valleys, deserts, and coastal lowlands we call home, but have created diverse geologic materials and geologic structures that form the landscape's foundation. These geologic elements include endless varieties of rocks, geologic structures (faults and folds), and surficial geologic materials.

Geologic Setting of the Transverse Ranges Province

The Transverse Ranges Province of Southern California is so-named because the mountains, valleys, and geologic structures within this province lie east-west or "transverse to" the prevailingly northwest-trending grain characteristic of Southern California. For example, northwest-trending faults of the Peninsular Ranges Province lend a northwest-oriented topographic and structural grain to that province. Likewise, the Coast Ranges and Sierra Nevada Provinces of Southern and Central California also are prevailingly northwest-trending. The Transverse Ranges lie athwart this northwest grain.

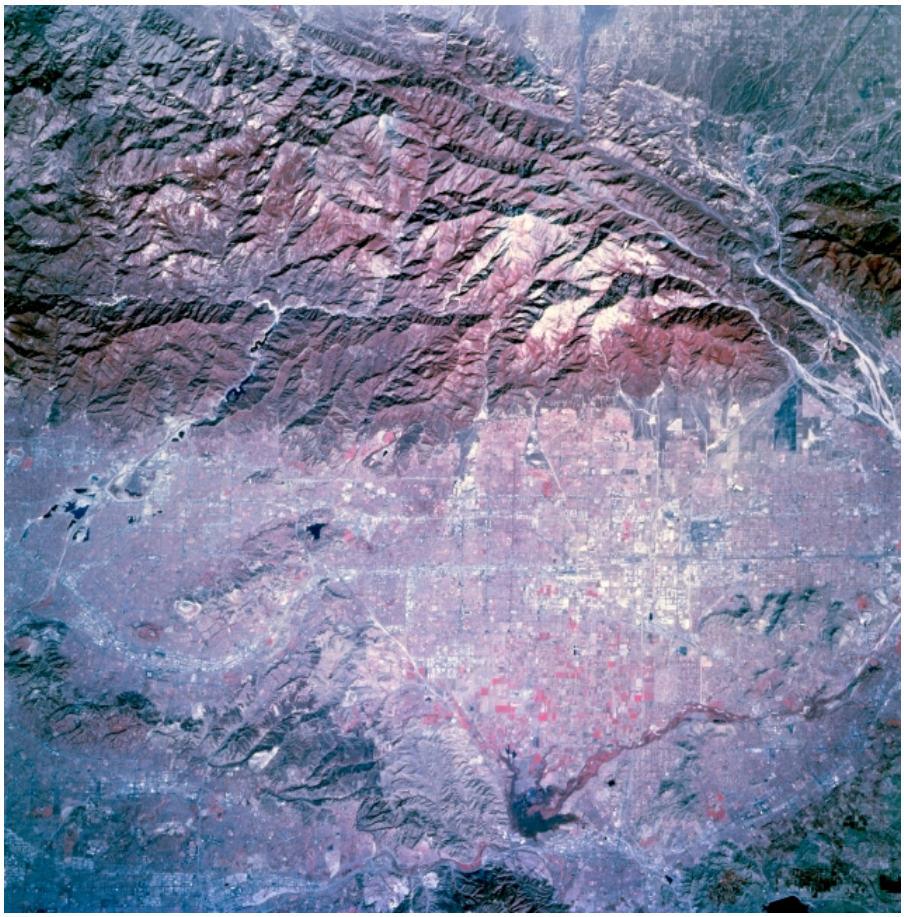
Although referred to collectively as the Transverse Ranges, the province consists of several discrete mountain ranges and intervening valleys, including the following:

- Santa Ynez and Topatopa Mountains
- Oak Ridge and the Santa Susanna Mountains
- Santa Clara and Simi Valleys
- Santa Monica Mountains
- San Gabriel Mountains
- Pinto Mountains
- Eagle and Cottonwood Mountains

Geologists group these discrete landforms within the Western, Central, and Eastern Transverse Ranges.

The San Gabriel Mountains

The San Gabriel Mountains are a fault-bounded block of ancient crystalline rocks that rises north of the Los Angeles Basin and the upper Santa Ana River Basin. The eastern end of the mountains rises abruptly to an elevation of over 10,000 feet. To the north, the mountains descend more gradually to the Mojave Desert and to the west to the Sierra Pelona and the Soledad Basin.



The range is bounded on the north by the San Andreas Fault Zone, on the south and southwest by thrust and reverse faults of the Cucamonga-Sierra Madre fault complex, and on the east by faults of the San Jacinto zone. The interior of the range is complexly deformed by faults of many different ages and tectonic styles.

Most of the crystalline basement rocks that make up the San Gabriel Mountains occur in two packages that are separated by a major geologic structure--the Vincent Thrust. The thrust apparently occurs throughout most of the range, and is a low-angle tectonic dislocation (fault or movement zone) that separates *upper-plate rocks* above the dislocation from *lower-plate rocks* below it. Fault movement along this low-angle zone may have been on the order of several tens of kilometers, and is responsible for bringing together the two distinctive packages of rock in the lower and upper plates.

Lower-plate rocks beneath the Vincent Thrust are a complex of metamorphosed sedimentary and volcanic rocks known as the Pelona Schist, a rock unit whose pre-metamorphic protolith consisted of Mesozoic (Jurassic and Cretaceous?) marine deep-water sand, silt, and calcareous and siliceous mud locally interlayered with basaltic flows. These rocks were metamorphosed at low to moderate grades (greenschist to lower amphibolite grade) in late Cretaceous or early Paleozoic time.

Upper-plate rocks above the Vincent Thrust include very old (Proterozoic) metamorphic and plutonic rocks that originally formed part of the ancient North American continental platform (Mendenhall Gneiss, anorthosite-syenite-gabbro complex). These older rocks are most abundant in the western and central part of the range. The ancient rocks have been intruded by various Mesozoic plutonic rocks that occur throughout the range, but are most abundant in the western and eastern parts.

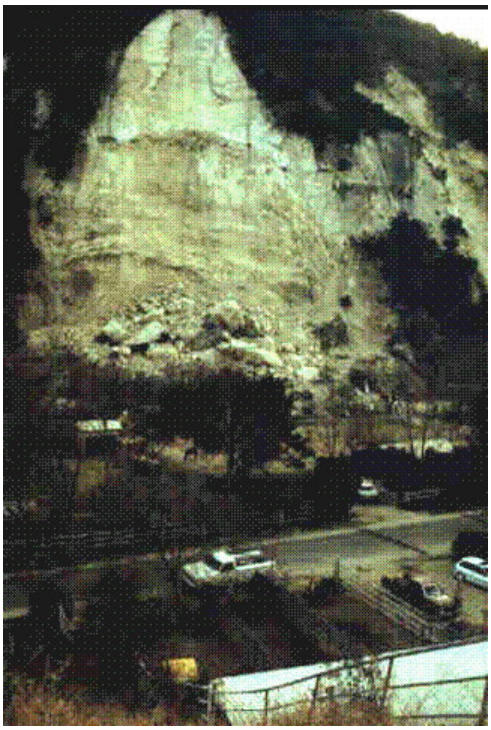
A terrain of metamorphosed sedimentary rock and associated plutonic rocks and high-grade (granulite grade) metamorphic rocks in the southeastern-most San Gabriel Mountains is overprinted by a distinctive belt of mylonitic deformation that is locally intense enough to generate mappable thicknesses of mylonite. Geologists still have not resolved how these rocks relate structurally and provincially to crystalline rocks in the main mass of the San Gabriel Mountains.

The San Gabriel Mountains are traversed by deep, steep-sided canyons cut into highly fractured crystalline basement rocks that form the bedrock underpinnings of the mountains. The sides of most canyons are blanketed by unstable hill-slope rock debris that constantly is being stripped away by slope failures and by runoff and washed out to the range fronts.

For maps and other information pertaining to earthquake-induced landslides, please refer to Section 5: Earthquakes.

Landslide damage from the Northridge earthquake was only moderate because the area of greatest landslide activity is not yet heavily developed. However, landslides did, as described below, block roads; damage and destroy homes; locally disrupt water mains, sewers, and power lines; and damage oil- and gas-production facilities.





Landslides in the Santa Susana and western San Gabriel Mountains blocked many roads, and thus hampered relief efforts and exacerbated the overall transportation problems caused by the earthquake.

Landslides impeded traffic flow that was diverted onto secondary highways as a result of the collapsed interchange at Interstate 5 and California State Highway 14. Rock falls and rock slides closed many of the alternate routes across the San Gabriel Mountains from the Lancaster/Palmdale and Santa Clarita Valley areas (plate 1) to Los Angeles, and it was several days before some of these routes were cleared of rock debris and made available to commuters.

Dozens of homes in the central and eastern Santa Monica Mountains were moderately or severely damaged by reactivation of deep block slides. Although the landslide features are subtle and the damage patterns complex, making it difficult to distinguish shaking damage from ground-failure damage in this area, many clusters of damaged homes clearly relate to reactivation of old, deep block slides. Fill failures in some areas also damaged hundreds of homes and other buildings.

Shallow, disrupted slides also seriously damaged many structures. One large home in Pacific Palisades was destroyed when the bluff on which it was built failed during the earthquake and caused half the house to tear loose and cascade down the steep slope. In the Santa Susana Mountains, rock falls damaged or destroyed several nonresidential buildings, but no injuries were reported. In Tapo Canyon, north of Simi Valley in the Santa Susana Mountains, rock falls came closest to hitting residences; fortunately, only outbuildings were crushed beneath rock falls.

Pacoima Canyon, in the San Gabriel Mountains, experienced extreme landslide damage during the earthquake. Several large rock falls and rock slides from the precipitous slopes of the canyon dumped hundreds of thousands of cubic meters of landslide debris into the canyon, which blocked access to Pacoima Dam and damaged areas around the dam. About 50,000 m^3 of landslide debris was trucked from the canyon following the earthquake. Rock falls damaged the spillway and the shotcrete covering the dam abutment. Continuing failure of material weakened by the earthquake seriously hampered repair efforts.



An unfortunate additional effect of the rock falls and rock slides in the Santa Susana Mountains was an outbreak of valley fever (coccidioidomycosis), which can only be contracted by inhaling airborne dust containing the fungal spores that cause the disease (Jibson and others, 1994b). The highly disrupted landslides triggered by the earthquake generated dense dust clouds(below) that blew downwind (southwestward) into Simi Valley (fig. 1), where a tight cluster of more than 150 cases of valley fever were diagnosed in the seven weeks following the earthquake (Centers for Disease Control and Prevention, 1994). During all of 1993, all of Ventura County had reported only 52 cases. Three valley fever fatalities occurred, which accounts for about 5% of the total earthquake fatalities.



The Northridge earthquake triggered landslides over an area of about 10,000 square kilometers. The landslide limit is the smoothed curve connecting the locations of farthest landslides at several different azimuths from the epicenter. The maximum epicentral distance to the landslide limit is about 70 km, which is about average in relation to historical worldwide earthquakes of this magnitude (Keefer, 1984). Within this broad area of scattered landslide activity is a 1,000–square kilometer area of much more concentrated land sliding that lies north and northwest of the epicenter, primarily in the Santa Susana Mountains and the mountains north of the Santa Clara River valley. This area of greatest landslide concentration consists primarily of Late Miocene through Pleistocene clastic sediment having little or no cementation and that has been folded and uplifted by rapid tectonic deformation. The young, weak material lacks significant tensile strength and erodes readily to form steep-walled canyons that commonly head in nearly vertical slopes. The combination of low strength and steep relief reaching elevations of 1,000 m above sea level makes the area highly susceptible to failure during seismic shaking.

Landslides were densest along the steep-walled canyons that have been incised into the northern and southern flanks of the Santa Susana Mountains; slides were sparser along the gently domed crest of those mountains. In the northeast part of the Santa Susana Mountains, landslide distribution reflects the regional geologic structure; outcropping strata that form steep ridges can be traced laterally by the broadly arcuate bands of landslides. Landslides were much more sparsely scattered throughout the Santa Monica and San Gabriel Mountains, which generally consist of more competent rock than exists in the Santa Susanas. One notable exception is the area in and around Pacoima Canyon, described subsequently.

The most common types of landslides triggered by the earthquake were highly disrupted, shallow falls and slides of rock and debris, numbering in the thousands to tens of thousands (if very small failures are considered) and extending over the entire area within the landslide limit.

Deeper, more coherent slumps and block slides, commonly in more competent materials, numbered in the tens to perhaps hundreds, and occurred primarily in the Santa Susana and Santa Monica Mountains. One well-developed liquefaction-induced lateral spread was mapped in Tapo Canyon (below).



Northeast of the epicenter, fewer and more widely scattered rock falls were triggered in the San Gabriel Mountains, which consist primarily of Mesozoic granitic and Precambrian metamorphic rock that, although deeply weathered, is more competent than the weak sediment of the Santa Susana Mountains. An exception is the southwest corner of the San Gabriel Mountains, where younger sediment produced abundant failures comparable to those in the Santa Susana Mountains. One area of exceptionally abundant landslide activity in the Mesozoic intrusive rock of the San Gabriel Mountains is near the mouth of Pacoima Canyon, where landslide concentrations were as high as in the Santa Susana Mountains. Slopes in surrounding canyons, however, had relatively few rock falls and rock slides—despite having similar rock types exposed. Our preliminary assessment of the characteristics of these rocks that determine their susceptibility to seismic failure (criteria from Harp and Noble, 1993) indicates no significant differences between the rock-mass quality in Pacoima Canyon and that of surrounding canyons that experienced far fewer slides. Pacoima Canyon does, however, have much steeper, higher slopes than surrounding canyons, and this may make the slopes there inherently less stable, as well as contributing to locally amplified strong shaking. Certainly shaking levels were high at Pacoima Dam, where strong-motion records on bedrock at the south abutment produced peak accelerations of about 1.5 *g* (Shakal and others, 1994). Interestingly, the 1971 San Fernando earthquake also produced anomalously high ground accelerations in Pacoima Canyon (Cloud and Hudson, 1975).

The scattered landslides in the Santa Monica Mountains generally are fairly small, shallow, disrupted landslides. This presumably is because most of the rock in the Santa Monicas is more competent than that in the Santa Susanas, and because the ground shaking appears to have been lower in the Santa Monicas. The highest concentration of slides is from the very high, steep slopes in Malibu Canyon.

The earthquake shaking reactivated several ancient block slides in the central and eastern Santa Monica Mountains, primarily between Topanga Canyon and Hollywood. This area, in general, is densely developed; thus, many of these slides damaged homes and roads. Unfortunately, the dense development generally made it impossible to precisely determine the geometric extent of individual landslides.

Failures commonly involved blocks of weakly cemented, deeply weathered Tertiary sedimentary rock, measuring several tens of meters across, that slipped a few centimeters to several decimeters along bedding planes. One particularly notable example is along Mulholland Drive about 1.5 km east of Interstate 405. At that location, bedding-plane slip displaced a landslide block a few decimeters northward, which offset Mulholland Drive and created a series of scarps in the front yard of a home on the mountain crest (below).



Shaking-induced settlement and slumping of cut-and-fill embankments were common, especially within some of the subdivisions in the Santa Clarita Valley, where fill settlements and displacement along cut/fill contacts damaged numerous residences. Even though the fills presumably were compacted according to strict codes, shaking was severe enough within the area to induce enough displacement in some fills to severely damage many homes and make them unsafe. Rebuilding on lots that failed in the earthquake has required significant mitigation efforts and considerable expense. In some cases, deep pilings have been used to stabilize building sites before reconstruction proceeded. In some areas of the Santa Monica Mountains, ancient landslides were covered with artificial fill when areas were developed, and settlement or movement of fill, possibly related to reactivation of underlying landslides, severely damaged homes and infrastructure.

U. S. Geological Survey

Vulnerability

The USGS seismic hazard zone maps on the following pages show specific areas vulnerable to damage from landslides. These maps depict seismic risk; however, when used in the context of topography and coupled with meteorological predispositions, they can also indicate potentially risk-prone areas vulnerable to weather-caused landslides. A past tendency for high-end residential development in or around slide-prone areas increases the risk for high losses.

Impact

Landslides and their impacts will vary by location and severity of any given landslide event, and will likely only affect certain areas of the county during specific times. Based on the risk assessment, it is evident that landslides will continue to have potentially devastating economic impacts on certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Sinkhole and Subsidence

Land subsidence (the vertical downward movement of the land surface) has a variety of causes, including some that are related exclusively to human activities (e.g., mining and drainage of organic soils). We have already seen that subsidence can result from isostatic adjustments and natural compaction. Now we shall examine subsidence caused by fluid withdrawal, sinkhole development, and hydro-compaction.

Deep subsidence is the slow downward movement of land caused by the compaction of sediments that occur below the earth's surface. Deep subsidence occurs in locations where fluids under pressure are withdrawn from the subsurface. This includes groundwater taken from confined aquifers and fluids pumped from oil and gas reservoirs.

- Central Valley, California: World's largest area of subsidence (geology).
- Long Beach, California: Up to 30 feet of subsidence occurred over field when fluids held under pressure within the subsurface are withdrawn, the fluid pressure drops. If the formation from which fluids were taken is composed of compressible sediments, a reduction in fluid pressure can cause the overlying formations to slowly subside.

- Santa Clara Valley, California: Groundwater levels correlate with subsidence.
- Long Beach, California: Subsidence has been halted by using injection wells.

Sinkholes

There are three types of sinkholes, each of which forms in a different way. Collapse sinkholes are by far the most hazardous because of how suddenly they can form.

Solution Sinkholes

Solution sinkholes form where soluble bedrock (e.g., limestone, dolomite, marble, or rock salt) is exposed at the land surface and therefore subject to dissolution by surface water. Runoff collects in natural depressions (often where bedrock fractures intersect) and slowly dissolves a sinkhole.

Subsidence Sinkholes

Subsidence sinkholes are similar to solution sinkholes, except the soluble bedrock is covered by a thin layer of unconsolidated material (e.g., soil, sediment, or both). Surface water infiltration dissolves cavities where the bedrock is most intensely fractured, and the overlying sediments gradually move downward into the expanding cavity.

Collapse Sinkholes

Collapse sinkholes form when surface materials suddenly sink into a subsurface cavity or cave. Cavities form slowly over time as groundwater moves along fractures in soluble bedrock and enlarge them through dissolution. Collapse can occur in two different ways where caves are found. When a cavity gets sufficiently large, the "roof" becomes too thin to support its own weight and the weight of any overlying rock or sediment, so it collapses into the cavity. Sometimes cavities are able to support the weight of overlying materials (usually sediments) by virtue of being completely filled with groundwater. If the groundwater level is lowered, then the overburden will first erode and then collapse into the dewatered cavity.



Hydro-Compaction

Hydro-compaction is the subsidence of shallow soils and sediments as a result of adding water to the land surface. Typically this occurs in dry regions where agriculture relies on extensive irrigation, and is notable not for the magnitude of the subsidence that occurs but for the fact that much of the western United States has the type of geologic conditions that are susceptible to this phenomenon. The sediments that are susceptible to hydro-compaction were loosely deposited in an arid or semi-arid environment by processes that left them with a very high porosity (> 45%). As these sediments dry out, their high-porosity structure is preserved by clay particles that act as "bridges" to cement the larger particles together. If water is added, the clay "cement" loses its strength, and the sediment subsides under its own weight.

A Los Angeles County Fire Department fire engine collapsed into a 15-foot-deep sinkhole caused by a water main break on September. 8, 2009. The crumbling infrastructure in Los Angeles mimics a nationwide problem. The American Society of Civil Engineers gave the country mostly "D's" in a recent report card

(Associated Press).

Windstorm Hazards

Why Are Severe Windstorms a Threat to the County of Los Angeles?

Although the County of Los Angeles has not been victim to significant damage from severe windstorms, it has been moderately affected in the past with both El Niño events and Santa Ana winds. Severe wind storms pose a significant risk to life and property in the County of Los Angeles by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause tornado-like damage to local homes and businesses in and near the County of Los Angeles. High winds can have destructive impact, especially on trees, power lines, and utility services.

Local Conditions

Based on local history, most incidents of high wind in the County of Los Angeles are the result of the Santa Ana and El Niño–related wind conditions. While high-impact wind incidents are not frequent in the area, significant wind events and sporadic tornado activity have been known to negatively affect the county. In addition, the county is increasingly concerned with "global warming" ramifications and potential increases in wind-related events.

What are Santa Ana Winds?

"Santa Ana winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles and Orange County basins.

Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the National Weather Service offices in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of 'Santa Ana' for winds greater than 25 knots." These winds accelerate to speeds of 35 knots as they move through canyons and passes, with gusts to 50 or even 60 knots.

The complex topography of Southern California combined with various atmospheric conditions create numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). Clockwise circulation around the center of this high pressure area forces air downslope from the high plateau. The air warms as it descends toward the California coast at the rate of five degrees F per 1,000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated."

These regional winds typically occur from October to March, and, according to most accounts, are named either for the Santa Ana River Valley where they originate, or for the Santa Ana Canyon, southeast of Los Angeles, where they pick up speed.

Impact of Windstorms in the County of Los Angeles

Based on the risk assessment, it is evident that windstorms continue to have potentially devastating economic impacts on certain areas of the county.

Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Historic Events in the Region

Following is a summary of high wind–related events (50 mph/43 knots or higher) in Los Angeles County.

Table 9-2: Wind Events in Los Angeles County: 50 MPH or Greater (updated 2011)
(Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms)

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
1 CAZ040>042 - 044>049 - 053>057	11/25/1996	10:00 PM	High Wind	85 knots	0	0	0	0
2 CAZ035>036 - 038>042 - 044>049 - 052>057 - 059>060	11/28/1996	08:00 PM	High Wind	52 knots	0	0	0	0
3 CAZ035>036 - 039>041 - 044>047 - 052>054	12/14/1996	02:00 PM	High Wind	83 knots	1	2	0	0
4 CAZ035>036 - 039>041 - 044>047 - 052>054	12/17/1996	03:00 AM	High Wind	61 knots	0	0	0	0
5 CAZ040>041 - 044>047 - 053>054	01/05/1997	09:00 PM	High Wind	86 knots	1	0	0	0
6 CAZ040>041 - 044>047 - 053>054	02/23/1997	11:00 PM	High Wind	52 knots	0	0	0	0
7 CAZ047	04/09/1997	10:00 AM	High Wind	57 knots	0	0	0	0
8 CAZ044>047 - 053>054	10/12/1997	02:30 PM	High Wind	52 knots	0	0	0	0
9 CAZ044>047 - 053>054	10/25/1997	02:00 AM	High Wind	65 knots	0	0	0	0
10 CAZ039>041 - 044>047 - 052>054	12/09/1997	08:00 AM	High Wind	63 knots	0	0	0	0
11 CAZ039 - 052>054	12/21/1997	02:00 PM	High Wind	61 knots	0	0	0	0
12 CAZ034>041 - 044>047 - 051>054 - 059	02/02/1998	10:00 PM	High Wind	78 knots	0	0	0	0
13 CAZ034>041 -	02/05/1998	10:00	High	61	0	0	0	0

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
044>047 - 051>054 - 059		PM	Wind	knots				
14 CAZ034>041 - 044>047 - 051>054 - 059	02/07/1998	05:00 AM	High Wind	61 knots	0	0	0	0
15 CAZ054	08/31/1998	01:45 AM	High Wind	46 knots	0	0	0	0
16 CAZ041	12/06/1998	04:10 AM	High Wind	43 knots	0	0	0	0
17 CAZ040>041 - 044>047 - 053>054	12/09/1998	03:00 AM	High Wind	66 knots	0	0	0	0
18 CAZ040 - 044>047 - 053>054	02/11/1999	03:00 AM	High Wind	65 knots	0	0	0	0
19 CAZ034>041 - 044>047 - 051>054 - 059	04/03/1999	10:30 AM	High Wind	56 knots	0	0	0	0
20 CAZ046 - 052>054	11/21/1999	07:35 PM	High Wind	63 knots	0	0	0	0
21 CAZ039 - 044>047 - 052>054	12/02/1999	05:30 PM	High Wind	67 knots	0	0	0	0
22 CAZ040>041 - 044>047	02/13/2001	01:00 AM	High Wind	45 knots	0	0	0	0
23 CAZ044>047 - 053>054	11/25/2002	09:30 AM	High Wind	70 knots	0	0	0	0
24 CAZ044>047	01/06/2003	03:40 AM	High Wind	65 knots	0	0	0	0
25 CAZ053 - 054	10/17/2006	22:37 PM	High Wind	56 knots	0	0	0K	0K
26 CAZ054	11/29/2006	12:53 PM	High Wind	59 knots	0	0	0K	0K
27 CAZ054	12/02/2006	23:53 PM	High Wind	51 knots	0	0	0K	0K

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
28 CAZ054	12/22/2006	09:50 AM	High Wind	54 knots	0	0	0K	0K
29 CAZ054	12/27/2006	18:50 PM	High Wind	65 knots	0	0	0K	0K
30 CAZ041	12/27/2006	20:00 PM	High Wind	52 knots	0	0	0K	0K
31 CAZ047	12/28/2006	08:35 AM	High Wind	63 knots	0	0	0K	0K
32 CAZ054	01/01/2007	03:37 AM	High Wind	58 knots	0	0	0K	0K
33 CAZ054	01/01/2007	04:35 AM	High Wind	58 knots	0	0	0K	0K
34 CAZ054	01/01/2007	11:35 AM	High Wind	50 knots	0	0	0K	0K
35 CAZ047	01/05/2007	12:36 PM	High Wind	55 knots	0	0	0K	0K
36 CAZ054	01/05/2007	21:37 PM	High Wind	61 knots	0	0	0K	0K
37 CAZ054	01/15/2007	06:37 AM	High Wind	54 knots	0	0	0K	0K
38 CAZ054	01/15/2007	06:53 AM	High Wind	56 knots	0	0	0K	0K
39 CAZ053 - 054	03/03/2007	02:50 AM	High Wind	50 knots	0	0	0K	0K
40 CAZ053 - 054	03/27/2007	14:53 PM	High Wind	55 knots	0	0	0K	0K
41 CAZ053 - 054	04/12/2007	10:50 AM	High Wind	75 knots	0	0	0K	0K
42 CAZ053 - 054	04/18/2007	14:37 PM	High Wind	51 knots	0	0	0K	0K

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
43 CAZ053 - 054	10/20/2007	14:30 PM	High Wind	56 knots	0	0	0K	0K
44 CAZ041	10/21/2007	06:00 AM	High Wind	52 knots	0	0	0K	0K
45 CAZ054	11/11/2007	20:37 PM	High Wind	60 knots	0	0	0K	0K
46 CAZ054	11/23/2007	14:37 PM	High Wind	53 knots	0	0	0K	0K
47 CAZ053 - 054	12/06/2007	22:49 PM	High Wind	58 knots	0	0	0K	0K
48 CAZ054	12/06/2007	22:59 PM	High Wind	60 knots	0	0	0K	0K
49 CAZ053 - 054	12/21/2007	01:53 AM	High Wind	50 knots	0	0	0K	0K
50 CAZ054	12/21/2007	05:54 AM	High Wind	50 knots	0	0	0K	0K
51 CAZ054	12/21/2007	06:53 AM	High Wind	63 knots	0	0	0K	0K
52 CAZ053 - 054	12/25/2007	01:37 AM	High Wind	57 knots	0	0	0K	0K
53 CAZ054	12/25/2007	02:53 AM	High Wind	50 knots	0	0	0K	0K
54 CAZ053 - 054	12/26/2007	16:53 PM	High Wind	59 knots	0	0	0K	0K
55 CAZ054	12/26/2007	17:53 PM	High Wind	54 knots	0	0	0K	0K
56 CAZ054	12/26/2007	18:37 PM	High Wind	50 knots	0	0	0K	0K
57 CAZ053 - 054	12/31/2007	23:53 PM	High Wind	50 knots	0	0	0K	0K

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
58 CAZ053 - 054	01/04/2008	16:37 PM	High Wind	64 knots	0	0	0K	0K
59 CAZ053 - 054	01/16/2008	18:37 PM	High Wind	67 knots	0	0	0K	0K
60 CAZ047	01/16/2008	21:00 PM	High Wind	70 knots	0	0	0K	0K
61 CAZ053 - 054	02/14/2008	10:53 AM	High Wind	55 knots	0	0	0K	0K
62 CAZ053 - 054	02/24/2008	21:30 PM	High Wind	64 knots	0	0	0K	0K
63 CAZ053 - 054	03/01/2008	20:30 PM	High Wind	56 knots	0	0	0K	0K
64 CAZ053 - 054	03/12/2008	22:30 PM	High Wind	56 knots	0	0	0K	0K
65 CAZ053 - 054	05/21/2008	16:37 PM	High Wind	74 knots	0	0	0K	0K
66 CAZ054	10/13/2008	03:37 AM	High Wind	63 knots	0	0	0K	0K
67 CAZ053 - 054	10/13/2008	03:53 AM	High Wind	73 knots	0	0	0K	0K
68 CAZ053 - 054	11/09/2008	19:37 PM	High Wind	54 knots	0	0	0K	0K
69 CAZ053 - 054	11/14/2008	10:00 AM	High Wind	52 knots	0	0	0K	0K
70 CAZ053 - 054	12/09/2008	05:53 AM	High Wind	66 knots	0	0	0K	0K
71 CAZ053 - 054	01/09/2009	11:53 AM	High Wind	63 knots	0	0	0K	0K
72 CAZ053 - 054	01/29/2009	01:53 AM	High Wind	58 knots	0	0	0K	0K

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
73 CAZ053 - 054	03/22/2009	19:37 PM	High Wind	64 knots	0	0	0K	0K
74 CAZ053 - 054	04/14/2009	18:37 PM	High Wind	53 knots	0	0	0K	0K
75 CAZ053 - 054	05/06/2009	21:54 PM	High Wind	74 knots	0	0	0K	0K
76 CAZ053 - 054	05/12/2009	19:53 PM	High Wind	69 knots	0	0	0K	0K
77 CAZ054	10/13/2009	14:37 PM	High Wind	60 knots	0	0	0K	0K
78 CAZ053 - 054	10/27/2009	10:53 AM	High Wind	70 knots	0	0	0K	0K
79 CAZ547	10/27/2009	16:13 PM	High Wind	50 knots	0	0	0K	0K
80 CAZ054	12/22/2009	08:37 AM	High Wind	68 knots	0	0	0K	0K
81 CAZ547	12/22/2009	22:48 PM	High Wind	52 knots	0	0	0K	0K
82 CAZ053 - 054	01/02/2010	02:37 AM	High Wind	61 knots	0	0	0K	0K
83 CAZ053 - 054	01/13/2010	18:00 PM	High Wind	72 knots	0	0	0K	0K
84 CAZ053 - 054	01/18/2010	16:00 PM	High Wind	57 knots	0	0	0K	0K
85 CAZ053 - 054	03/09/2010	18:53 PM	High Wind	67 knots	0	0	0K	0K
86 CAZ053 - 054	04/29/2010	08:53 AM	High Wind	59 knots	0	0	0K	0K
TOTALS:					**2**	**2**	**0**	**0**

Table 9-3: National Weather Service Query Results for Tornado Events in Los Angeles County from 1950 to 2009

(Source: National Climate Data Center, www.ncdc.noaa.gov/oa/ncdc.html)

Location in County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
1 LOS ANGELES	12/20/1952	1400	Tornado	F	0	0	0K	0
2 LOS ANGELES	01/18/1955	1301	Tornado	F	0	0	3K	0
3 LOS ANGELES	05/09/1956	1030	Tornado	F0	0	1	25K	0
4 LOS ANGELES	02/19/1962	1800	Tornado	F1	0	0	3K	0
5 LOS ANGELES	05/14/1962	1400	Tornado	F1	0	0	25K	0
6 LOS ANGELES	11/09/1964	0900	Tornado	F1	0	0	3K	0
7 LOS ANGELES	11/07/1966	1500	Tornado	F2	0	0	3K	0
8 LOS ANGELES	11/07/1966	1500	Tornado	F2	0	10	250K	0
9 LOS ANGELES	04/18/1967	2000	Tornado	F0	0	0	3K	0
10 LOS ANGELES	05/08/1977	1200	Tornado	F	0	0	2.5M	0
11 LOS ANGELES	01/04/1978	1715	Tornado	F	0	0	0K	0
12 LOS ANGELES	02/10/1978	0030	Tornado	F	0	0	0K	0
13 LOS ANGELES	01/31/1979	1245	Tornado	F	0	0	2.5M	0
14 LOS ANGELES	01/28/1980	1515	Tornado	F0	0	0	3K	0
15 LOS ANGELES	03/29/1982	2330	Tornado	F1	0	0	0K	0
16 LOS ANGELES	11/09/1982	1130	Tornado	F1	0	0	25K	0
17 LOS ANGELES	11/09/1982	1330	Tornado	F2	0	0	2.5M	0
18 LOS ANGELES	11/09/1982	1400	Tornado	F0	0	0	3K	0
19 LOS ANGELES	11/09/1982	1400	Tornado	F2	0	0	2.5M	0
20 LOS ANGELES	03/01/1983	0940	Tornado	F2	0	30	25.0M	0

Location in County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
21 LOS ANGELES	03/01/1983	1015	Tornado	F0	0	0	0K	0
22 LOS ANGELES	09/30/1983	0900	Tornado	F0	0	0	250K	0
23 LOS ANGELES	10/01/1983	0035	Tornado	F1	0	3	3K	0
24 LOS ANGELES	05/30/1984	1115	Tornado	F0	0	0	0K	0
25 LOS ANGELES	06/05/1987	1515	Tornado	F0	0	0	25.0M	0
26 LOS ANGELES	01/16/1990	2320	Tornado	F0	0	0	0K	0
27 LOS ANGELES	03/19/1991	0400	Tornado	F0	0	0	0K	0
28 LOS ANGELES	03/20/1992	2100	Tornado	F1	0	0	0K	0
29 LOS ANGELES	01/14/1993	0140	Tornado	F1	0	0	500K	0
30 LOS ANGELES	01/17/1993	2345	Tornado	F0	0	0	50K	0
31 Sun Valley	02/07/1994	1545	Tornado	F0	0	0	50K	0
32 Whittier	06/16/1995	1255	Tornado	F0	0	0	0	0
33 Palmdale	07/21/1997	03:55 PM	Tornado	F0	0	0	0	0
34 Long Beach	01/09/1998	02:00 PM	Tornado	F1	0	1	0	0
35 Chatsworth	04/01/1999	02:00 PM	Tornado	F0	0	0	0	0
36 Covina	02/16/2000	04:30 PM	Tornado	F0	0	0	0	0
37 Little Rock	08/28/2000	01:45 PM	Tornado	F0	0	0	0	0
38 Walnut	12/21/2001	12:40 AM	Tornado	F0	0	0	0	0
39 Long Beach	12/28/2004	10:40 PM	Tornado	F0	0	0	0	0

Location in County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
40 Inglewood	12/29/2004	12:15 AM	Tornado	F0	0	0	0	0
41 Whittier	12/29/2004	12:15 AM	Tornado	F0	0	0	0	0
42 (pmd)palmdale Arpt	08/15/2005	05:53 PM	Tornado	F0	0	0	0	0
43 (wjf)wm Fox Fld Lanc	09/01/2007	15:20 PM	Tornado	F0	0	0	0K	0K
TOTALS:					**0**	**45**	**$61 M**	**0**

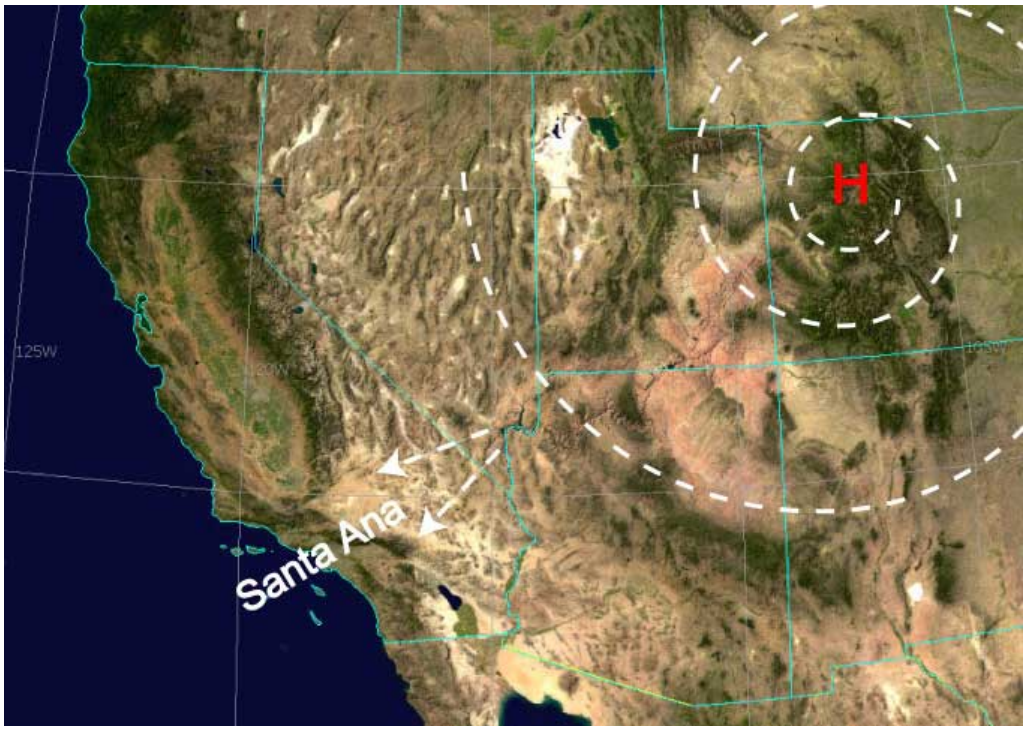
High Wind Characteristics

Santa Ana wind conditions results in two general disaster conditions. The most common is fire fanned by the high winds. This was the situation in 1993 in Laguna Beach when a massive fire destroyed a number of homes in the surrounding hills. Wind-driven flames again caused the destruction of more than 3,000 homes in Southern California in October 2003. Other forms of disaster would be direct building damage, damage to utilities, and infrastructure damage as a result of the high winds. This has occurred in the past few years in many Southland communities, including Los Angeles County.

Santa Ana winds commonly occur between October and February, with December having the highest frequency of events. Summer events are rare. Wind speeds are typically north to east at 35 knots through and below passes, and canyons have gusts to 50 knots. Stronger Santa Ana winds have gusts greater than 60 knots over widespread areas, and gusts greater than 100 knots in favored areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze. The sea breeze, which typically blows onshore daily, can moderate the Santa Ana winds during the late morning and afternoon hours. Santa Ana winds are an important forecast challenge because of the high fire danger associated with them. Also, unusually high surf conditions on the northeast side of the Channel Islands normally accompany a Santa Ana event.

Figure 9-2: Santa Ana Winds

(Source: http://upload.wikimedia.org/wikipedia/commons/f/fa/Santa_ana_wind1.jpg)



The Beaufort Scale below, coined and developed by Sir Francis Beaufort in 1805, illustrates the effect that varying wind speed can have on sea swells and structures:

Table 9-4: Beaufort Scale

(Source: http://www.compuweather.com/decoder-charts.html)

Beaufort Force	Speed (mph)	Wind Description – State of Sea – Effects on Land
0	Less than 1	Calm – Mirror-like – Smoke rises vertically
1	1–3	Light – Air ripples look like scales; no crests of foam – Smoke drift shows direction of wind, but wind vanes do not
2	4–7	Light breeze – Small but pronounced wavelets; crests do not break – Wind vanes move; leaves rustle; you can feel wind on the face
3	8–12	Gentle breeze – Large wavelets; crests break; glassy foam; a few whitecaps – Leaves and small twigs move constantly; small, light flags are extended

Beaufort Force	Speed (mph)	Wind Description – State of Sea – Effects on Land
4	13–18	Moderate breeze – Longer waves; whitecaps – Wind lifts dust and loose paper; small branches move
5	19–24	Fresh breeze – Moderate, long waves; many whitecaps; some spray – Small trees with leaves begin to move
6	25–31	Strong breeze – Some large waves; crests of white foam; spray – Large branches move; telegraph wires whistle; hard to hold umbrellas
7	32–38	Near gale – White foam from breaking waves blows in streaks with the wind – Whole trees move; resistance felt walking into wind
8	39–46	Gale – Waves high and moderately long; crests break into spin drift, blowing foam in well-marked streaks – Twigs and small branches break off trees; difficult to walk
9	47–54	Strong gale – High waves with wave crests that tumble; dense streaks of foam in wind; poor visibility from spray – Slight structural damage
10	55–63	Storm – Very high waves with long, curling crests; sea surface appears white from blowing foam; heavy tumbling of sea; poor visibility – Trees broken or uprooted; considerable structural damage
11	64–73	Violent storm – Waves high enough to hide small and medium-sized ships; sea covered with patches of white foam; edges of wave crests blown into froth; poor visibility – Seldom experienced inland; considerable structural damage
12	>74	Hurricane – Sea white with spray; foam and spray render visibility almost nonexistent – Widespread damage; very rarely experienced on land

What are Tornadoes?

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction in the path of the wind—such as a house— causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of expected damage. The scale measures six classifications of tornadoes with increasing magnitude, from an “F0” tornado to an “F6+” tornado.

Other hazards include wind damage to property, turbulence and low-level wind shear for aircraft, and high-wind dangers for boaters.

Table 9-5: Fujita Tornado Damage Scale

(Source: http://weather.latimes.com/tornadoFAQ.asp**)**

Scale	Wind Estimated (mph)	Typical Damage
F0	< 73	**Light damage.** Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees.
F1	73–112	**Moderate damage.** Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road (74 mph is the beginning of hurricane wind speed).
F2	113–157	**Considerable damage.** Roofs torn off frame houses, leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway.
F3	158–206	**Severe damage.** Roofs and some walls torn off frame houses; some rural buildings demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted, snapped, or leveled.
F4	207–260	**Devastating damage.** Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated.
F5	261–318	**Incredible damage.** Whole frame houses tossed off foundations; steel-reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur.
F6–F12	319 to sonic	**Inconceivable damage.** Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, and automobiles will create serious secondary damage on structures.

Microbursts

Unlike tornadoes, microbursts are strong, damaging winds that strike the ground and often give the impression that a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward-moving air from a thunderstorm's core. But unlike a tornado, microbursts affect only a rather small area. University of Chicago storm researcher Dr. Ted Fujita first coined the term “downburst” to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June 1975.

A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena he defined two sub-categories of downbursts: the larger macrobursts and small microbursts.

Macrobursts are downbursts with winds up to 117 mph that spread across a path greater than 2.5 miles wide at the surface, and which last from 5 to 30 minutes. A microburst, on the other hand, is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often lasts for less than five minutes.

"Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.

"When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings, and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."

Tornadoes, like those that occur every year in the Midwest and Southeastern parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from microbursts.

Terrorism and Weapons of Mass Destruction (WMD)

The complexity, scope, and potential consequences of a terrorist threat or incident require that there be a rapid and decisive capability to resolve the situation. The resolution to an act of terrorism demands an extraordinary level of coordination of crisis and consequence management functions and technical expertise across all levels of government. No single federal, state, or local governmental agency has the capability or requisite authority to respond independently and mitigate the consequences of such a threat to national security. The incident may affect a single location or multiple locations, each of which may be a disaster scene, a hazardous scene, and/or a crime scene simultaneously.

Differences between WMD Incidents and Other Incidents

As in all incidents, WMD incidents may involve mass casualties and damage to buildings or other types of property. However, there are several factors surrounding WMD incidents that are unlike any other type of incidents; these factors must be taken into consideration when planning a response. First responders' ability to identify aspects of the incident (e.g., signs and symptoms exhibited by victims) and report them accurately will be essential to maximizing the use of critical local resources and for triggering a federal response.

The situation may not be recognizable until there are multiple casualties. Most chemical and biological agents are not detectable by methods used for explosives and firearms. Most agents can be carried in containers that look like ordinary items.

There may be multiple events (i.e., one event in an attempt to influence another event's outcome).

Responders are placed at a higher risk of becoming casualties. Because agents are not readily identifiable, responders may become contaminated before recognizing the agent involved. First responders may, in addition, be targets for secondary releases or explosions.

The location of the incident will be treated as a crime scene. As such, preservation and collection of evidence is critical. Therefore, it is important to ensure that actions on-scene are coordinated between response organizations to minimize any conflicts between law enforcement authorities, who view the incident as a crime scene, and other responders, who view it as a hazardous materials or disaster scene.

Contamination of critical facilities and large geographic areas may result. Victims may carry an agent unknowingly to public transportation facilities, businesses, residences, doctors' offices, walk-in medical clinics, or emergency rooms because they don't realize that they are contaminated. First responders may carry the agent to fire or precinct houses, hospitals, or to the locations of subsequent calls.

The scope of the incident may expand geometrically and may affect mutual aid jurisdictions. Airborne agents flow with the air current and may disseminate via ventilation systems, carrying the agents far from the initial source.

There will be a stronger reaction from the public than with other types of incidents. The thought of exposure to a chemical or biological agent or radiation evokes terror in most people. The fear of the unknown also makes the public's response more severe.

Time is working against responding elements. The incident can expand geometrically and very quickly. In addition, the effects of some chemicals and biological agents worsen over time.

Support facilities such as utility stations and 911 centers, along with critical infrastructure facilities, are at risk as targets.

Specialized state and local response capabilities may be overwhelmed.

State of California Terrorism Guidance

The catastrophic attacks on the World Trade Center Building in New York City and the Alfred P. Murrah Federal Building in Oklahoma City shocked the nation into the reality that there are no domestic safe havens from acts of terrorism. These two apparently unrelated events punctuate our nation's vulnerability, and highlight California's risk of similar attack against its public officials, private and multi-national corporations, public infrastructure, and government facilities.

Historically, California has had a long experience combating terrorist groups, both domestic and international. Domestic terrorist groups in the state have been largely issue-oriented, while the few known internationally based incidents have mostly targeted the state's émigré communities and been related to foreign disputes. Today, however, both groups are more likely to be aligned nationally and/or internationally through electronic networking. The issues and politics of these groups remain essentially unchanged but now include increasing expressions of hatred for existing forms of government. The World Trade Center Incident demonstrates that international terrorist groups have the potential to operate with deadly effectiveness in this country. Such groups may offer no allegiance to any particular country but seek political or personal objectives that transcend national/state boundaries.

There is appropriate concern that such attacks as witnessed in Tokyo, New York City, and Oklahoma City could occur in California. A terrorist acting alone or in concert with any of the known national or international groups could readily commit acts of terrorism in California. The open availability of basic shelf-type chemicals and mail order biological research materials, coupled with an access to even the crudest laboratory facilities, could enable the individual extremist or an organized terrorist faction to manufacture proven highly lethal substances or to fashion less sophisticated weapons of mass destruction. The use of such weapons could result in mass casualties, long term contamination, and wreak havoc to both the state and national economies.

The freedom of movement and virtually unrestricted access to government officials, buildings, and critical infrastructure afforded to California's citizens and foreign visitors, presents the terrorist with the opportunity and conditions of anonymity to deliver such devastation and its tragic consequences with only the crudest devices of nuclear, chemical, or biological content.

Terrorist incidents create a unique environment in which to manage emergency response. Local responders are typically the first on scene during an actual incident and local government has primary responsibility for protecting public health and safety. Ordinarily, the local first response will be conducted under California's Standardized Emergency Management System (SEMS) which forms the basis of California's concept of operations for managing any kind of emergency or disaster, including terrorist incidents. The local responders will manage all aspects of the incident until the FBI assumes command, by virtue of its legal authority, of the law enforcement aspects relating to identifying, apprehending, and neutralizing the terrorists and their weapons. Local and state authorities always maintain control of their response resources and continue to operate utilizing SEMS. (Source: *California Emergency Management Agency Terrorism Response Plan*)

Los Angeles County Terrorism Early Warning (TEW) Group

Effective and rapid dissemination of indications and warnings to local emergency response agencies is an essential yet problematic element of terrorism management efforts. For bio-terrorist threats, such efforts must integrate ongoing real-time surveillance efforts. Terrorism Early Warning Groups are a multilateral, multidisciplinary effort to monitor open source data to identify trends and potential threats, monitor potential threat information during periods of heightened concern, assess potential targets and perform net assessments to guide decision making during actual events. TEW provides integrated threat and net assessment from a multi-jurisdictional perspective. City and county fire departments work together with emergency management, FBI, local law enforcement agencies, Department of Health Services, as well as other state and federal offices. The formation of TEW groups supports field response in the preparation for and response to acts of terrorism.

IAFC, October 2001 (et seq.)

The Los Angeles Operational Area TEW Group provides unified command structure with the impact of an attack on the operational area, gauges resource needs and shortfalls, continuously monitors and assesses situational awareness and status, and acts as the point of contact for interagency liaison in order to develop options for courses of action for incident resolution. TEW is an "Emerging Threat Workspace (Civil Battle Lab)" for stimulating national strategy for emerging threat issues:

- Terrorism and infrastructure protection
- Public order (riots/disturbances)
- Civil-military interoperability for urban operations
- Civilian police (CIVPOL) for peace officers
- Networked threats and emerging threats
- Counterterrorism technology test bed

Biological and Chemical Terrorism

The Public Health Response to Biological and Chemical Terrorism: Interim Planning Guidance for State Public Health Officials (hereafter referred to as the *Planning Guidance*) outlines steps for strengthening the capacity of the public health system to respond to and protect the nation against the dangers of a terrorism incident. Although the Planning Guidance focuses on the biological and chemical terrorism preparedness efforts of state-level health department personnel, it can be used as a planning tool by anyone in the response community, regardless of his or her position within that community or level of government.

The public health community at large also can use this document to improve its terrorism preparedness and develop terrorism response plans. The preparedness program outlined in this *Planning Guidance*, once implemented, should improve the ability of all public health agencies to respond to emergency situations arising from all sources, not just terrorism.

The *Planning Guidance* focuses on the capabilities that state health departments are likely to need to respond effectively to a terrorism incident. Despite the public health focus of this document, the terrorism plan ultimately should not be agency-specific.

Instead, the terrorism plan should be integrated, outlining the roles and responsibilities of all agencies that participate in a response. This coordinated terrorism plan should then be annexed to the states all-hazard *Emergency Operations Plan (EOP)*.

Background

The intentional release of sarin, an organophosphate nerve agent, into the Tokyo subway system helped to focus the United States on its need to prepare for what was once unthinkable. Aum Shinrikyo, the group responsible for the Tokyo incident, disbursed botulinum toxin and anthrax bacteria, and the group attempted to obtain Ebola (1).

The World Trade Center and Oklahoma City bombings confirm that terrorism is not an event that occurs only on foreign soil. Terrorism incidents or threats involving *Salmonella* (2) and ricin (3) amply demonstrate that the United States is vulnerable not only to bombs but to biological and chemical threats as well.

These and other events caused health departments across the country to consider their ability to respond to a terrorism incident. In addition to their more traditional responsibilities in disease surveillance and management, health departments are defining their roles to respond effectively to an intentional release of biological organisms or hazardous chemicals into an unsuspecting population.

Because states differ in size, population, risks, needs, and capabilities, terrorism preparedness and response efforts inevitably must differ. This document does not establish a “one size fits all” model; rather, it addresses important areas of preparedness and response that can be tailored to meet the needs of individual jurisdictions. Health department officials should consider the information contained in this guidance, identify the health and medical effects that an explosion or the intentional release or threatened release of a biological organism or hazardous chemical could have on the population, and prepare to address the public health consequences of those effects.

Well-developed surveillance and epidemiologic capacity is the foundation on which health departments will detect, evaluate, and design effective responses to terrorism events. Not only will this capacity facilitate the initial detection and response in a terrorism event, it will be essential to monitoring the impact of these events and the effectiveness of public health responses. Detection of acute or insidious terrorism attacks using biological (or certain chemical) agents also will require linking of data from a variety of sources. An effective public health response will depend on the timeliness and quality of communications among numerous public health agencies at local, state, and federal levels; clinicians; laboratories; poison centers; medical examiners; and other health response partners.

Complementing the need for accurate and timely case reports is the need for expertise to analyze the information properly. Epidemiologic expertise is critical to judging whether the incident involves biological or chemical agents or is a consequence of a natural phenomenon, an accident, or terrorism. Expertise also is critical in determining the likely site and time of the exposure; size and location of the population exposed; prospect for delayed exposure or secondary transmission of an infectious agent; and whether any people should receive prophylaxis (either medications or vaccines) and, if so, which population groups.

Timely and accurate information and analysis must be coupled with effective and rapid dissemination of information to those who need to know (e.g., response partners and the public) to instill confidence in both the short- and long-term response of the affected community.

Terrorism Mitigation

Because the primary mechanism for past terrorist incidents has been bombings and because of the potential for mass casualties from a WMD terrorist event, the primary focus of the state's hazard mitigation strategy for terrorism is on mitigation measures that reduce risk from bomb blast and nuclear, biological, and chemical attacks to critical state facilities and population. Measures include the following:

Hardening (construction/retrofitting)

- Relocation/retrofitting of air intakes
- Ventilation system upgrade/retrofit
- Protecting tower bases of bridges
- Seismic retrofitting
- Upgrading/retrofit of water main system
- Blast guarding window film/glazing, frames
- Egress improvements

Barriers and Fencing

- Fencing around air intakes
- Fencing around fuel supply
- Vehicle barriers, bollards, popup gates, hydraulic barriers
- Waterfront security system
- Perimeter fencing

Redundant Systems

- Fire protection system
- Communications systems
- Information technology
- Utility (gas/heat/water)
- Utility (electric)

Security Measures

- Security systems/early warning systems
- Warning and alarms systems directly related to system protection/shutdown
- Smart utility management systems on all critical services

Planning/Studies

- Telecommunications plans
- IT disaster recovery plans
- Business continuity/resumption plans
- Intelligence gathering and sharing
- Threat, vulnerability, and risk assessments
- Evacuation plans
- Site security planning

Seismic Study

- Retrofitting
- Interior lighting
- Exterior lighting
- Staging areas
- Surveillance
- Secure access and entry points
- Card swipe system
- Magnetometer
- Metal detectors
- Surveillance cameras and closed circuit TVs
- Personnel detection equipment
- Vehicle detection equipment
- Radar systems
- Building access system
- Motion detectors
- Replacing door locks and keys

IT Systems

- Security management system

- Building access system
- Employee identification system
- Coding protocol for sensitive records

These above-listed measures are already being used in many communities and situations and have proven effective in reducing or eliminating hazard risk. Each of these measures directly meets an objective stated in the state's *Hazard Mitigation Strategy*.

Infrastructure Loss – Utility, Data / Telecommunications

The 2000–2001 California electricity crisis brought to light many critical issues surrounding the state's power generation and distribution system, including its dependency on out-of-state resources. Although California has implemented effective energy conservation programs, the state continues to experience both population growth and weather cycles that contribute to a heavy demand for power.

Hydro-generation provides approximately 25% of California's electric power, with the balance coming from fossil fuel, nuclear, and green sources. As experienced in 2000 and 2001, blackouts can occur due to losses in transmission or generation and/or extremely severe temperatures that lead to heavy electric power consumption.

The Impact of Loss of Power on Water and Sewer Systems

California is a populous state that receives minimal rainfall. Approximately 70% of the population obtains its drinking water from surface sources with the remainder relying on groundwater supplies. The basic types of system used by the water companies are pressurized (pressure-fed) and non-pressurized (gravity-fed) systems. The basic types of system used by the sewer companies are collection and treatment systems that use force pumps to move sewerage.

Drinking water is supplied to California residents through myriad governmental agencies, cities, districts, private utilities, mutual water companies, private businesses, and individually owned wells.

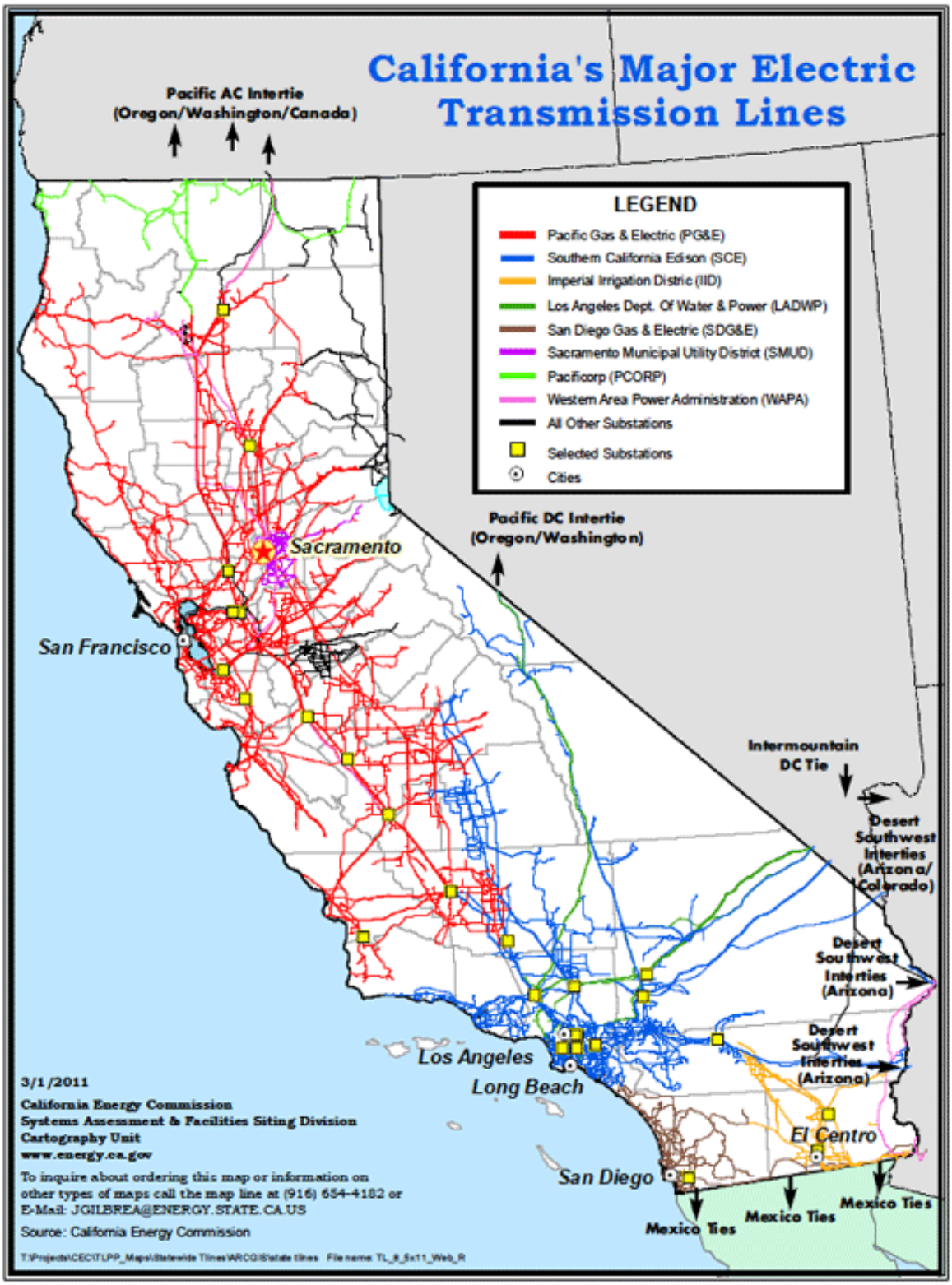
There are over 10,000 public water suppliers in the state serving water to approximately 29 million consumers. Less than 10% of the public water systems in the state serve collectively more than 95% of the state's population. The remaining 90% of the systems serves less than 5% of the population. D.01-05-089 added Category M (limited other customers as necessary to protect public health and safety, to the extent exempted by the Commission) to the list of essential customers normally exempt from rotating outages.

Due to the energy situation and rolling blackouts that occurred earlier in the year, the Water Division has conducted an informal inquiry into the impact of the rolling blackouts and has concluded that during the first four months of the year, California energy situation and rolling blackouts have had no significant impact on the California water and sewer system industries, in part due to the "Y2K" efforts in 1999. Water utilities and sewer system utilities appear to have the matter well under control, with little to no impact on customer service at this time.

The Effects on Public Health and Safety

Public health and safety must be the primary factor used to evaluate a customer's eligibility for exemption from rotating outages. Exempting a fire department from rotating outages is of little value if the water resources needed to fight these fires are not available to it, particular during the high fire season. Fires that start during extreme fire weather conditions are a high risk to the safety of the residents and firefighters, and have a high probability of spreading rapidly and inflicting major property loss if water pumping facilities are compromised.

Power Transmission Lines in California (updated 2011)

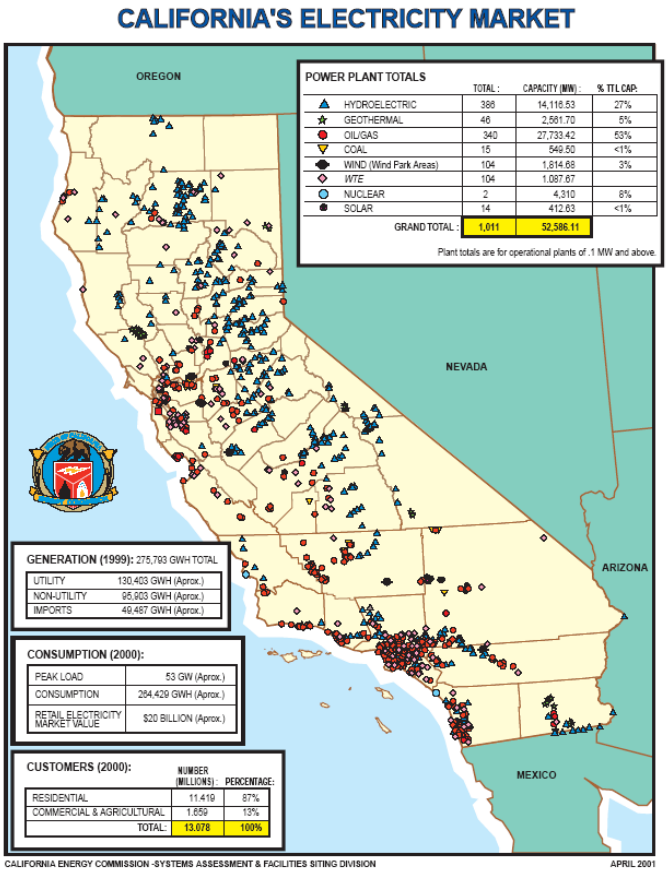


California Department of Energy

A review of the Chief of the Los Angeles County Fire Department's (LACoFD) comments indicated that the emergency restoration procedures are likely inadequate and do not ensure that sufficient water supplies will be available in an emergency. LACoFD also is concerned that the procedures have not been activated nor tested; the procedures may not have been communicated consistently between the electric utilities, water agencies, and fire fighting forces; the procedures do not provide for the instantaneous supply of water required in a fire emergency; and the current procedures require the caller to identify the exact location of the power restoration.

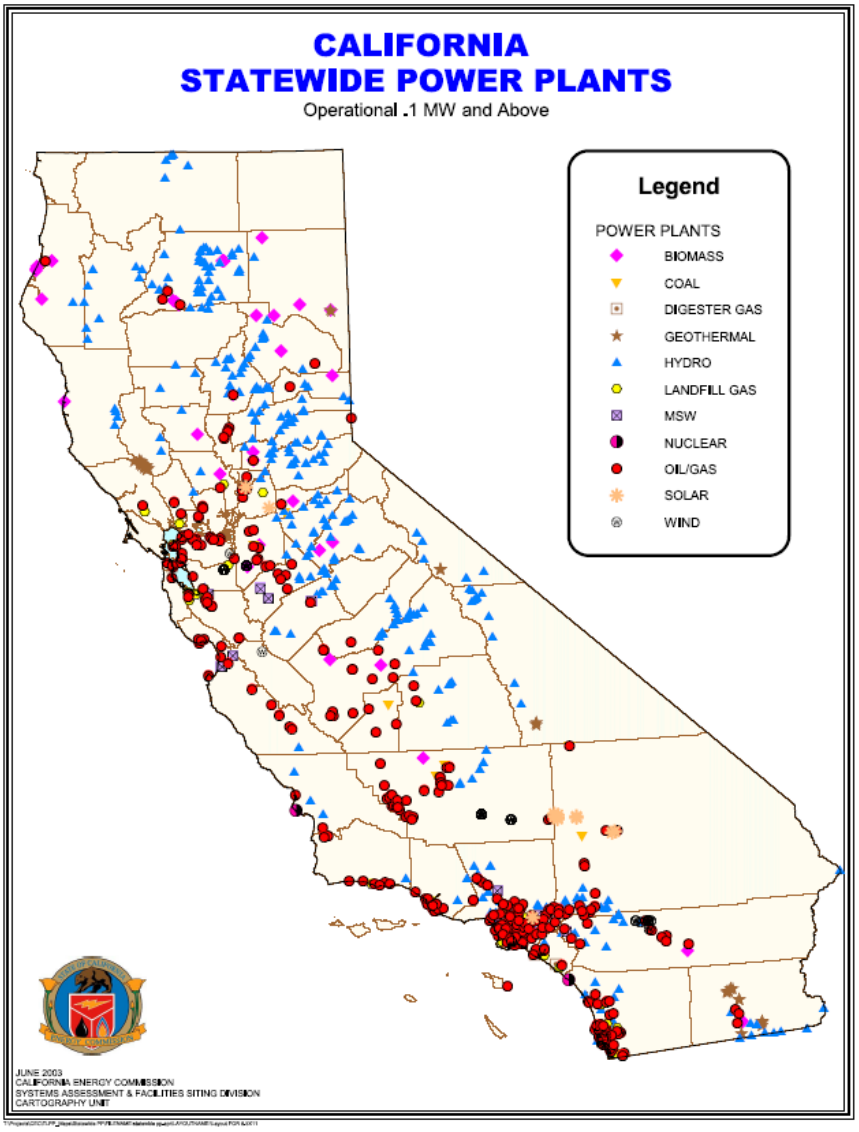
California has experienced many power outages from natural disasters such as fires, floods, earthquakes, and rainstorms. This means that water and sewer systems must have adequate backup power for extended electric outages, independent of rolling blackouts. Due to "Y2K" efforts, many large water systems have adequate storage facilities and have installed backup generators to maintain system pressures during power failures. Rotating power outage duration is usually less than two hours, or between two and four hours. Therefore, rolling blackouts have little impact on customer service.

In addition, water and sewer treatment utilities may request partial or complete rotating outage exemption from electric utilities in times of emergency identified as requiring their service, such as firefighting. The Water Division believes that it is reasonable to order electric companies to notify all of their water and sewer customers and test the emergency restoration procedures to minimize the effects on public health and safety. The Water Division recommends that water and sewer companies be excluded from Category M.



Mitigation Measures Available for These Systems

Backup power was a big issue due to the energy situation and rolling blackouts that occurred this summer. Many water systems have argued that backup power was not necessary since they received electrical power from more than one substation, but the power shortage has negated that argument. Many large water systems have adequate storage facilities and have installed backup generators to maintain system pressures during power failures due to "Y2K" efforts. It is the smaller systems that generally do not have backup power. To mitigate possible public health and safety impacts due to a loss of power, the Water Division recommends that all water companies with pressurized systems and sewer companies install backup generators on the wells with the largest pumping capacity or the lead wells. This will ensure system integrity.



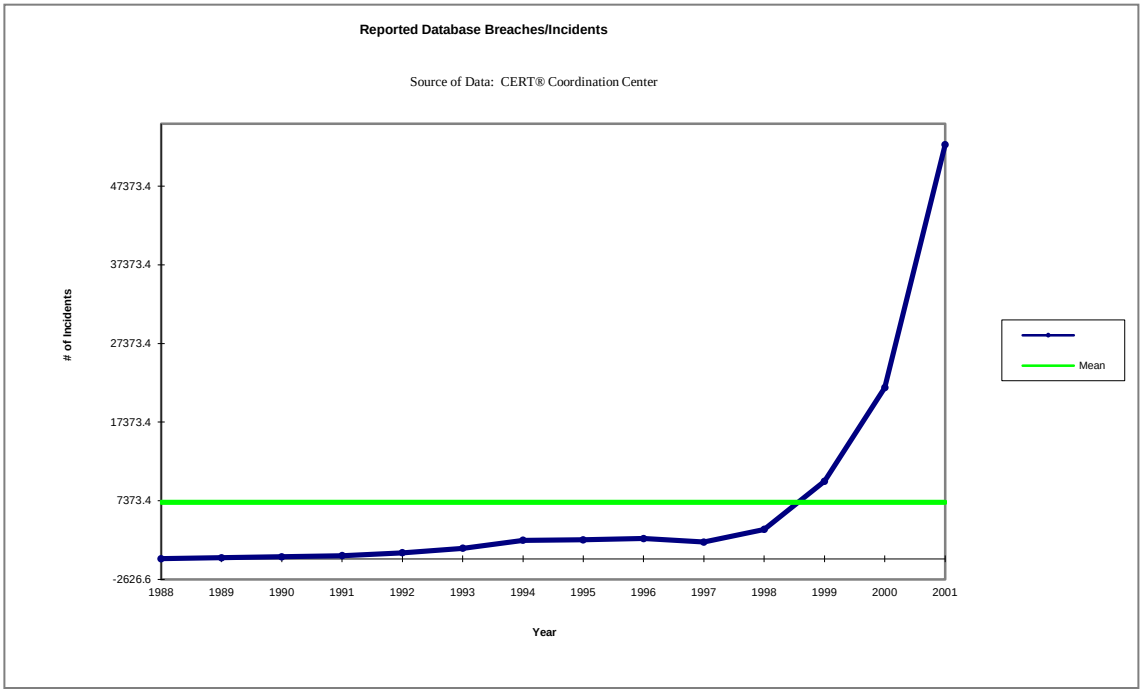
Los Angeles County depends on information systems and communications networks to carry out nearly all aspects of day-to-day business. In this digital era, as we use automated information technology (IT) systems to process information for better support of our missions, risk management plays a critical role in protecting our information assets, and therefore our missions, against IT-related risk.

An effective risk management process is an important component of a successful IT security program. The principal goal of an organization's risk management process should be to protect the *organization and its ability to perform their mission*, not just its IT assets. Therefore, the risk management process should not be treated primarily as a technical function carried out by the IT experts who operate and manage the IT system, but as an essential management function of the organization.

Computer Security Breaches

Computer breach incidents have risen sharply since the 1980s. These include viruses, worms, Trojan horses, break-ins, and other damaging breaches. Whereas only six incidents were reported in 1988, the number rose gradually during the late 1980s and 1990s, made a sharp rise beginning in 1998, and has risen exponentially since. To date, there have been over 142,500 computer breaches.

The 2002 Computer Security Institute (CSI) Computer Crime and Security Survey revealed that each year, over half of all databases have some kind of breach and that the average breach amounts to nearly $4 million in losses. This percentage is staggeringly high given that these are the security problems that companies are reporting. Organizations don't want to advertise the fact that their internal people have access to customer data and can steal that data, cover their tracks, give the data to anybody, and stay undetected and employed while a crime is committed.



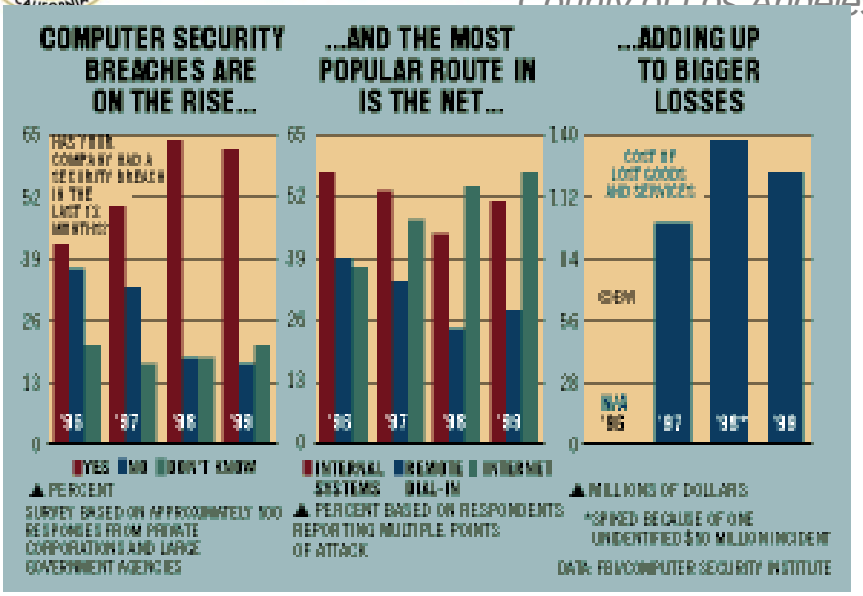
California recently enacted a law mandating the public disclosure of computer security breaches involving confidential information. The law covers not just state agencies but all private enterprises doing business in California. Starting July 1, 2003, any entity that fails to disclose that a breach has occurred could be liable for civil damages or face class action suits.

Cyber Crime

Cyber crime is becoming one of the Net's growth businesses. The recent spate of attacks that gummed up Web sites for hours--known as "denial of service"--is only one type. Today, criminals are doing everything from stealing intellectual property and committing fraud to unleashing viruses and committing acts of cyber terrorism in which political groups or unfriendly governments nab crucial information. Indeed, the tactic used to create mayhem in the past few days is actually one of the more innocuous ones. Cyber thieves have at their fingertips a dozen dangerous tools, from "scans" that ferret out weaknesses in Web site software programs to "sniffers" that snatch passwords. All told, the FBI estimates computer losses at up to $10 billion a year.

Sadly, the biggest threat is from within. Law enforcement officials estimate that up to 60% of break-ins are from employees. Take the experience of William C. Boni, a digital detective for PricewaterhouseCoopers in Los Angeles. Last year, he was called in by an entertainment company that was suspicious about an employee. The employee, it turns out, was under some financial pressure and had installed a program called Back Orifice on three of the company's servers. The program, which is widely available on the Internet, allowed him to take over those machines, gaining passwords and all the company's financial data. The employee was terminated before any damage could be done.

The dirty little secret is that computer networks offer ready points of access for disgruntled employees, spies, thieves, sociopaths, and bored teens. Once they're in a corporate network, they can lift intellectual property, destroy data, sabotage operations, or even subvert a particular deal or career." Any business on the Internet is a target as far as I'm concerned," says Paul Field, a reformed hacker who is now a security consultant.



It's point and click, then stick 'em up. Interested in a little mayhem? Security experts estimate that there are 1,900 Web sites that offer the digital tools--for free--that will let people snoop, crash computers, hijack control of a machine, or retrieve a copy of every keystroke. Steve O'Brien, vice-president for information operation assessments at Info-Ops.com, an Annapolis (Md.)-based company that provides intrusion detection services and security solutions, says the number of ways to hack into computers is rising fast. He tracks potential threats both from hacker groups and from the proliferation of programs. Once a rare find, he now discovers at least three new nasty software programs or vulnerabilities every day. And those tools aren't just for the intellectually curious." Anyone can get them off the Internet—just point and click away," says Robert N. Weaver, a Secret Service agent in charge of the New York Area Electronic Crimes Task Force.

Experts say the first step for companies is to secure their systems by searching for hacker programs that might be used in such attacks. They also suggest formal security policies that can be distributed to employees letting them know how often to change passwords or what to do in case of an attack. An added help: Constantly updating software with the latest versions and security patches. Down the road, techniques that can filter and trace malicious software sent over the Web may make it harder to knock businesses off the Net. Says Novell Inc. CEO Eric Schmidt:" Security is a race between the lock makers and the lock pickers." Regulators say that cybercrime thrives because people accord the Internet far more credibility than it deserves." You can get a lot of good information from the Internet—95% of what you do there is bona fide," says G. Philip Rutledge, deputy chief counsel of the Pennsylvania Securities Commission." Unfortunately, that creates openings for fraud."

Excerpts from *Business Week Online*, Ira Sager in New York, with Steve Hamm and Neil Gross in New York, John Carey in Washington, D.C., and Robert D. Hof in San Mateo, Calif.

Top Ten Computer Security Breaches

Systems affected: All system and network devices

BIND weaknesses: The Berkeley Internet Name Domain (BIND) package is the most widely used implementation of Domain Name Service (DNS) by which we locate systems on the Internet by name, without having to know specific IP addresses.

In a typical example of a BIND attack, intruders erase system logs, and install tools to gain administrative access. They then compile and install IRC utilities and network scanning tools, which are used to scan

more than a dozen class-B networks in search of additional systems running vulnerable versions of BIND. In a matter of minutes, they can use the compromised system to attack hundreds of remote systems.

Systems affected: Multiple UNIX and Linux systems

Vulnerable CGI (Common Gateway Interface) programs and application extensions (e.g., ColdFusion) installed on Web servers: Most Web servers support CGI for data collection and verification. Intruders are known to have exploited vulnerable CGI programs to vandalize Web pages, steal credit card information, and set up back doors to enable future intrusions, even if the CGI programs are secured. As a general rule, sample programs should always be removed from production systems.

Systems affected: All Web servers

Remote procedure call (RPC) weaknesses: Remote procedure calls (RPC) allow programs on one computer to execute programs on a second computer. They are widely used to access network services such as shared files in NFS. There is compelling evidence that the vast majority of distributed denial of service attacks launched during 1999 and early 2000 were executed by systems that had been victimized because they had RPC vulnerabilities. The broadly successful attack on US military systems during the Solar Sunrise incident also exploited an RPC flaw found on hundreds of Department of Defense systems.

Systems affected: Multiple UNIX and Linux systems

RDS security hole in Microsoft Internet Information Server (IIS): Programming flaws in Microsoft's Internet Information Server (IIS) used to host websites deployed on Microsoft Windows NT and Windows 2000 are employed by malicious users to run remote commands with administrator privileges. Some participants who developed the "Top Ten" list believe that exploits of other IIS flaws, such as .HTR files, are at least as common as exploits of RDS.

Systems affected: Microsoft Windows NT systems using Internet Information Server

Sendmail: Sendmail is the program that handles most e-mail on the Internet. Its widespread use makes it a prime target. In one of the most common exploits, the attacker sends a crafted mail message to the machine running Sendmail, and Sendmail reads the message as instructions requiring the victim machine to send its password file to the attacker's machine (or to another victim) where the passwords can be cracked.

Systems affected: Multiple UNIX and Linux systems

Sadmind and mountd: Sadmind allows remote administration access to Solaris systems, providing graphical access to system administration functions. Mountd controls and arbitrates access to NFS mounts on UNIX hosts. Buffer overflows in these applications can be exploited, allowing attackers to gain control with root access.

Systems affected: Multiple UNIX and Linux systems; Sadmind: Solaris machines only

Global file sharing and inappropriate information sharing via NetBIOS and Windows NT ports: These services allow file sharing over networks. When improperly configured, they can expose critical system files or give full file system access to hostile parties.

Systems affected: UNIX, Windows and Macintosh systems

User IDs, especially root/administrator with no passwords or weak passwords: Some systems come with "demo" or "guest" accounts with no passwords or with widely known default passwords. Service workers often leave maintenance accounts with no passwords, while some database management systems install administration accounts with default passwords. In addition, busy system administrators often select system passwords that are easily guessable ("love," "money," "wizard" are common) or just use a blank password. Many attackers try default passwords and then try to guess passwords before resorting to more sophisticated methods.

Systems affected: All systems

IMAP and POP buffer overflow vulnerabilities or incorrect configuration: IMAP and POP are popular remote access mail protocols, allowing users to access their e-mail accounts. The "open access" nature of these services makes them especially vulnerable to exploitation because openings are frequently left in firewalls to allow for external e-mail access. Attackers who exploit flaws in IMAP or POP often gain instant root-level control.

Systems affected: Multiple UNIX and Linux systems

Default SNMP community strings set to 'public' and 'private': The Simple Network Management Protocol (SNMP) is widely used by network administrators to monitor and administer all types of network-connected devices, ranging from routers to printers to computers. SNMP uses an unencrypted "community string" as its only authentication mechanism. Lack of encryption is bad enough, but the default community string used by the vast majority of SNMP devices is "public", with a few clever network equipment vendors changing the string to "private". Attackers can use this vulnerability in SNMP to reconfigure or shut down devices remotely.

Express Computer Business Weekly

Information Technology Security Practices

Computer Security Policy

The term *computer security policy* has more than one meaning. Policy is senior management's directives to create a computer security program, establish its goals, and assign responsibilities. The term policy is also used to refer to the specific security rules for particular systems. Additionally, policy may refer to entirely different matters, such as the specific managerial decisions setting an organization's e-mail privacy policy or fax security policy.

Program Management

Managing computer security at multiple levels brings many benefits. Each level contributes to the overall computer security program with different types of expertise, authority, and resources. In general, executive managers (such as those at the headquarters level) better understand the organization as a whole and have more authority. On the other hand, front-line managers (at the computer facility and applications levels) are more familiar with the specific requirements, both technical and procedural, and problems of the systems and the users. The levels of computer security program management should be complementary; each can help the other be more effective. Many organizations have at least two levels of computer security management; the *central* level and the *system* level.

Risk Management

Risk is the possibility of something adverse happening. Risk management is the process of assessing risk, taking steps to reduce risk to an acceptable level and maintaining that level of risk. Risk management requires the analysis of risk, relative to potential benefits, consideration of alternatives, and,

finally, implementation of what management determines to be the best course of action. Risk management consists of two primary and one underlying activity; risk assessment and risk mitigation are the primary activities and uncertainty analysis is the underlying one. An organization should consider the following when assessing risks.

Life Cycle Planning

Security, like other aspects of an IT system, is best managed if planned for *throughout* the IT system life cycle. There are many models for the IT system life cycle but most contain five basic phases: initiation, development/acquisition, implementation, operation, and disposal.

Personnel/User Issues

Many important issues in computer security involve users, designers, implementers, and managers. A broad range of security issues relate to how these individuals interact with computers and the access and authorities they need to do their job. No IT system can be secured without properly addressing these security issues.

Preparing for Contingencies and Disasters

Contingency planning directly supports an organization's goal of continued operations. Organizations should practice contingency planning because it makes good business sense.

Contingency planning addresses how to keep an organization's critical functions operating in the event of disruptions, both large and small. This broad perspective on contingency planning is based on the distribution of computer support throughout an organization. The following six steps describe the basic functions an organization should employ when developing contingency plans.

Computer Security Incident Handling

A computer security incident can result from a computer virus, other malicious code, or a system intruder, either an insider or an outsider. The definition of a computer security incident is somewhat flexible and may vary by organization and computing environment. An incident handling capability may be viewed as a component of contingency planning, because it provides the ability to react quickly and efficiently to disruptions in normal processing. Incident handling can be considered that portion of contingency planning that responds to malicious technical threats.

Awareness and Training

An effective computer security awareness and training program requires proper planning, implementation, maintenance, and periodic evaluation.

Security Considerations in Computer Support and Operations

Computer support and operations refers to system administration and tasks external to the system that support its operation (e.g., maintaining documentation). Failure to consider security as part of the support and operations of IT systems is, for many organizations, a significant weakness. Computer security system literature includes many examples of how organizations undermined their often expensive security measures because of poor documentation, no control of maintenance accounts, or other shoddy practices.

Physical and Environmental Security

Physical and environmental security controls are implemented to protect the facility housing system resources, the system resources themselves, and the facilities used to support their operation. An organization's physical and environmental security program should address the following seven topics. In doing so, it can help prevent interruptions in computer services, physical damage, unauthorized disclosure of information, loss of control over system integrity, and theft.

Identification and Authentication

Identification and Authentication is a critical building block of computer security since it is the basis for most types of access control and for establishing user accountability. Identification and Authentication is a technical measure that prevents unauthorized people (or unauthorized processes) from entering an IT system. Access control usually requires that the system be able to identify and differentiate among users. For example, access control is often based on *least privilege*, which refers to the granting to users of only those accesses minimally required to perform their duties. User accountability requires the linking of activities on an IT system to specific individuals and, therefore, requires the system to identify users.

Logical Access Control

Access is the ability to do something with a computer resource (e.g., use, change, or view). Logical access controls are the system-based means by which the ability is explicitly enabled or restricted in some way. Logical access controls can prescribe not only who or what (e.g., in the case of a process) is to have access to a specific system resource but also the type of access that is permitted.

Audit Trails

Audit trails maintain a record of system activity by system or application processes and by user activity. In conjunction with appropriate tools and procedures, audit trails can provide a means to help accomplish *several* security-related objectives, including individual accountability, reconstruction of events, intrusion detection, and problem identification.

Cryptography

Cryptography is a branch of mathematics based on the transformation of data. It provides an important tool for protecting information and is used in many aspects of computer security. Cryptography is traditionally associated only with keeping data secret. However, modern cryptography can be used to provide many security services, such as electronic signatures and ensuring that data has not been modified. Several important issues should be considered when designing, implementing, and integrating cryptography in an IT system.

Biological and Health Emergencies

Los Angeles County has experienced numerous disasters, varying in type and severity. Disasters often result in the need for health and human services as part of the immediate and long-term recovery period. Some disasters are localized with service needs focused in a single location; other disasters, such as earthquakes and civil unrest, result in geographically widespread health and human services needs.

Following a disaster, it is essential to identify locations where large numbers of people are gathered in open areas. These areas will require evaluation in order to assess health and human service needs. The recovery period may be shortened if health, mental health, and housing problems can be addressed quickly.

This plan is primarily directed to Los Angeles County departments that will provide the initial team members. Other key human service providers, public and private, will be added to the teams to meet the growing needs of disaster victims.

Mission statements of the following departments all relate to health and human services; they are annotated below:

Department of Public Health

The Los Angeles County Department of Public Health protects health, prevents disease, and promotes the health and well-being for all persons in Los Angeles County. Our focus is on the population as a whole, and we conduct our activities through a network of public health professionals throughout the community.

Public health nurses make home visits to families with communicable diseases; epidemiologists investigate the sources of disease outbreaks; environmental health specialists ensure safe food, water, and housing; and all work with community coalitions to advocate for public policies to protect and improve health.

Department of Health Services

“To protect, maintain, and improve the health of the community.”

Community Health Services

“To provide population-based public health services and public health clinics in order to assure healthy communities in Los Angeles County through the services of Public Health Nurses, Public Health Investigators, and others.”

Environmental Health Services

“To protect health, prevent disease, and promote health for all persons in Los Angeles County through the management of potentially harmful chemical, physical, or biological agents in the environment.”

Department of Mental Health

The Department of Mental Health (DMH) will coordinate and provide mental health services to community disaster victims and disaster workers throughout the entire duration of the disaster and its recovery period. DMH will augment the Department of Health Services by providing disaster mental health services.

Department of Public Social Services

The Department of Public Social Services (DPSS) is responsible, in partnership with the American Red Cross, to ensure that residents receive appropriate emergency shelter. DPSS is the County's liaison with Emergency Network Los Angeles/LA Voluntary Agencies Active in Disaster (ENLA/LAVOAD). In a disaster, DPSS will communicate community needs to this agency.

Department of Children and Family Services

The Department of Children and Family Services (DCFS) is responsible for the safety and well-being of the children in its care, and the children otherwise known as "unaccompanied minors" who may be left unsupervised as a result of a disaster.

Department of Community and Senior Services

The Department of Community and Senior Services (CSS) will manage and staff emergency shelters; contact high-risk IHSS clients; implement the Federal Repatriation Program; staff Disaster Services Centers using volunteers and contract agencies; provide public information through the Information and Referral network; and perform outreach and disaster assistance services through grants received from the California Departments of Aging and Social Services.

Disaster Assessment & Recovery Team (DART)

County human services departments have formed interdisciplinary **D**isaster **A**ssessment and **R**ecovery **T**eams (DARTs), which will activate following a disaster. Once activated, DARTs will go to parks, shelters, and other areas where large numbers of people are gathered. Activities will:

- Encourage people to move to established shelters or, if safe, return to their homes;
- Identify health and human services needs that will assist large groups of people to recover from the event;
- Maximize resource utilization;
- Eliminate resource duplication; and
- Respond immediately to meet health and human needs for larger groups of people.
- The following are important assumptions; they are not prioritized:
- DARTs will focus on community assessment and service referral; individual service delivery will be provided as time allows.
- Some team members in the impacted area(s) may not necessarily activate until their personal situations are stabilized.
- In any particular disaster, not all teams may be needed.
- Teams may be re-deployed from their identified service planning area.
- DARTs do not replace other departmental disaster response efforts or their primary disaster response mission, but work in concert with their emergency operations services.

- Team size will be determined by need and available transportation resources.
- The teams may require support from public safety agencies, such as transportation and security.
- Composition of the teams will vary over time with evolving health and human needs and services.
- Teams will request bilingual/bicultural assistance from departmental employees, community agencies, other established networks or Emergency Network Los Angeles as needed.
- Teams may request assistance from other agencies as needed.
- Safety is a priority. Teams will not expose themselves to dangerous situations.
- All requests will follow the Standardized Emergency Management System protocols for requesting assistance.

Team Roles

DART Teams

Teams will self-designate operational roles for each team member, to include at least a leader, assistant leader, and record keeper. These roles will transfer as the team's composition changes. However, when providing services, each team member will work within their prescribed discipline.

DART Members

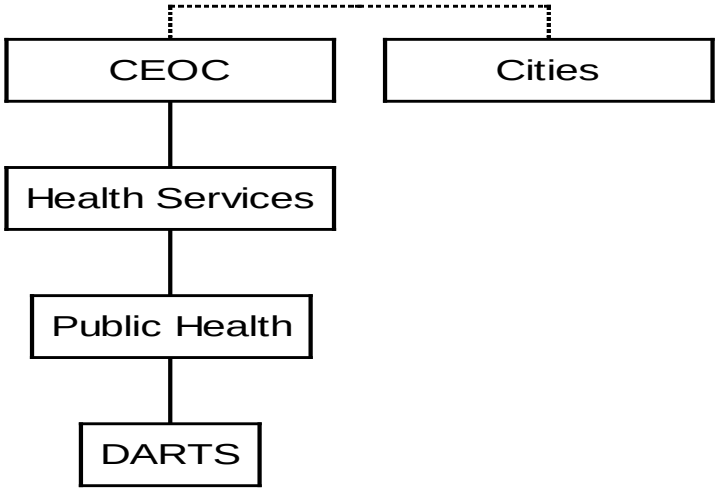
Team members will:

- Be expected to mobilize respective Department resources to respond to disaster needs.
- Provide services within their specific discipline.
- Collaborate with the team leader on the formulation of the daily report.

Command Structure

Per SEMS, the Operational Area coordinates information, resources and priorities among all local governments. For the County of Los Angeles, the Operational Area is synonymous with the County Emergency Operations Center (CEOC). County Departments report to the CEOC in a disaster.

The command structure for the DART team follows existing chain of command.



Public Health Rapid Response Team (PHRRT)

The mission of the **P**ublic **H**ealth **R**apid **R**esponse **T**eams (PHRRT) will be to conduct rapid, coordinated epidemiologic investigations or health needs assessments while providing technical assistance to DART members and response partners in the mitigation of public health emergencies. The PHRRT units will be trained and equipped to respond to CBRNE (Chemical, Biological, Radiological, Nuclear, and Explosive) events, natural and manmade disasters, and other large-scale infectious disease outbreaks. PHRRT members will be equipped to respond 24 hours a day, 7 days a week to a variety of emergency settings countywide, including field investigation sites, impact zones, recovery shelters, field treatment centers, and/or medical facilities. Team functions will include:

Rapid collection, analysis, and dissemination of epidemiologic data to provide decision makers with critical information in the midst of a public health emergency

- Post-disaster surveillance or monitoring, via active or passive mechanisms, of critical health-related data sources and zones of impact
- Technical or operational assistance to emergency response personnel under the Incident Command Structure of the Standardized Emergency Management System, including Disaster Assessment and Recovery Team personnel.
- Identification of at-risk populations for the effective deployment and delivery of public health resources (needs assessments, contact tracing, etc.)
- Provide critical public health information to those affected and interface with other local responders on the potential health risks of a disaster.

- Assist with the implementation and evaluation of disaster mitigation strategies that will set the stage for additional comprehensive public health interventions

- Evaluation and analysis of post-disaster impact, resource utilization, and community health through rapid needs assessments and impact surveys

PHRRT Team Structure & Response

The PHRRT will consist of a field-deployable 40-person team of pre-designated, highly trained public health personnel. Based on the nature of the incident, the following Public Health programs or units may act as the designated lead (or co-lead) units for the PHRRT during a public health emergency:

- Health Assessment and Epidemiology (including Injury Program, Toxics Epidemiology)

- Acute Communicable Disease Control (including Immunization Program)

- Disease Control Programs (Veterinary Program, TB, etc.)

- Environmental Health (including Environmental Hygiene, Radiation Management)

- Public Health Nursing Programs

- Public Health Investigations

Composition of Team

In order to provide an effective, multi-disciplinary response workforce, the PHRRT unit will include the following classifications of Los Angeles County Public Health personnel:

- Epidemiologists/Epidemiology Analysts (8 Field-Based, 5 Central)

- Environmental Health Specialists (6, includes Sanitarians, Hygienists, Rad. Technicians)

- Public Health Laboratory Technicians (2)

- Public Health Veterinarians (2)

- Program or SPA Medical Directors (4)

- Public Health Nurses or Program Specialists (8)

- Public Health Investigators (8)

- Communications Specialist (2)

- Media Liaisons (2)

- Agency Liaisons (EOC, DOC, TEW)

The composition and structure of the PHRRT will allow for partial or scaled mobilization and deployment of personnel to adjust to the projected needs of any public health emergency, including smallpox. The designated lead Public Health program(s) and PHRRT Commander will be charged with determining the level of deployment and number of PHRRT personnel needed to adequately assess and respond to the

public health impact of an event. To ensure coordination and cooperation with other relevant response entities in the county such as the Emergency Medical Services Agency, Department of Mental Health, and the Los Angeles County Terrorism Early Warning Group network of agencies, the composition and structure of the PHRRT teams will serve to complement or augment the specialized capacity of these entities. For example, PHRRT personnel will cross-train with DART personnel to understand individual roles and the necessary level of interaction required to respond effectively.

Conversely, personnel such as criminal investigators, medical examiners, and Health hazmat personnel may be tasked to the PHRRT to assist with public health base and field operations.

Additional personnel tasked to the PHRRT will include information systems technicians, transport personnel and other clerical staff who will be pre-identified to ensure availability of services to support effective central and field-based operations. These individuals will be pre-identified by the Chief of Operations for Public Health, who is tasked with operational support for all public health resources during a public health emergency. Any subsequent additions and support personnel from the Federal or State level will be integrated into ongoing PHRRT response activities through the designated lead unit(s) and provide expanded support when needed.

Health Hazards

West Nile Virus

Humans

As of August 17, 2004, a total of 189 WNV infections have been reported from the following local health jurisdictions: San Bernardino (76), Los Angeles (59), Riverside (40), Orange (6), Imperial (1), Kern (2), Fresno (2), Tulare (1), Ventura (1) and Yolo (1) counties. Thirteen of these WNV infections were initially detected in asymptomatic individuals through screening done at blood banks – one of these individuals later became symptomatic. Of the 177 WNV cases with symptoms, 80 are classified as West Nile fever cases, 74 are classified as West Nile neuroinvasive disease, and 23 are of unknown status. The median age for all cases where data was available = 50 years (range: 9 – 91 years). Median age for West Nile fever cases = 46 years (range: 9 – 82 years). Median age for West Nile neuroinvasive disease cases = 59 years (range: 15 – 91 years). 115/177 (65%) of the cases are male. There have been five fatalities to date in California in Orange (1), San Bernardino (2) and Los Angeles (2) counties.

Equines

The California Department of Food and Agriculture confirmed 30 WNV equine cases from the counties of Alpine (1), Butte (1), Fresno (1), Orange (1), Riverside (12), Sacramento (4), San Bernardino (2), San Diego (1), Tehama (1), and Ventura (1) last week. This represents the first equine cases in the counties of Alpine, Butte, Orange, San Diego, and Ventura and the first indication of WNV in Alpine County. Forty-eight horses have been euthanized or have died after being infected with WNV.

Dead Birds

The following eleven new counties detected WNV in dead birds last week: Calaveras (1), Lake (1), Lassen (1), Mariposa (1), Plumas (1), San Luis Obispo (1), San Mateo (1), Sierra (1), Sutter (2), Yolo (1), and Yuba (3). An additional 183 WNV positive dead birds were reported last week from Alameda (1), Butte (48), Contra Costa (1), El Dorado (2), Fresno (9), Glenn (5), Kern (3), Los Angeles (37), Mendocino (1), Orange (20), Placer (1), Riverside (1), Sacramento (16), San Diego (1), San Joaquin (2), Santa Barbara (1), Shasta (4), Solano (1), Sonoma (7), Stanislaus (3), Tehama (18), and Tulare (1). In 2004, a total of 1,447 WNV positive dead birds have been detected in California.

Mosquito Pools and Sentinel Chickens:

A total of 109 mosquito pools tested positive for WNV last week from Los Angeles (43), Orange (30), San Bernardino (26), Kern (4), Shasta (3), Riverside (1), Sacramento (1), and San Luis Obispo (1) counties, thus bringing the yearly total to 523. This represents the first positive mosquito activity reported in San Luis Obispo County. Fourteen chickens from Imperial (4), Los Angeles (3), and San Bernardino (7) counties seroconverted to WNV last week, bringing the yearly total to 214.

Table 9-6: Summary of West Nile Virus Activity in California, 2006 (updated 2011)
(Source: http://www.westnile.ca.gov/2006_casecounts.php)

County	Human Cases	Horses	Dead Birds	Mosquito Samples	Sentinel Chickens	Squirrels
State Totals	276	58	1446	832	640	32
Alameda	1	-	41	9	-	2
Alpine	-	-	-	-	-	-
Amador	-	-	2	-	-	-
Butte	31	-	40	1	49	1
Calaveras	-	-	2	2	-	-
Colusa	4	-	9	-	1	-
Contra Costa	8	1	93	18	25	18
Del Norte	-	-	-	-	-	-
El Dorado	2	-	19	2	-	-
Fresno	11	5	75	40	37	-
Glenn	12	-	35	1	10	-
Humboldt	-	-	2	-	-	-
Imperial	1	-	-	14	57	-
Inyo	-	-	8	3	-	-
Kern	49	4	24	230	92	-
Kings	1	-	13	34	25	-
Lake	2	2	8	12	6	-
Lassen	-	7	3	3	-	-
Los Angeles	13	-	98	78	38	1
Madera	-	-	3	4	9	-
Marin	1	1	9	2	2	1
Mariposa	-	-	1	-	-	-
Mendocino	-	2	7	-	-	-
Merced	4	3	41	8	15	-
Modoc	2	2	2	-	-	-
Mono	1	-	1	-	-	-
Monterey	-	-	5	-	-	-
Napa	1	-	8	-	-	-
Nevada	1	-	4	-	-	-
Orange	6	-	49	14	-	-
Placer	8	1	13	23	11	-
Plumas	-	-	-	-	-	-
Riverside	4	-	3	31	27	-
Sacramento	15	1	89	34	13	-
San Benito	-	-	1	-	-	-
San Bernardino	3	-	33	25	26	3
San Diego	1	3	26	-	-	-
San Francisco	-	-	3	-	-	-
San Joaquin	8	2	47	40	19	-
San Luis Obispo	1	5	14	-	-	-
San Mateo	-	-	7	-	-	2
Santa Barbara	-	2	19	1	-	-
Santa Clara	5	1	224	9	1	2
Santa Cruz	-	-	7	-	-	-
Shasta	4	4	89	7	4	2
Sierra	-	-	-	-	-	-
Siskiyou	-	-	1	-	-	-
Solano	6	-	21	1	22	-
Sonoma	-	1	23	1	1	-
Stanislaus	11	3	77	51	45	-
Sutter	12	1	2	55	36	-
Tehama	6	2	12	-	3	-
Trinity	-	-	1	-	-	-
Tulare	6	3	14	8	30	-
Tuolumne	-	-	1	-	-	-
Ventura	3	-	62	2	1	-
Yolo	27	-	54	64	26	-
Yuba	5	2	1	6	9	-
State Totals	276	58	1446	832	640	32

West Nile Virus Facts

1. West Nile virus (WNV) is a mosquito-borne disease that is common in Africa, west Asia, and the Middle East.

2. West Nile virus was first detected in the United States in New York in 1999. Since then, WNV has spread to 46 states, Canada, and Mexico.

3. In 2003, three locally acquired human WNV cases were detected in residents of Los Angeles, Imperial, and Riverside counties, and WNV activity was detected in dead birds, mosquitoes, sentinel chickens, and a horse in six Southern California counties. West Nile virus has also been detected in 2004 in Southern California.

4. Last year there were almost 10,000 human cases of WNV detected, including 262 deaths in the United States.

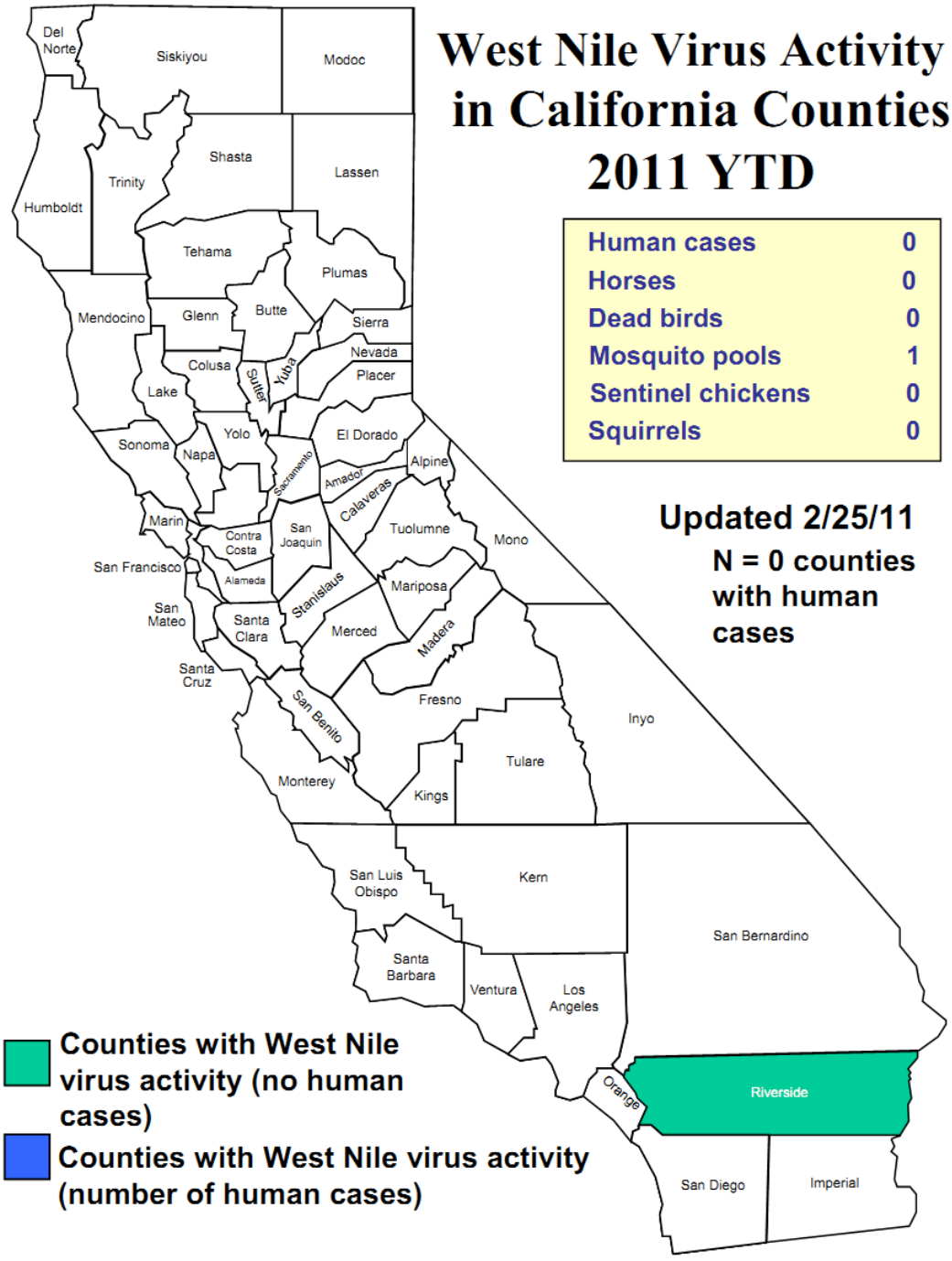
5. People usually get WNV from the bite of an infected mosquito. There is also evidence that WNV can be acquired via a blood transfusion or organ transplant from an infected donor.

6. Most people who are bitten by a mosquito with WNV will not get sick. People who do become ill may experience mild to moderate flu-like symptoms like fever, headache, and body ache. It is estimated that less than 1% of the people who are infected with WNV become severely ill and require hospitalization. The elderly and immuno-compromised are particularly susceptible to illness caused by WNV.

7. Currently there is no specific treatment for WNV infection. Since it is a virus it does not respond to antibiotics. In severe cases hospitalization and supportive care is important.

8. California has a long history of conducting surveillance for mosquito-borne viruses and has taken active steps to ensure early detection of WNV. Due to ongoing collaboration between over 70 local mosquito and vector control agencies and state public agencies, California is well prepared to detect, monitor, and respond to WNV. These agencies use a variety of scientific techniques and products to control mosquitoes in their earliest stages, and play a key role in reducing the risk of WNV. Also, California has launched a statewide public education effort about personal protection measures and reporting dead birds.

9. The public is encouraged to assist in the efforts to detect and monitor WNV by calling the WNV hotline if they find a crow, raven, magpie, jay, sparrow, finch, or hawk that has been dead for about a day. Birds play an important role in maintaining and spreading this virus. Mosquitoes acquire the virus from infected birds, and then transmit the virus to people. Evidence of the virus in dead birds is often the first indication that WNV has been introduced into a new region.


West Nile Virus Activity in California Counties 2011 YTD
Human cases 0
Horses 0
Dead birds 0
Mosquito pools 1
Sentinel chickens 0
Squirrels 0
Updated 2/25/11
N = 0 counties with human cases
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Nevada
Colusa
Sutter
Yuba
Placer
Lake
Yolo
El Dorado
Sonoma
Napa
Sacramento
Amador
Alpine
Calaveras
Marin
Contra Costa
San Joaquin
Tuolumne
Mono
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
Fresno
Inyo
San Benito
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial
Counties with West Nile virus activity (no human cases)
Counties with West Nile virus activity (number of human cases)

Surveillance for Human Cases

Because the primary public health objective of surveillance systems for neurotropic arboviruses is prevention of human infections and disease, human case surveillance alone should not be used for the detection of arbovirus activity, except in jurisdictions where arbovirus activity is rare, or resources to support avian-based and/or mosquito-based arbovirus surveillance are unavailable.

GOALS OF SURVEILLANCE FOR HUMAN CASES: To (1) assess the local, state and national public health impact of WNV disease and monitor national trends; (2) demonstrate the need for public health intervention programs; (3) allocate resources; (4) identify risk factors for infection and determine high-risk populations; (5) identify geographic areas in need of targeted interventions; and (6) identify geographic areas in which it may be appropriate to conduct analytic studies of important public health issues.

Recent Experience

1. In the U.S. during 1999–2002, the peak human risk for WN viral infection occurred in August and September, although in 2002 human illness onset was reported as early as mid-May and as late as mid-December. In many regions, the peak minimum infection rates in mosquitoes and a rapid increase in the number of reported avian and equine WN viral infections occurred just prior to the period of maximal human risk.

2. In 1999–2002, the majority of reported, confirmed, or probable cases of human WN viral disease were among persons with meningo-encephalitis. Testing of patients with aseptic meningitis or unexplained febrile illnesses for evidence of WN viral infection may be beneficial, but can also overwhelm laboratory testing capacity and appears to be of relatively low yield for surveillance purposes, since the majority of these cases will not be due to WNV infection.

3. Most patients with WN encephalitis or meningitis (WNME) are older adults, generally over 50 years old. In the U.S. in 1999–2001, the median age among the 142 reported WNME cases was 68 years. In 2002, among 2,942 reported cases of WN meningo-encephalitis, the median age was 59 years. Although 21% of reported cases were in persons younger than 40, only 4% of reported cases were in persons younger than 18.

4. When WN viral infections were first identified in the United States, WN encephalitis was associated with a Guillain-Barrè-like syndrome with generalized muscle weakness. In 1999–2000, generalized muscle weakness was reported in 29% of WN encephalitis cases. In 2002, at least two new neurologic syndromes associated with WN viral infection were identified: acute flaccid paralysis (“WN poliomyelitis-like syndrome”) and brachial plexopathy.

5. Using CDC-recommended test methods in public health laboratories, WNV-specific IgM antibody was detected in acute-phase (i.e., those collected eight or less days after illness onset) serum or CSF specimens, or both, in the large majority of confirmed cases. In contrast, only a small number of suspected cases were subsequently confirmed in which specific IgM antibody reactivity in acute-phase serum or CSF was in the equivocal or low-positive range.

6. Longitudinal studies of WNME cases have shown that WNV-specific IgM antibody can persist in serum for 12 months or longer. Thus, the presence of WNV-specific IgM antibody in a single serum sample is not necessarily diagnostic of *acute* WN viral infection. For this reason, especially in areas where WNV is known to have circulated previously, suspected, acute WN viral disease cases should be confirmed by observing a fourfold or more change in titer of WNV-specific antibody in serum and the presence of WNV-specific IgM antibody in CSF, when available.

7. In 1999 in the United States, the sensitivity of polymerase chain reaction (PCR) tests of CSF for the diagnosis of human WN encephalitis cases was only 57%; more recent statistics are currently unavailable. Thus, PCR for the diagnosis of WN viral infections of the human central nervous system (CNS) continues to be experimental and should not replace tests for the detection of WNV-specific antibody in CSF and serum, tests that are far more sensitive.

8. During 1999–2001, 7 cases of uncomplicated WN fever (WNF) were reported in the United States, which represents 5% of the total number of WNV disease cases reported. In 2002, over 1,100 WNF cases were reported (30% of total). Contributing factors likely include the intensive media attention paid to the 2002 epidemic that may have led to increased consumer demand for WNV diagnostic testing by patients and physicians, and the greater availability of commercial testing. Nevertheless, during 1999–2002, WNF was probably significantly under-diagnosed in the United States. It has been estimated that approximately 20 WNF cases occur for every WNME case.

9. For suspected WNV disease cases in immuno-compromised patients, WNV-specific antibody may not be present. Since longer viremias may be observed in these patients, testing serum and CSF samples for the presence of virus or viral RNA may be useful.

Vector Control

A surveillance program adequate to monitor WNV activity levels associated with human risk must be in place. Detection of epizootic transmission of enzootic arboviruses typically precedes detection of human cases by several days to two weeks or longer (e.g., as found in SLE epidemics). If adequate surveillance is in place, the lead time between detecting significant levels of epizootic transmission and occurrence of human cases can be increased, which will allow for more effective intervention practices. Early-season detection of enzootic or epizootic WNV activity appears to be correlated with increased risk of human cases later in the season. Control activity should be intensified in response to evidence of virus transmission, as deemed necessary by the local health departments.

Such programs should consist of public education emphasizing personal protection and residential source reduction; municipal larval control to prevent repopulation of the area with competent vectors; adult mosquito control to decrease the density of infected, adult mosquitoes in the area; and continued surveillance to monitor virus activity and efficacy of control measures.

As evidence of sustained or intensified virus transmission in an area increases, emergency response should be implemented. This is particularly important in areas where vector surveillance indicates that infection rates in *Culex* mosquitoes are increasing, or that potential accessory vectors (e.g., mammalophilic species) are infected with WNV. Delaying adulticide applications in such areas until human cases occur is illogical and negates the value and purpose of the surveillance system.

Adult Mosquito Control Recommendations

Ground-based (truck-mounted) application of adult mosquito control agents has several positive attributes. Where road access is adequate, such as in urban and suburban residential areas, good coverage may be achieved. In addition, ground-based application can be done throughout the night, thereby targeting night-active mosquito species. Such applications are prone to skips and patchy coverage in areas where road coverage is not adequate or in which the habitat contains significant barriers to spray dispersal and penetration.

Aerial application is capable of covering larger areas in shorter time periods than a ground-based application. This is a critical positive attribute when large residential areas must be treated quickly.

In addition, aerial application is less prone to patchy coverage than ground-based application in areas where road coverage is not adequate. One limitation of aerial application is that many applicators will not fly at night, potentially reducing the effectiveness of the applications in *Culex* species control efforts. Cost benefits of aerial application over ground application may not be realized unless relatively large areas are treated.

Several formulations of a variety of active ingredients are available for adulticide applications. Material choice for ground-based or aerially applied mosquito control in public health emergency situations is limited by EPA restrictions on the pesticide label and applicable state and local regulations.

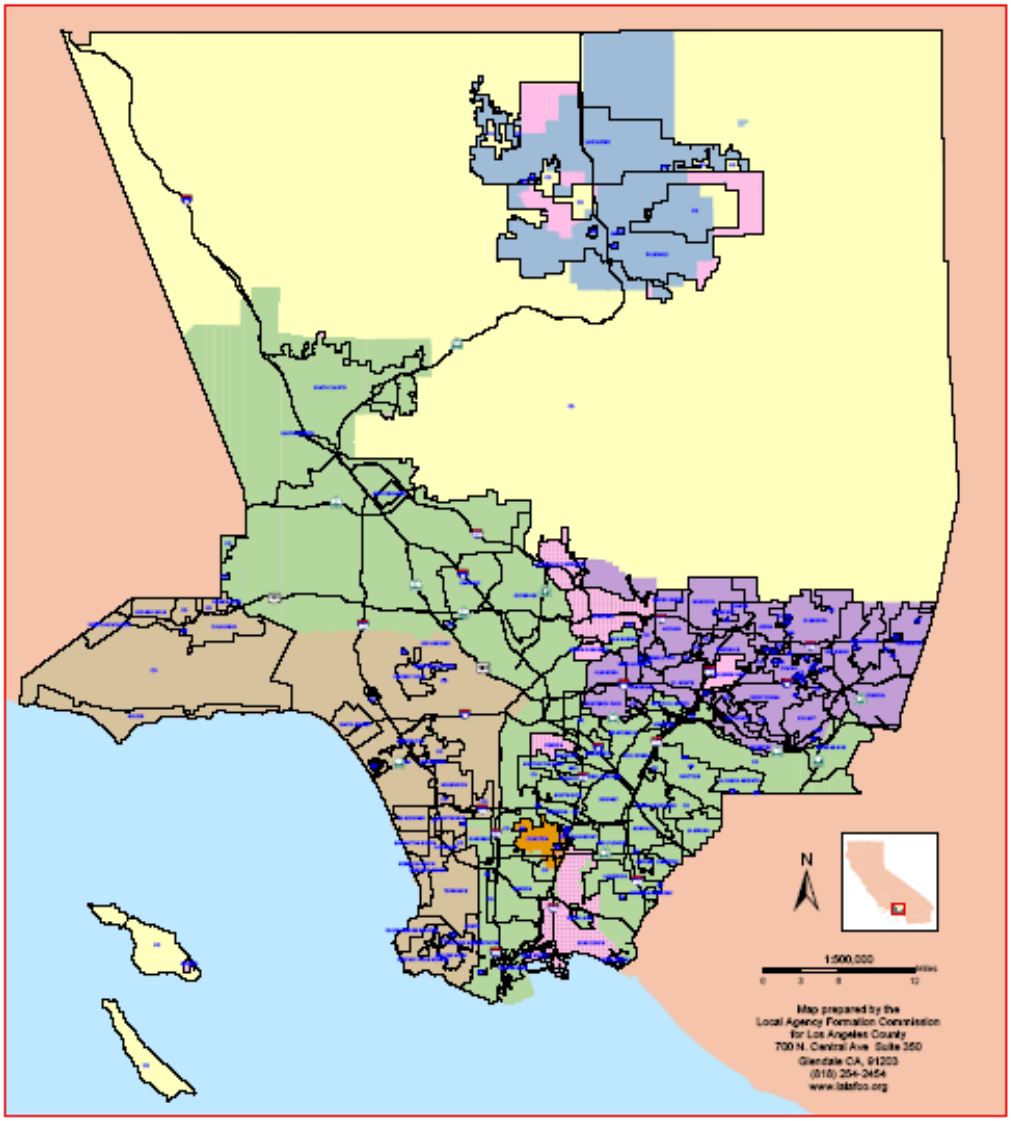
Multiple applications will likely be required to appreciably reduce *Culex* populations and interrupt arbovirus transmission. An emergency SLE virus response plan developed for New Orleans, Louisiana indicates the need for repeated applications to control Cx.quinquefasciatus, and the need to repeatedly apply adulticides in high-risk areas (areas with human cases or positive surveillance events). Two to three adulticide applications spaced 3-4 days apart may be required to significantly reduce *Cx*. pipiens populations. Effective surveillance must be maintained to determine if and when retreatment is required to maintain suppression of the vector populations.

Urban/suburban population centers with multiple positive surveillance events as described above should be treated first to most efficiently protect the largest number of people from exposure to WNV. Applications should be timed to coincide with the peak activity periods of the target species. For example, applications should be made at night to maximize control of night-active *Culex* species. Other species such as Oc. sollicitans or Ae. vexans are active shortly after sunset and are effectively controlled with appropriately timed applications. Day-active potential accessory vectors (e.g., Oc. japonicus, Oc. triseriatus).

Ae. albopictus) must be addressed separately and are most effectively controlled by residential source reduction efforts, though there is preliminary evidence that early morning ULV applications may be used to control these species.

Centers for Disease Control and Prevention, “Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control”; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Infectious Diseases, Division of Vector-Borne Infectious Diseases, Fort Collins, Colorado, 3rd Revision, 2003

Mosquito and / or Vector Control Districts
Incorporated and Unincorporated Areas of Los Angeles County



Antelope Valley
Mosquito and Vector Control District
P.O. Box 1192
Lancaster, CA 93584
(661) 942-2917
www.avmosquito.org

Compton Creek
Mosquito Abatement District
1224 S. Santa Fe Ave.
Compton, CA 90221
(310) 639-7375

Greater Los Angeles County
Vector Control District
12545 Florence Ave.
Santa Fe Springs, CA 90670
(562) 944-9656
www.glacvcd.org

San Gabriel Valley
Mosquito & Vector Control District
1145 N. Azusa Canyon Rd.
West Covina, CA 91790
(626) 814-9466
www.sgvmosquito.org

Los Angeles County West
Vector Control District
6750 Centinela Ave.
Culver City, CA 90230
(310) 915-7370
www.lawestvector.org

Non-District Mosquito
and / or Vector Control

City of Long Beach
Health and Human Services
2525 Grand Ave. Rm. 230
Long Beach, CA 90815
(562) 570-4132
www.longbeach.gov

City of Pasadena
Public Health Department
1845 N Fair Oaks Ave
Pasadena, CA 91103
(626) 744-6005
www.ci.pasadena.ca.us/publichealth/

City of LaCañada-Flintridge City Hall
1327 Foothill Blvd.
La Cañada Flintridge, CA 91011
(818) 790-8880
www.lacanadaflintridge/city/index.htm

City of Vernon
4305 South Santa Fe Ave
Vernon, CA 90058
(326) 826-1420
www.cityofvernon.org/index1.htm

Los Angeles County
Public Health
Department of Health Services

Acute Communicable
Disease Control Program
313 N. Figueroa St.
Los Angeles, CA 90012
(213) 240-7941
www.lapublichealth.org/acd/index.htm

Environmental Health
Vector Management
5050 Commerce Dr.
Baldwin Park, CA 91706
(626) 430-5200
www.lapublichealth.org/eh/index.htm

Veterinary Public Health
3834 S. Western Ave., Suite 238
Los Angeles, CA 90062
(323) 730-3723
www.lapublichealth.org/vet/index.htm

State of California Department
of Health Services

Communicable Disease Control
Toll Free Telephone: 877-968-2473
E-mail: arbovirus@dhs.ca.gov
www.westnile.ca.gov

Cities not covered by
Mosquito and/or Vector
Control Districts

Unincorporated County
areas not covered by
Mosquito and/or Vector
Control Districts

This map was made possible by the Epidemiology and Laboratory Capacity (ELC) and Emerging Infections Program (EIP) Cooperative Agreement funds (Grant No. U50/CCU912001-07/3) from the Centers for Disease Control and Prevention (CDC) and dedicated professionals for the independent, city, county and state public services in Los Angeles County.

030104

Severe Acute Respiratory Syndrome (SARS)

Los Angeles County includes major port cities, and as such diseases anywhere in the world constitute a potential threat. Severe acute respiratory syndrome (SARS), a recently recognized, contagious febrile lower respiratory infection caused by a novel corona virus called SARS-CoV, is an example of a potential threat to a port city.

The worldwide outbreak of SARS that occurred between November 2002 and July 2003 most likely originated in China and then spread through travel. During this outbreak 22 potential SARS cases were investigated in Los Angeles. Seven were considered probable SARS but none of these cases had a specimen that was positive for SARS-CoV infection. The investigation and monitoring required for 22 potential cases was considerable.

It is possible that SARS may re-emerge; therefore, it is important that Los Angeles County be prepared to immediately identify cases and contain the disease.

The California Health and Safety Code (H&S), the California Code of Regulations (CCR) and the Los Angeles County Code (LACC) grant the Los Angeles County Health Officer authority to collect records and data with respect to communicable disease, initiate disease control measures, control property, and manage persons (including isolation and quarantine).

SARS Case Count

During November 2002–July 2003, a total of 8,098 probable SARS cases were reported to the World Health Organization (WHO) from 29 countries. In the United States, only 8 cases had laboratory evidence of infection with SARS-CoV. Since July 2003, when SARS-CoV transmission was declared contained, active global surveillance for SARS-CoV disease has detected no person-to-person transmission of SARS-CoV. CDC has therefore archived the case report summaries for the 2003 outbreak.

During the 2003 epidemic, CDC and the Council of State and Territorial Epidemiologists (CSTE) developed surveillance criteria to identify persons with SARS in the United States. The surveillance case definition changed throughout the epidemic, to reflect increased understanding of SARS-CoV disease.

In California, there were a total of 29 cases, 22 of which were suspect, 5 were probably SARS and 2 were confirmed.

SARS Surveillance

The key to controlling a SARS outbreak is prompt detection of cases and their contacts, followed by rapid implementation of control measures. Identification of SARS cases is the basic step in prevention efforts, whereas contact tracing provides a means to focus case-finding and containment efforts on persons who are at greatest risk of SARS-CoV disease. Two features of SARS-CoV disease pose challenges for case surveillance. First, the early signs and symptoms are not specific enough to reliably distinguish SARS-CoV disease from other common respiratory illnesses. Second, existing laboratory diagnostic tests are not adequately sensitive early in the course of illness.

Therefore, risk of exposure (i.e., to another case of SARS-CoV disease or to a setting where SARS-CoV transmission is occurring) is key to considering the likelihood of a diagnosis of SARS-CoV disease.

Potential sources of SARS-CoV for future exposures include persistent infection in previously ill persons or reintroduction to humans from an animal reservoir. In the absence of SARS-CoV transmission worldwide, the most likely sites of recurrence are the original site of introduction of SARS-CoV from animals to humans and locations where person-to-person SARS-CoV transmission previously occurred.

Laboratories that contain live SARS-CoV could be a source of further transmission if compromised laboratory techniques result in laboratory-acquired infections. Because persons with SARS-CoV disease tended to appear in clusters (e.g., in healthcare facilities, households, and a few special settings) during the 2003 outbreaks, early signals of the reappearance of the illness in U.S. communities could include unusual clusters of unexplained pneumonia.

In the presence of person-to-person SARS-CoV transmission anywhere in the world, patients with SARS-CoV disease or sites of SARS-CoV transmission become the most likely sources of exposure. Contact tracing, the identification of persons who had contact with a potential case of SARS-CoV disease or may have been exposed while present in locations (e.g., hospitals) with known SARS-CoV transmission, is essential for the implementation of appropriate measures to reduce further spread of the disease.

The overall goals of SARS surveillance are to:

- Maximize early detection of cases and clusters of respiratory infections that might signal the re-emergence of SARS-CoV disease while minimizing unnecessary laboratory testing, concerns about SARS-CoV, implementation of control measures, and social disruption.

- If person-to-person SARS-CoV transmission recurs, maintain prompt and complete identification and reporting of potential cases to facilitate outbreak control and management.

- Identify and monitor contacts of cases of SARS-CoV disease to enable early detection of illness in persons at greatest risk.

Lessons Learned

The following lessons from the global experience with SARS surveillance have been considered in developing this document:

- Astute healthcare providers will likely be the key to early detection and reporting of initial cases of SARS-CoV disease.

- The key to recognizing persons with SARS-CoV disease is identification of an epidemiologic link of exposure to another case of SARS-CoV disease or to a setting (e.g., hospital) where SARS-CoV transmission is occurring.

- Screening criteria for epidemiologic linkages need to reflect (1) the status of SARS-CoV transmission globally and the risk of exposure from international and domestic travel, and (2) the status of SARS activity in the community, at the work site, or in other settings where a patient with SARS-like illness may have been.

- In a setting of extensive SARS-CoV transmission, the possibility of SARS-CoV disease should be considered in all persons with a fever or lower respiratory illness, even if an epidemiologic link cannot be readily established.

- Healthcare facilities were disproportionately affected by SARS-CoV, and healthcare workers were among the first and most severely affected groups in every large outbreak reported.

- Contact tracing is resource intensive yet critical to containment efforts since it allows early recognition of illness in persons at greatest risk.

- Collection of appropriate and timely clinical specimens for laboratory testing is central to monitoring the status of SARS-CoV transmission at the local, state, and federal levels.

- Timely reporting of cases, updates on the clinical status and disposition of patients, real-time analysis of data, and timely dissemination of information are essential for outbreak-management decisions.

- Paper-based reporting systems are too slow and labor intensive to manage a large SARS outbreak. A rapid and efficient electronic reporting system that facilitates real-time analysis of clinical, epidemiologic, and laboratory information at the local level is essential.

- Frequent communication and data sharing among public health officials and healthcare providers are needed to update the status of potential and confirmed cases of SARS-CoV disease.

Mad Cow Disease (Creutzfeldt-Jakob disease [vCJD])

Background

New variant CJD (vCJD) is a rare, degenerative, fatal brain disorder in humans. Although experience with this new disease is limited, evidence to date indicates that there has never been a case of vCJD transmitted through direct contact of one person with another. However, a case of probable transmission of vCJD through transfusion of blood components from an asymptomatic donor who subsequently developed the disease has been reported.

As of December 1, 2003, a total of 153 cases of vCJD had been reported in the world: 143 from the United Kingdom, six from France, and one each from Canada, Ireland, Italy, and the United States (note: the Canadian, Irish, and U.S. cases were reported in persons who resided in the United Kingdom during a key exposure period of the U.K. population to the BSE agent).

Almost all the 153 vCJD patients had multiple-year exposures in the United Kingdom between 1980 and 1996 during the occurrence of a large UK outbreak of bovine spongiform encephalopathy (BSE, commonly known as mad cow disease) among cattle.

There has never been a case of vCJD that did not have a history of exposure within a country where this cattle disease, BSE, was occurring.

It is believed that the persons who have developed vCJD became infected through their consumption of cattle products contaminated with the agent of BSE. There is no known treatment of vCJD and it is invariably fatal.

Since 1996, evidence has been increasing for a causal relationship between ongoing outbreaks in Europe of a disease in cattle, called bovine spongiform encephalopathy (BSE, or "mad cow disease"), and a disease in humans, called variant Creutzfeldt-Jakob disease (vCJD). Both disorders are invariably fatal brain diseases with unusually long incubation periods measured in years, and are caused by an unconventional transmissible agent.

On December 23, 2003, the U.S. Department of Agriculture (USDA) announced a presumptive diagnosis of bovine spongiform encephalopathy (BSE, or "mad cow" disease) in an adult Holstein cow from Washington State. The diagnosis was confirmed by an international reference laboratory in Weybridge, England, on December 25. Preliminary trace-back based on an ear-tag identification number suggests that the BSE-infected cow was imported into the United States from Canada in August 2001.

Description

Although there is very strong evidence that the agent responsible for the human disease is the same agent responsible for the BSE outbreaks in cattle, the specific foods that might be associated with the transmission of this agent from cattle to humans are unknown. However, bioassays have identified the presence of the BSE agent in the brain, spinal cord, retina, dorsal root ganglia (nervous tissue located near the backbone), distal ileum, and the bone marrow of cattle experimentally infected with this agent by the oral route.

In addition to cattle, sheep are susceptible to experimental infection with the BSE agent by the oral route. Thus, in countries where flocks of sheep and goats may have been exposed to the BSE agent through contaminated feed, a theoretical risk exists that these animals might have developed infections caused by the BSE agent and that these infections are being maintained in the flocks, even in the absence of continued exposure to contaminated feed (for example, through maternal transmission). Regardless, as of July 2002, cattle remain the only known food animal species with disease caused by the BSE agent.

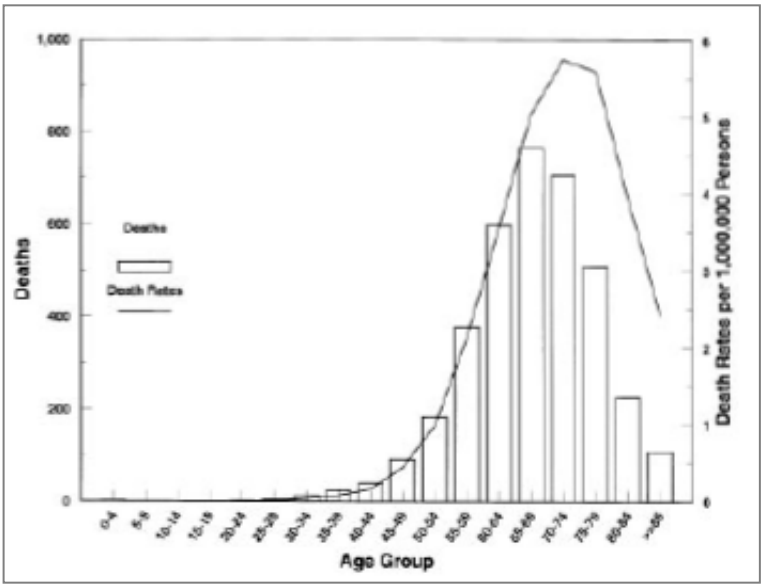
U.S. Surveillance for CJD

The Centers for Disease Control and Prevention (CDC) monitors the trends and current incidence of CJD in the United States by analyzing death certificate information from U.S. multiple cause-of-death data, compiled by the National Center for Health Statistics, CDC.

By 3- or 4-year periods from 1987 through 2001, the average annual death rates of CJD (not vCJD) have remained relatively constant, ranging from 0.95 cases per 1 million in 1999-2001 to 1.14 cases per 1 million in 1995–1998. In addition, deaths from non-iatrogenic CJD in persons aged <30 years in the United States remain extremely rare (<5 cases per 1 billion per year). In contrast, in the United Kingdom, over half of the patients who died with vCJD were in this young age group.

In addition, CDC collects, reviews and, when indicated, actively investigates reports by health care personnel or institutions of possible CJD or vCJD cases. Also, in 1996–97, CDC established, in collaboration with the American Association of Neuro-pathologists, the National Prion Disease Pathology Surveillance Center at Case Western Reserve University, which performs special diagnostic tests for prion diseases, including post-mortem tests for vCJD.

Creutzfeldt-Jakob disease deaths and death rates by age group. United States, 1979 through 1994.



California Creutzfeldt-Jakob Disease (CJD) Surveillance Project

The California Creutzfeldt-Jakob Disease Surveillance Project is funded by the federal Centers for Disease Control and Prevention (CDC) through the California Emerging Infections Program (EIP) to improve the public health capacity to detect cases of CJD. In 1996, the first cases of variant CJD occurring in unusually young persons and resulting from ingestion of bovine spongiform encephalopathy (BSE)-contaminated beef were identified in the United Kingdom. Since then, the CDC and the EIP have conducted enhanced surveillance and death certificate reviews. National surveillance has indicated that the incidence of CJD in the United States is about 1 case per million population per year (JAMA, Vol. 284, No. 18, November 8, 2000).

Recently, one confirmed case of variant CJD was identified in a Florida resident and another in a Canadian resident, both of whom resided in the United Kingdom during the height of the BSE epidemic. In addition, the identification of chronic wasting disease (CWD), a form of transmissible spongiform encephalopathy affecting deer and elk in the mid-western United States, has led to heightened awareness and surveillance efforts for any associated potential human public health risks.

CDC Dispatch, Vol. 2, No. 4—October-December 1996 Emerging Infectious Diseases

Influenza (Flu)

Epidemics of influenza typically occur during the winter months and have been responsible for an average of approximately 36,000 deaths per year in the United States during 1990–1999. Influenza viruses also can cause pandemics, during which rates of illness and death from influenza-related complications can increase dramatically worldwide. Influenza viruses cause disease among all age groups. Rates of infection are highest among children, but rates of serious illness and death are highest among persons aged $\geq$ 65 years and persons of any age who have medical conditions that place them at increased risk for complications from influenza.

Influenza vaccination is the primary method for preventing influenza and its severe complications. In this report from the Advisory Committee on Immunization Practices (ACIP), the primary target groups recommended for annual vaccination are (1) groups that are at increased risk for influenza-related complications (e.g., persons aged $\geq$ 65 years and persons of any age with certain chronic medical conditions); (2) the group aged 50–64 years because this group has an elevated prevalence of certain chronic medical conditions; and (3) persons who live with or care for persons at high risk (e.g., health-care workers and household contacts who have frequent contact with persons at high risk and who can transmit influenza to persons at high risk). Vaccination is associated with reductions in influenza-related respiratory illness and physician visits among all age groups, hospitalization and death among persons at high risk, otitis media among children, and work absenteeism among adults. Although influenza vaccination levels increased substantially during the 1990s, further improvements in vaccine coverage levels are needed, chiefly among persons aged <65 years who are at increased risk for influenza-related complications among all racial and ethnic groups and among blacks and Hispanics aged $\geq$ 65 years. ACIP recommends using strategies to improve vaccination levels, including using reminder/recall systems and standing orders programs. Although influenza vaccination remains the cornerstone for the control and treatment of influenza, information is also presented regarding antiviral medications, because these agents are an adjunct to vaccine.

Biology of Influenza

Influenza A and B are the two types of influenza viruses that cause epidemic human disease. Influenza A viruses are further categorized into subtypes on the basis of two surface antigens: hemagglutinin (H) and neuraminidase (N). Influenza B viruses are not categorized into subtypes. Since 1977, influenza A (H1N1) viruses, influenza A (H3N2) viruses, and influenza B viruses have been in global circulation.

In 2001, influenza A (H1N2) viruses that probably emerged after genetic re-assortment between human A (H3N2) and A (H1N1) viruses began circulating widely. Both influenza A and B viruses are further separated into groups on the basis of antigenic characteristics.

New influenza virus variants result from frequent antigenic change (i.e., antigenic drift) resulting from point mutations that occur during viral replication. Influenza B viruses undergo antigenic drift less rapidly than influenza A viruses.

A person's immunity to the surface antigens, including hemagglutinin, reduces the likelihood of infection and severity of disease if infection occurs. Antibody against one influenza virus type or subtype confers limited or no protection against another. Furthermore, antibody to one antigenic variant of influenza virus might not protect against a new antigenic variant of the same type or subtype. Frequent development of antigenic variants through antigenic drift is the virologic basis for seasonal epidemics and the reason for the usual incorporation of $\geq$ 1 new strains in each year's influenza vaccine.

Influenza Epidemic

The influenza (flu) epidemics that happen nearly every year are important events. Influenza is a respiratory illness that makes hundreds of thousands of people sick each year. The illness can cause severe health problems for the elderly and younger people with diseases, such as diabetes, heart or lung disease, and illness that can weaken the immune system. Typical primary influenza illness lasts about a week and is characterized by abrupt onset of fever, muscle aches, sore throat, and nonproductive cough. In some persons, severe malaise and cough can persist for several days or weeks.

Influenza infection not only causes primary illness but also can lead to severe secondary medical complications, including influenza viral pneumonia, secondary bacterial pneumonia, worsening of underlying medical conditions, such as congestive heart failure, asthma, or diabetes, or other complications such as ear infections (i.e., otitis media) in children.

Elderly persons (i.e., those 65 years and over) and persons with certain underlying medical conditions, such as chronic heart or lung disease, are at increased risk for developing complications from influenza infection. These complications increase the risk for hospitalization or death.

One of the most important features about influenza viruses is that their structure changes slightly but frequently over time (a process known as “drift”), and that this process results in the appearance of different strains that circulate each year. The composition of the flu vaccine is changed each year to help protect people from the strains of influenza virus that are expected to be the most common ones circulating during the coming flu season.

The ability of the vaccine to protect against influenza during a particular season depends on several factors, but particularly (1) the match between influenza strains in the vaccine and strains circulating in the community, and (2) the ability of each person's immune system to mount a protective response as a result of the vaccination. Although the vaccine may not prevent everyone who takes it from getting sick, it does reduce the risk of severe illness, hospitalization, and death. That's why it is so important for anyone who wants to reduce his or her risk of getting severely ill from influenza to receive the vaccine each year.

Influenza Pandemic

By contrast to the more gradual process of drift, in some years, the influenza virus changes dramatically and unexpectedly through a process known as “shift.” Shift results in the appearance of a new influenza virus to which few (if any) people are immune. If this new virus spreads easily from person to person, it could quickly travel around the world and cause increased levels of serious illness and death, affecting millions of people. **This is called an influenza pandemic.**

Fortunately, pandemics don't occur very often. There has not been an influenza pandemic since 1968. In 1997, however, a flu virus, that had previously infected only birds, caused an outbreak of illness in humans. This virus, known as the "avian flu," resulted in 18 illnesses and six deaths in Hong Kong but did not easily spread from person to person. Still, it provided a frightening reminder that the next pandemic could occur at any time. Governments around the world took notice. The U.S. government worked with state and local governments, and private-sector partners, to develop strategies and programs that would prepare our country for a pandemic.

Influenza Pandemic Start

There are three main types of influenza viruses: A, B, and C. Influenza C causes only mild disease and has not been associated with widespread outbreaks. Influenza types A and B, however, cause epidemics nearly every year. Influenza A viruses are divided into subtypes, based on differences in two surface proteins: hemagglutinin (H) and neuraminidase (N). Influenza B viruses are not divided into subtypes. During an influenza flu season, usually one or more influenza A subtype and B viruses circulate at the same time.

A pandemic is possible when an influenza A virus makes a dramatic change (i.e., "shift") and acquires a new H or H+N. This shift results in a new or "novel" virus to which the general population has no immunity. The appearance of a novel virus is the first step toward a pandemic. However, the novel influenza A virus also must spread easily from person to person (and cause serious disease) for a pandemic to occur. Influenza B viruses do not undergo shift and do not cause influenza pandemics.

The reservoir for Type A influenza viruses is wild birds, but influenza A viruses also infect animals such as pigs and horses, as well as people. The last two pandemic viruses were combinations of bird and human influenza viruses. Many persons believe that these new viruses emerged when an intermediate host, such as a pig, was infected by both human and bird influenza A viruses at the same time. A new virus was created. Events in Hong Kong in 1997, however, showed that this is not the only way that humans can become infected with a novel virus. Sometimes, an avian influenza virus can "jump the species barrier" and move directly from chickens to humans and cause disease.

Since, by definition, a novel virus is a virus that has never previously infected humans, or hasn't infected humans for a long time, it's likely that almost no one will have immunity, or antibody to protect them against the novel virus. Therefore, anyone exposed to the virus—young or old, healthy or weak—could become infected and get sick. If the novel virus is related to a virus that circulated long ago, older people might have some level of immunity. It is possible that the novel virus may be especially dangerous to some age groups that are not usually at risk of severe illness or death from annual influenza (such as healthy young adults). Such widespread vulnerability makes a pandemic possible and allows it to have potentially devastating impact.

Influenza Pandemic Impact

There's no simple answer to the question of how serious a pandemic might be. It all depends on how virulent (severe) the virus is, how rapidly it can spread from population to population, and the effectiveness of pandemic prevention and response efforts. The 1918 Spanish flu is an example of a worst-case scenario because the strain was highly contagious and quite deadly. This pandemic killed more Americans than all the wars of the 20th century. Since our world today is vastly more populated, and people travel the globe with ease, the spread of a next pandemic could be more rapid than that of previous pandemics.

The impact of a pandemic isn't measured only by how many people will die. If millions of people get sick at the same time, major social consequences will occur. If many doctors and nurses become ill, it will be difficult to care for the sick.

If the majority of a local police force is infected, the safety of the community might be at risk. If air traffic controllers are all sick at once, air travel could grind to a halt, interrupting not only business and personal travel, but also the transport of life-saving vaccines or anti-viral drugs. Therefore, a vital part of pandemic planning is the development of strategies and tactics to address all these potential problems.

Avian Influenza (Bird Flu)

Influenza viruses that infect birds are called " avian influenza viruses." Only influenza A viruses infect birds. All known subtypes of influenza A virus can infect birds. However, there are substantial genetic differences between the subtypes that typically infect both people and birds. Within subtypes of avian influenza viruses there also are different strains (described in "Strains").

Avian influenza H5 and H7 viruses can be distinguished as "low pathogenic" and "high pathogenic" forms on the basis of genetic features of the virus and the severity of the illness they cause in poultry; influenza H9 virus has been identified only in a "low pathogenicity" form. Each of these three avian influenza viruses (H5, H7, and H9) can theoretically be partnered with any one of nine neuraminidase surface proteins; thus, there are potentially nine different forms of each subtype (e.g., H5N1, H5N2, H5N3 …H5N9).

Below is summary information about these three prominent subtypes of avian influenza virus:

Influenza A H5

- Potentially nine different subtypes
- Can be highly pathogenic or low pathogenic
- H5 infections have been documented among humans, sometimes causing severe illness and death

Influenza A H7

- Potentially nine different subtypes
- Can be highly pathogenic or low pathogenic
- H7 infection in humans is rare, but can occur among persons who have close contact with infected birds; symptoms may include conjunctivitis and/or upper respiratory symptoms

Influenza A H9

- Potentially nine different subtypes
- Documented only in low pathogenic form
- Three H9 infections in humans have been confirmed.

Spread of Avian Influenza Viruses among Birds

Avian influenza viruses circulate among birds worldwide. Certain birds, particularly water birds, act as hosts for influenza viruses by carrying the virus in their intestines and shedding it. Infected birds shed virus in saliva, nasal secretions, and feces. Susceptible birds can become infected with avian influenza virus when they have contact with contaminated nasal, respiratory, or fecal material from infected birds. Fecal-to-oral transmission is the most common mode of spread between birds.

Most often, the wild birds that are host to the virus do not get sick, but they can spread influenza to other birds. Infection with certain avian influenza A viruses (for example, some H5 and H7 strains) can cause widespread disease and death among some species of domesticated birds.

Avian Influenza Infection in Humans

Although avian influenza A viruses do not usually infect humans, several instances of human infections and outbreaks of avian influenza have been reported since 1997. Most cases of avian influenza infection in humans are thought to have resulted from contact with infected poultry or contaminated surfaces. However, there is still a lot to learn about how different subtypes and strains of avian influenza virus might affect humans. For example, it is not known how the distinction between low pathogenic and highly pathogenic strains might affect the health risk to humans. Of the documented cases of human infection with avian influenza viruses, illnesses caused by highly pathogenic viruses appear to be more severe.

Because of concerns about the potential for more widespread infection in the human population, public health authorities closely monitor outbreaks of human illness associated with avian influenza. To date, human infections with avian influenza viruses detected since 1997 have not resulted in sustained human-to-human transmission. However, because influenza viruses have the potential to change and gain the ability to spread easily between people, monitoring for human infection and person-to-person transmission is important.

To date, there have been no recorded cases of Avian Influenza in California. Documented cases in North America include British Columbia, Canada; the Eastern United States; and Texas.

Smallpox

Smallpox virus is a high-priority "Category A" agent that poses a risk to Los Angeles County, California, and national security because it can be easily disseminated and transmitted from person to person; results in high mortality rates and has the potential for major public health impact; might cause public panic and social disruption; and requires special action for public health preparedness.

The Los Angeles County Department of Health Services (LAC DHS) developed the *Smallpox Preparedness, Response and Recovery Plan* for the county to prepare for the possibility of an outbreak of smallpox in the county.

If an outbreak of smallpox were to occur, several factors could contribute to a more rapid spread of smallpox than was routinely seen before this disease was eradicated in 1977. These factors include: 1) virtually non-existent immunity to smallpox in the absence of naturally occurring disease and the discontinuation of routine vaccination in the United States in the early 1970s, (2) potentially delayed recognition of smallpox by health personnel who are unfamiliar with the disease, (3) increased mobility and crowding of the population, and (4) potential use of higher virulence "weaponized" viruses with decreased incubation periods. Because of these factors, a single case of smallpox would require an immediate and coordinated public health and medical response to contain the outbreak and prevent further infection of susceptible individuals.

Vaccination

The federal government has not yet provided definitive guidance on the extent of preparedness vaccination (smallpox vaccination of persons prior to a confirmed case of smallpox). It is anticipated that the guidance will be forthcoming in the near future. Such guidance, and release of sufficient quantities of smallpox vaccine, may be for (1) specified first responders only, (2) a larger group of health care workers, law enforcement, and emergency responders, or (3) the entire population on a voluntary basis. Guidance may be provided in a phased manner for these, or other, groups over time.

The LAC DHS is prepared to implement the guidance received from the federal government on preparedness vaccination. Since this vaccination will take place prior to a smallpox emergency and there will be no urgency to complete vaccination within a few days (as required in a smallpox emergency), existing facilities and staff are deemed sufficient to carry out preparedness vaccination of the first two groups. It may even be that federal personnel will be utilized for this preparedness vaccination of limited numbers of persons. LAC DHS has developed its own recommendations for preparedness smallpox vaccination prioritization.

Los Angeles County Smallpox Preparedness Plan

Monkeypox

The Centers for Disease Control and Prevention (CDC) and state and local health departments continue to investigate cases of monkeypox among persons who had close contact with wild or exotic mammalian pets, or persons with monkeypox. Results of serologic testing, polymerase-chain-reaction analysis, viral culture and gene sequencing performed at the CDC indicate that the causative agent is monkeypox virus, a member of the orthopoxvirus group of viruses. CDC is updating previous interim guidance concerning infection control precautions and exposure management in the health-care and community settings. The guidance will be further updated as additional information about the epidemiology of disease transmission is better understood.

Limited data on transmission of monkeypox virus are available from studies conducted in Africa. Person-to-person transmission is believed to occur primarily through direct contact and also by respiratory droplet spread. Transmission of monkeypox within hospitals has been described, albeit rarely. Extrapolating from smallpox for which airborne transmission has been clearly described, airborne transmission of monkeypox virus cannot be excluded, especially in patients presenting with cough.

To date in the United States there has been no evidence of person-to-person transmission of monkeypox. However, recovery of monkeypox virus from skin lesions and tonsillar tissue demonstrates the potential for contact and droplet transmission, and at least a theoretical risk for airborne transmission.

A recent modification of CDC.s infection control guidance is based on the accumulating experience in the United States that suggests a relatively low risk of person-to-person transmission. All health-care settings (i.e., hospitals, emergency departments, physician offices),have the capacity to care for monkeypox patients and protect health-care workers and other patients from exposure.

Centers for Disease Control and Prevention

Hoof and Mouth Disease

In the United States we usually call it "Hoof and Mouth Disease." In the U.K. they call it "Foot and Mouth Disease." But, wherever it appears, and whatever it's called, this highly contagious livestock disease means trouble. The outbreak of the disease in Great Britain quickly spread to the European continent, and British officials even considered eradicating that country's entire livestock population. The last major outbreak in the United States was in 1929.

Hoof and mouth disease is a viral infection that afflicts animals with cloven hooves such as cattle, pigs, and sheep. Onset of the disease is characterized by fever, which is followed by the development of blisters inside the mouth and on the feet. It is transmitted easily among animals through fluids such as blood, saliva, and milk. Fluid from broken blisters has especially high concentrations of the virus. The disease is not necessarily fatal, and symptoms can clear up after several weeks, but the disease generally leaves animals underweight and sometimes disabled. Because of the highly infectious nature

of the disease, and the condition in which it leaves animals even after they have recovered, farmers almost always destroy infected animals and burn their carcasses.

While not susceptible to the hoof and mouth disease, humans can carry and transmit the disease without even realizing it. This makes an already highly contagious disease even more difficult to contain. Governments can control the export and import of farm animals, and can destroy animals possibly exposed to the disease, but confining the human carriers of the virus is much more difficult.

This disease is explained further under "**Agricultural Loss**."

Hepatitis

Hepatitis is inflammation of the liver. Several different viruses cause viral hepatitis. They are named the hepatitis A, B, C, D, and E viruses.

All of these viruses cause acute, or short-term, viral hepatitis. The hepatitis B, C, and D viruses can also cause chronic hepatitis, in which the infection is prolonged, sometimes lifelong.

Other viruses may also cause hepatitis, but they have yet to be discovered and they are obviously rare causes of the disease.

Hepatitis Incidence/Epidemiology

Hepatitis A occurs sporadically and epidemically worldwide, with a tendency to cyclic recurrences.

Epidemics are uncommon in developing countries where adults are generally immune. Improved sanitation and hygiene conditions in different parts of the world leave large segments of the population susceptible to infection, and outbreaks may result whenever the virus is introduced.

Common-source epidemics, related to contaminated food or water, may evolve explosively, as did the largest mollusc-linked epidemic in Shanghai, in 1988, involving about 300,000 people.

Worldwide, HAV infections account for 1.4 million cases annually.

Table 9-7: Hepatitis Strains

Strain	Disease Spread	People at Risk	Prevention	Treatment
Hepatitis A	Primarily through food or water contaminated by feces from an infected person. Rarely, it spreads through contact with infected blood	International travelers; people living in areas where hepatitis A outbreaks are common; people who live with or have sex with an infected person; during outbreaks, day care children and employees, men who have sex with men, and injection drug users	The hepatitis A vaccine, also, avoiding tap water when traveling internationally and practicing good hygiene and sanitation	Hepatitis A usually resolves on its own over several weeks.

Strain	Disease Spread	People at Risk	Prevention	Treatment
Hepatitis B	Through contact with infected blood, through sex with an infected person, and from mother to child during childbirth	People who have sex with an infected person, men who have sex with men, injection drug users, children of immigrants from disease-epidemic areas, infants born to infected mothers, people who live with an infected person, health care workers, hemodialysis patients, people who received a transfusion of blood or blood products before July 1992 or clotting factors made before 1987, and international travelers	Hepatitis B vaccine	For chronic hepatitis B: drug treatment with alpha interferon, peginterferon, lamivudine, or adefovir dipivoxil. Acute hepatitis B usually resolves on its own. Very severe cases can be treated with lamivudine.
Hepatitis C	Primarily through contact with infected blood, less commonly, through sexual contact and childbirth	Injection drug users, people who have sex with an infected person, people who have multiple sex partners, health care workers, infants born to infected women, hemodialysis patients, and people who received a transfusion of blood or blood products before July 1992 or clotting factors made before 1987	There is no vaccine for hepatitis C; the only way to prevent the disease is to reduce the risk of exposure to the virus. This means avoiding behaviors like sharing drug needles or sharing personal items like toothbrushes, razors, and nail clippers with an infected person	Chronic hepatitis C: drug treatment with perginterferon alone or combination treatment with peginterferon and the drug ribavirin. Acute hepatitis C: treatment is recommended if it does not resolve within 2 to 3 months.

Strain	Disease Spread	People at Risk	Prevention	Treatment
Hepatitis D	Through contact with infected blood. This disease occurs only in people who are already infected with hepatitis B.	Anyone infected with hepatitis B: injection drug users who have hepatitis B have the highest risk. People who have hepatitis B are also at risk if they have sex with a person infected with hepatitis D or if they live with an infected person. Also at risk are people who received a transfusion of blood or blood products before July 1992 or clotting factors made before 1987.	Immunization against hepatitis B for those not already infected; also, avoiding exposure to infected blood, contaminated needles, and an infected person's personal items.	Chronic hepatitis D: drug treatment with alpha interferon
Hepatitis E	**Through food or water contaminated by feces from an infected person. This disease in uncommon in the United States.**	**International travelers; people living in areas where hepatitis E outbreaks are common; and people who live or have sex with an infected person**	**There is no vaccine for hepatitis E; the only way to prevent the disease is to reduce the risk of exposure to the virus. This means avoiding tap water when traveling internationally and practicing good hygiene and sanitation.**	**Hepatitis E usually resolves on its own over several weeks or months.**

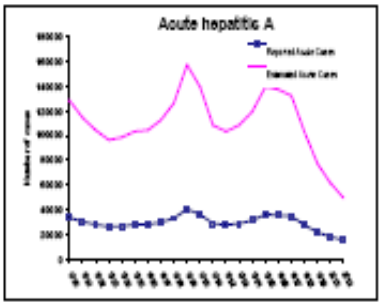
Hepatitis Facts

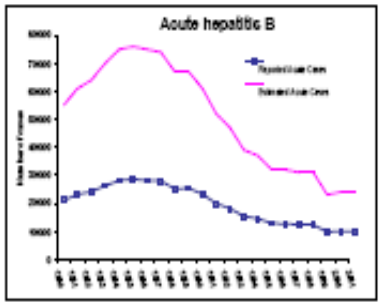
- An estimated 40,000 people were infected with the hepatitis C virus (HCV) in 1998.
- There are an estimated 3.9 million people who are or have been infected with hepatitis C, 2.7 of whom are chronically infected; approximately 70% of people infected do not know they have the virus.
- 8,000–10,000 people die of hepatitis C each year. The Centers for Disease Control and Prevention (CDC) estimate that the number of annual deaths from hepatitis C will triple in the next 10–20 years.
- Hepatitis B is responsible for 5,000 deaths annually, including 3,000–4,000 from cirrhosis and approximately 1,000–1,500 from primary liver cancer.

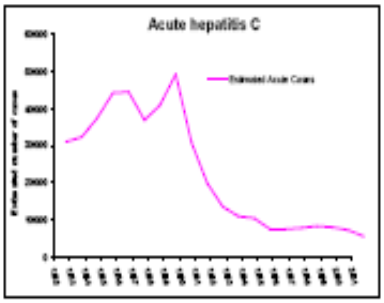
- One out of every 250 people is a carrier of hepatitis B and can pass it on to others, often unknowingly.
- There were approximately 80,000 estimated new infections of hepatitis B in the United States in 1999.
- Up to 90% of pregnant women who are carriers of the hepatitis B virus could transmit the virus to their children. Vaccinations of the newborns would prevent them from becoming carriers.
- Due to the screening of pregnant women for HBV and vaccinations of newborns with the hepatitis B vaccine, there has been a decline in that number of infected newborns.
- Hepatitis B is 100 times more infectious than HIV, the virus that causes AIDS. There are 500 million hepatitis B viral particles in one teaspoon of blood compared to 5–10 HIV particles.
- The estimated medical and work loss cost per year of hepatitis B is $700 million; the estimated medical and work loss cost per year of hepatitis C is $600 million.
- One out of every 20 people will be infected with hepatitis B in his/her lifetime.
- Approximately 5,000 liver transplants were performed in 2000. Because of the shortage of organs, it is estimated that nearly 1,700 prospective recipients died in 2001 while waiting for a liver for transplantation. There are currently over 18,000 people waiting for a liver transplant.
- Non-Hispanic African Americans have the highest infection rate for hepatitis C; Asian and Pacific Islanders have the highest rate for hepatitis B infection.

Disease Burden from Viral Hepatitis A, B, and C in the United States

	Hepatitis A		Hepatitis B		Hepatitis C	
	2001	2000	2001	2000	2001	2000
Number of Acute Clinical Cases Reported[a]	10,810	13,397	7,844	8,938	No data	No data
Estimated Number of Acute Clinical Cases[b]	46,000	57,000	22,000	32,000	4,000	5,700
Estimated Number of New Infections[b]	93,000	143,000	78,000	81,000	25,000	35,000
Number of Persons with Chronic Infection[c]	No chronic infection		1.25 million		3.7 million	
Estimated Annual Number of Chronic Liver Disease Deaths[†]	No chronic infection		5,000		8,000-10,000	
Percent ever infected[‡]	31.5%		4.5%		1.8%	







HEPATITIS A

Year	Reported Acute Cases	Estimated Acute Cases	Estimated Total New Infections
1980	26267	124,000	234,000
1981	25802	110,000	225,000
1982	23404	100,000	220,000
1983	21534	92,000	221,000
1984	22038	94,000	232,000
1985	23211	99,000	226,000
1986	23429	100,000	239,000
1987	26280	103,000	255,000
1988	28508	122,000	305,000
1989	35822	153,000	380,000
1990	31522	135,000	373,000
1991	24219	104,000	288,000
1992	23112	99,000	274,000
1993	24238	104,000	284,000
1994	26798	115,000	333,000
1995	31582	135,000	356,000
1996	31032	133,000	335,000
1997	30021	128,000	341,000
1998	23229	99,000	243,000
1999	17047	73,000	181,000
2000	13397	57,000	143,000
2001	10810	46,000	93,000

HEPATITIS B

Year	Reported Acute Cases	Estimated Acute Cases	Estimated Total New Infections
1980	18014	53,000	208,000
1981	21151	59,000	229,000
1982	22178	62,000	239,000
1983	24319	68,000	267,000
1984	26116	73,000	281,000
1985	26812	74,000	287,000
1986	26108	73,000	283,000
1987	25915	72,000	287,000
1988	23175	65,000	253,000
1989	23421	65,000	255,000
1990	21277	59,000	232,000
1991	17911	50,000	193,000
1992	16128	45,000	175,000
1993	13381	37,000	144,000
1994	12517	35,000	133,000
1995	10805	30,000	113,000
1996	10837	30,000	112,000
1997	10416	29,000	110,000
1998	10258	29,000	109,000
1999	7894	21,000	79,000
2000	8038	22,000	81,000
2001	7844	22,000	78,000

HEPATITIS C

Year	Estimated Acute Cases	Estimated Total New Infections
1982	29,500	180,000
1983	30,000	186,000
1984	35,000	219,000
1985	42,700	261,000
1986	43,000	262,000
1987	35,400	216,000
1988	39,400	240,000
1989	47,000	291,000
1990	29,400	179,000
1991	18,400	112,000
1992	12,000	73,000
1993	9,400	57,000
1994	8,900	54,000
1995	5,900	36,000
1996	5,900	36,000
1997	6,300	38,000
1998	6,800	41,000
1999	6,400	39,000
2000	5,700	35,000
2001	4,000	25,000

Notes on sources and methodology:

a. Number of Acute Clinical Cases Reported: For hepatitis A and hepatitis B, the number of cases reported to the National Notifiable Disease Surveillance System (NNDSS). Cases of hepatitis C are also reported to NNDSS (3,856 cases in 2001) but are unreliable for monitoring trends in hepatitis C because these reports include cases based only on a positive laboratory test for anti-HCV, most of which represent chronic HCV infection. (CDC. Summary of Notifiable Diseases, United States, 2000, MMWR 2002;49(53)

b. Estimated Number of Clinical Cases and New Infections: The ratio of reported acute cases to the total number of newly acquired infections occurring was estimated by catalytic modeling of seroprevalence data (from the National Health and Nutrition Examination Survey (NHANES III)). Incidence estimates adjusted for underreporting and asymptomatic infections were then calculated by multiplying the number of cases reported (for hepatitis A and hepatitis B, NNDSS data are used; for hepatitis C, Sentinel Counties Study of Viral Hepatitis data are used) by these ratios. HAV: Armstrong GL et al, Pediatrics 2002, 109(5):839-845; HCV: Armstrong GL et al. Hepatology 2000, 31:777-782.

c. Number of Persons with Chronic Infection: HBV: Margolis HS, Coleman PJ, Brown RE, et al. Prevention of hepatitis B virus transmission by immunization: An economic analysis of current recommendations. JAMA 1995; 274(15): 1201 - 1208. HCV: Alter MJ et al. Prevalence of hepatitis C virus infection in the United States, 1988 through 1994. NEJM 1999; 341:556-562.

†. Estimated Annual Number of Chronic Liver Disease Deaths: Estimated number of chronic liver disease deaths are for the year 1990. HBV: Centers for Disease Control and Prevention. Protection against Viral Hepatitis. MMWR 1990; 39(RR-2). HCV: Centers for Disease Control and Prevention. Recommendations for the prevention and control of hepatitis C virus infection and HCV-related chronic disease. MMWR 1998; 47(RR-19):1-39.

‡. Percent ever infected: Prevalence estimates for HAV, HBV and HCV come from the Third National Health and Nutrition Examination Survey. HAV: CDC. Prevention of Hepatitis A through active or passive immunization. MMWR 1999; 48: RR-12. HBV: McQuillan GM, et al. Prevalence of hepatitis B virus infection in the United States: The National Health and Nutrition and Examination Surveys, 1976 through 1994. AJPH 1999; 89(1)14-18. HCV: Alter MJ et al. Prevalence of hepatitis C virus infection in the United States, 1988 through 1994. NEJM 1999; 341:556-562.

Other Diseases

Plague

Plague is transmitted to humans by fleas or by direct exposure to infected tissues or respiratory droplets; the disease is characterized by fever, chills, headache, malaise, prostration, and leukocytosis that manifests in one or more of the following principal clinical forms:

Regional lymphadenitis (bubonic plague)

Septicemia without an evident bubo (septicemic plague)

Plague pneumonia, resulting from hematogenous spread in bubonic or septicemic cases (secondary pneumonic plague) or inhalation of infectious droplets (primary pneumonic plague)

Pharyngitis and cervical lymphadenitis resulting from exposure to larger infectious droplets or ingestion of infected tissues (pharyngeal plague)

Brucellosis

Brucellosis is an infectious disease caused by the bacteria of the genus *Brucella*. These bacteria are primarily passed among animals, and they cause disease in many different vertebrates. Various *Brucella* species affect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. Humans become infected by coming in contact with animals or animal products that are contaminated with these bacteria. In humans brucellosis can cause a range of symptoms that are similar to the flu and may include fever, sweats, headaches, back pains, and physical weakness. Sever infections of the central nervous systems or lining of the heart may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fevers, joint pain, and fatigue.

Brucellosis is not very common in the United States, where100 to 200 cases occur each year. But brucellosis can be very common in countries where animal disease control programs have not reduced the amount of disease among animals.

Botulism (Food-borne)

Ingestion of botulinum toxin results in an illness of variable severity. Common symptoms are diplopia, blurred vision, and bulbar weakness. Symmetric paralysis may progress rapidly.

Botulism (Wound)

This is an illness resulting from toxin produced by *Clostridium botulinum* that has infected a wound. Common symptoms are diplopia, blurred vision, and bulbar weakness. Symmetric paralysis may progress rapidly.

Water/Wastewater Emergency

Water

With a growing population and economy, increasing environmental concerns and vibrant agriculture industry at play, how we choose to collect, store, distribute, use and dispose of water has never been more critical.

Every drop of water not used by a household, farm, or business can be used to create higher river flows to benefit fisheries and floodways. Likewise, recycled water stored in new reservoirs can be used to recharge over-drafted groundwater aquifers. In short, new and innovative ideas are on the table that will help California rework its waterworks so that it is not necessary to choose between the environment, the economy, and people's livelihoods and lifestyles.

From the northern reaches to the San Joaquin Delta, which provides two-thirds of the state's residents with their drinking water, California is under the gun to reconstruct and rehabilitate its water and wastewater systems. The challenge is being met on many fronts. On these pages you will find a summary of the water and wastewater challenges California faces today, along with the lowdown on solutions in the works.

Problems

- Our groundwater basins are over-drafted and our existing surface storage cannot meet future water demands, particularly in times of drought.
- The gap between water supply and demand in California is predicted to total 2.4 million acre feet during drought years and up to 6.2 million acre feet in drought years by 2020. (An acre foot is enough to meet the annual needs of between one and two households.) Six million feet is roughly triple the amount of water the Bay Area uses in a year. At the same time, growers, manufactures and businesses are demanding more reliable and better quality water.
- It can take 20 years or longer to develop and finance a supplemental water supply for new developments.
- About 894 gallons of water are needed to grow the food for the daily diet of an average person. On an annual basis, an individual's water use is about 326,310 gallons.
- Some of our cities rely on water mains and sewers that are more than 100 years old.
- In 2001 California officials issued more than 2,000 beach closings and health advisories because of sewer spills and overflows. Spills and overflows typically happen because wastewater systems have not been upgraded to facilitate new growth, and sewer pipes have not been replaced in time to avert a main break.
- When it rains, at times as little as one-quarter inch, the volume of combined runoff and wastewater becomes too great for sewage treatment plants to handle, and the flow is diverted to outfall points that discharge raw sewage, toxic industrial waste, and floatables such as garbage and syringes.
- California needs an estimated $8.4 billion for local wastewater treatment improvements.

Solutions – Water

Through a state/federal partnership known as CALFED, for example, some $10 billion in expanded storage, increased recycling and conservation, ecological restoration of key watersheds, and improved water distribution and conveyance has been identified that over the next few decades help meet some of these challenges. Cities are expanding wastewater treatment systems, improving water distribution infrastructure, and developing local recycling programs as well, some using funds from the CALFED program.

To offset water shortages, the state's water recycling program needs more investment. In 1998, the last year it revised its state water plan, the California Department of Water Resources issued a 10-year capital improvement forecast calling for more than $1.6 billion in spending to ensure delivery of clean water. In addition, a state/federal partnership known as CALFED is overseeing a vast reworking of the state's water storage and distribution system. The CALFED program as it is known foresees $10 billion in environmental and ecological restoration projects, new storage facilities, recycling programs, and water transfer arrangements to help strike a balance the state's competing water needs.

Solutions – Wastewater

State and federal water quality regulations require cities and other municipalities to upgrade wastewater treatment and distribution systems to prevent overflows during wet weather no later than 2014. Pipe replacement projects, construction of new retention ponds, increased recycling and conservation programs, and expanded treatment facilities are all part of the mix of solutions.

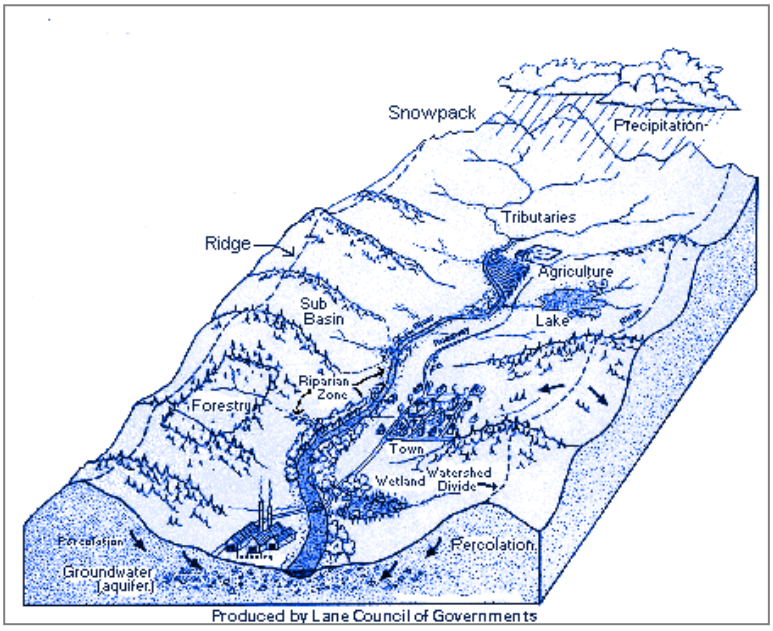
California Dept. of Water Resources, Water Education Foundation, Natural Resources Defense Council

Watersheds

A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. John Wesley Powell, scientist geographer, put it best when he said that a watershed is:

"that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."

Watersheds come in all shapes and sizes. They cross county, state, and national boundaries. No matter where you are, you're in a watershed!



There are six watersheds serving Los Angeles County: Antelope-Fremont Valleys, Santa Clara, Los Angeles River, San Gabriel River, Santa Monica Bay, Sun Valley, Ballona Creek, Dominguez River, and San Pedro/Channel Islands (see map on next page). The map below shows the area of South Coast watersheds.

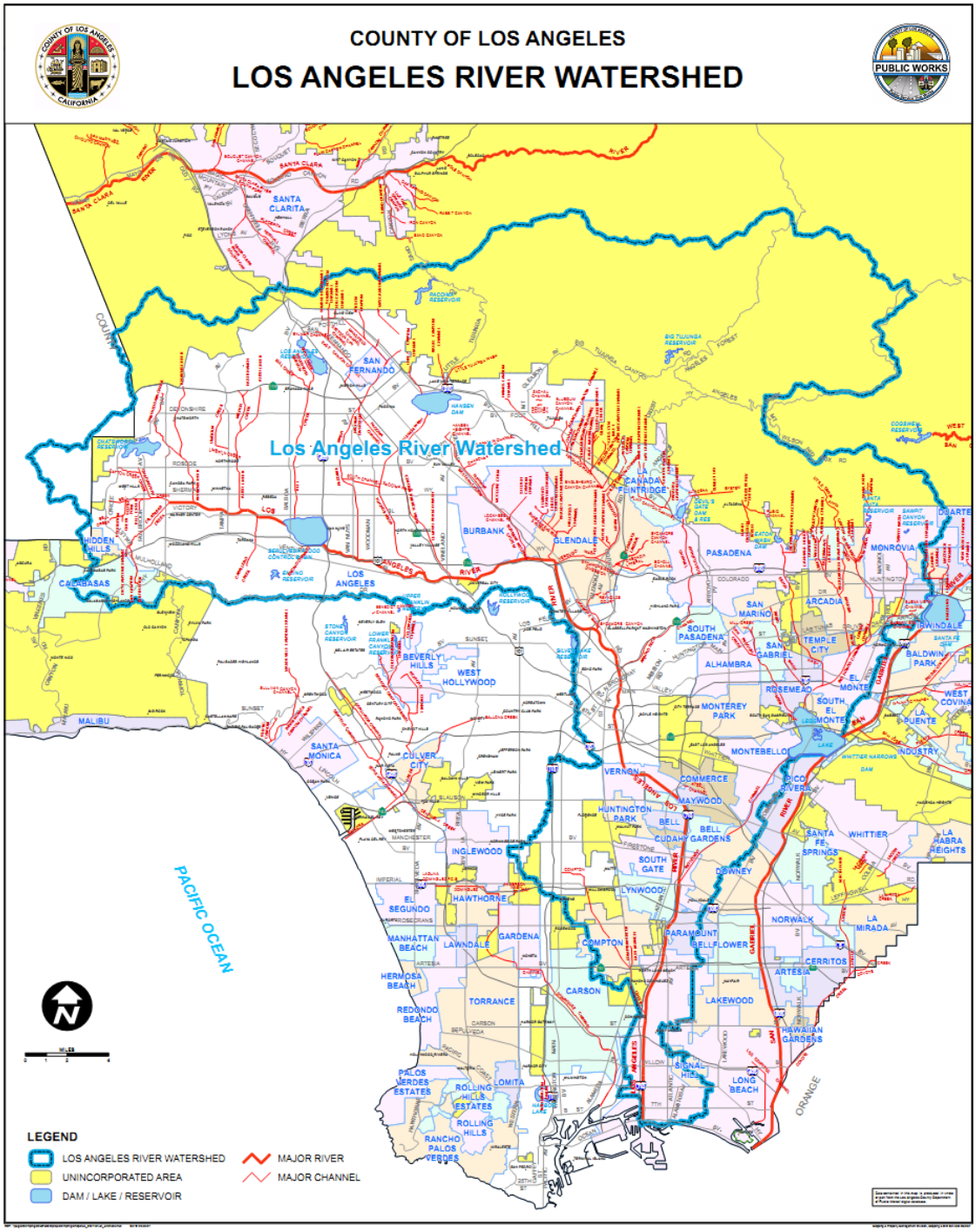


The Los Angeles River Watershed

The Los Angeles River watershed covers a land area of 834 square miles. The eastern portion spans from the Santa Monica Mountains to the Simi Hills, and in the west from the Santa Susana Mountains to the San Gabriel Mountains. The watershed encompasses and is shaped by the path of the Los Angeles River, which flows from its headwaters in the mountains eastward to the northern corner of Griffith Park. Here the channel turns southward through the Glendale Narrows before it flows across the coastal plain and into San Pedro Bay near Long Beach. The Los Angeles River has evolved from an uncontrolled, meandering river providing a valuable source of water for early inhabitants to a major flood protection waterway.

Table 9-8: Los Angeles Watershed Statistics
(Department of Public Works)

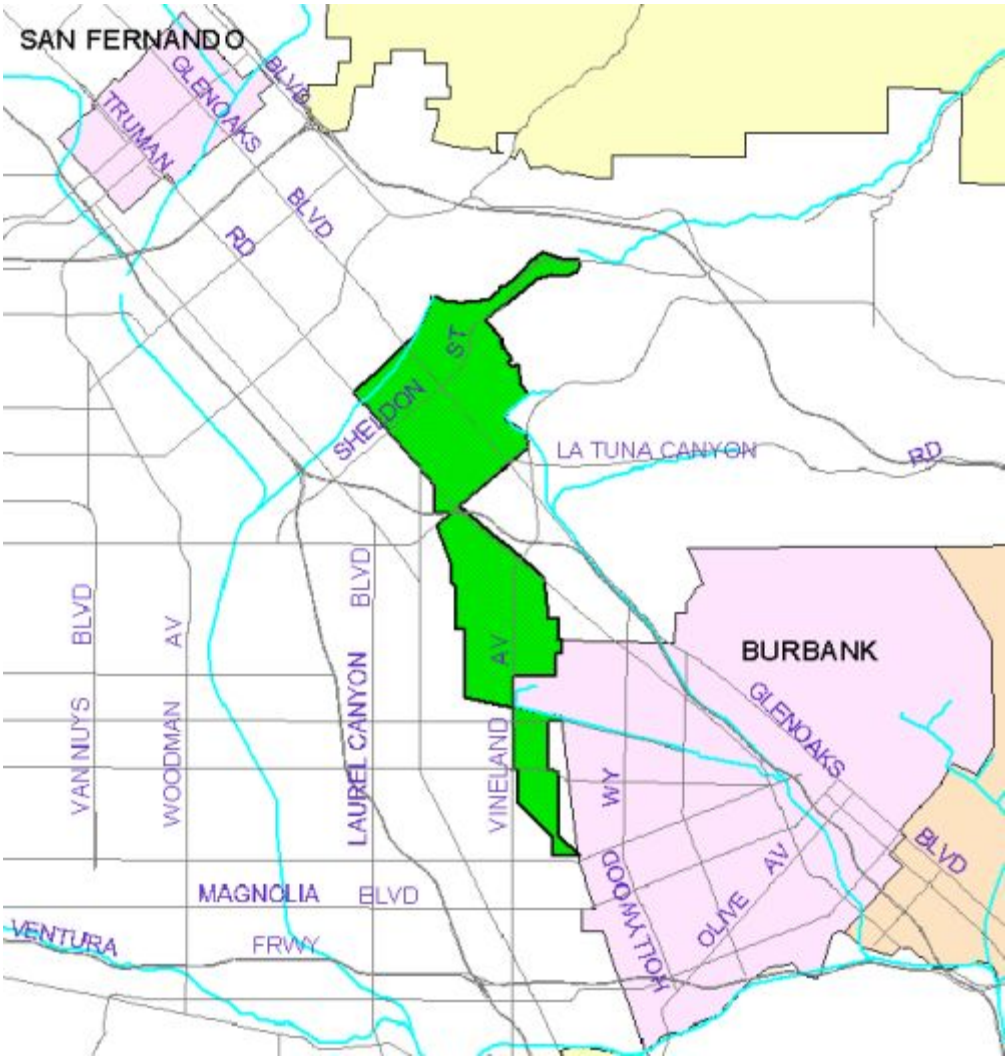
Watershed Size:	834 square miles
Supervisorial District:	1, 2, 3, 4, 5
Cities within Watershed:	44 + other unincorporated communities
Land Use:	37% residential 8% commercial 11% industrial 44% open space
Total Population:	Approximately 9 million


COUNTY OF LOS ANGELES
LOS ANGELES RIVER WATERSHED
PUBLIC WORKS
Los Angeles River Watershed
PACIFIC OCEAN
LEGEND
LOS ANGELES RIVER WATERSHED
UNINCORPORATED AREA
DAM / LAKE / RESERVOIR
MAJOR RIVER
MAJOR CHANNEL

Sun Valley Watershed

Sun Valley Watershed is an urban sub-watershed tributary to the Los Angeles River. It is bordered by Tujunga Wash on the west, the Burbank Airport on the east, Hansen Dam on the north, and Burbank Boulevard on the south. It is approximately 2,800 acres (or 4.4 square miles) in size, located approximately 14 miles northwest of downtown Los Angeles, and encompasses the communities of Sun Valley and portions of North Hollywood.

The watershed is highly developed with industrial, commercial, and residential developments. Active gravel mines, landfills, numerous auto-dismantling operators, and various other industrial and commercial land uses occupy more than 60% of the watershed. In the watershed are two neighborhood parks and one public library.



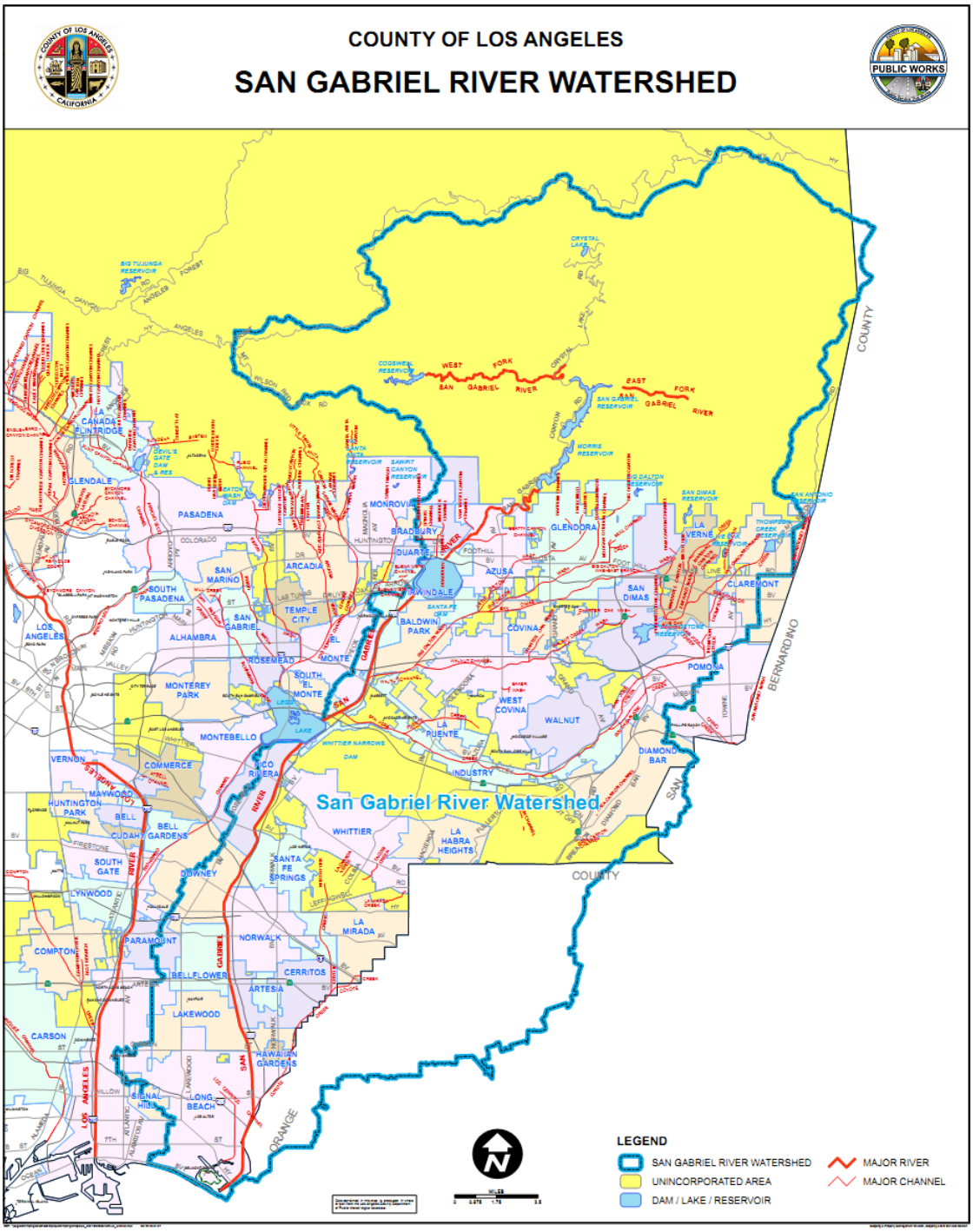
San Gabriel River Watershed

This section focuses on planning an integrated watershed system within the San Gabriel River watershed that provides flood protection, water conservation, habitat, recreation, and open space benefits for the public to enjoy. The San Gabriel River watershed is located in the eastern portion of Los Angeles County. It is bound by the San Gabriel Mountains to the north, most of San Bernardino/Orange County to the east, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south.

The watershed drains into the San Gabriel River from the San Gabriel Mountains, flowing 58 miles south until its confluence with the Pacific Ocean. Major tributaries to the San Gabriel River include Walnut Creek, San Jose Creek, Coyote Creek, and numerous storm drains entering from the 19 cities that the San Gabriel River passes through. Channel flows pass through different sections in the San Gabriel River, diverting from the riverbed into four different spreading grounds, held behind several rubber dams for controlled flow and ground water recharge, and controlled through 10 miles of concrete channel bottom from below Whittier Narrows Dam to past Coyote Creek.

Table 9-9: San Gabriel River Watershed Statistics

Watershed Size:	**640 square miles**
Supervisorial District:	1,4,5
Cities within Watershed:	35
Land Use:	26% residential 15% commercial 50% rural 9% other
Total Population:	Approximately 2 million


COUNTY OF LOS ANGELES
SAN GABRIEL RIVER WATERSHED
PUBLIC WORKS
San Gabriel River Watershed
LEGEND
SAN GABRIEL RIVER WATERSHED
UNINCORPORATED AREA
DAM / LAKE / RESERVOIR
MAJOR RIVER
MAJOR CHANNEL

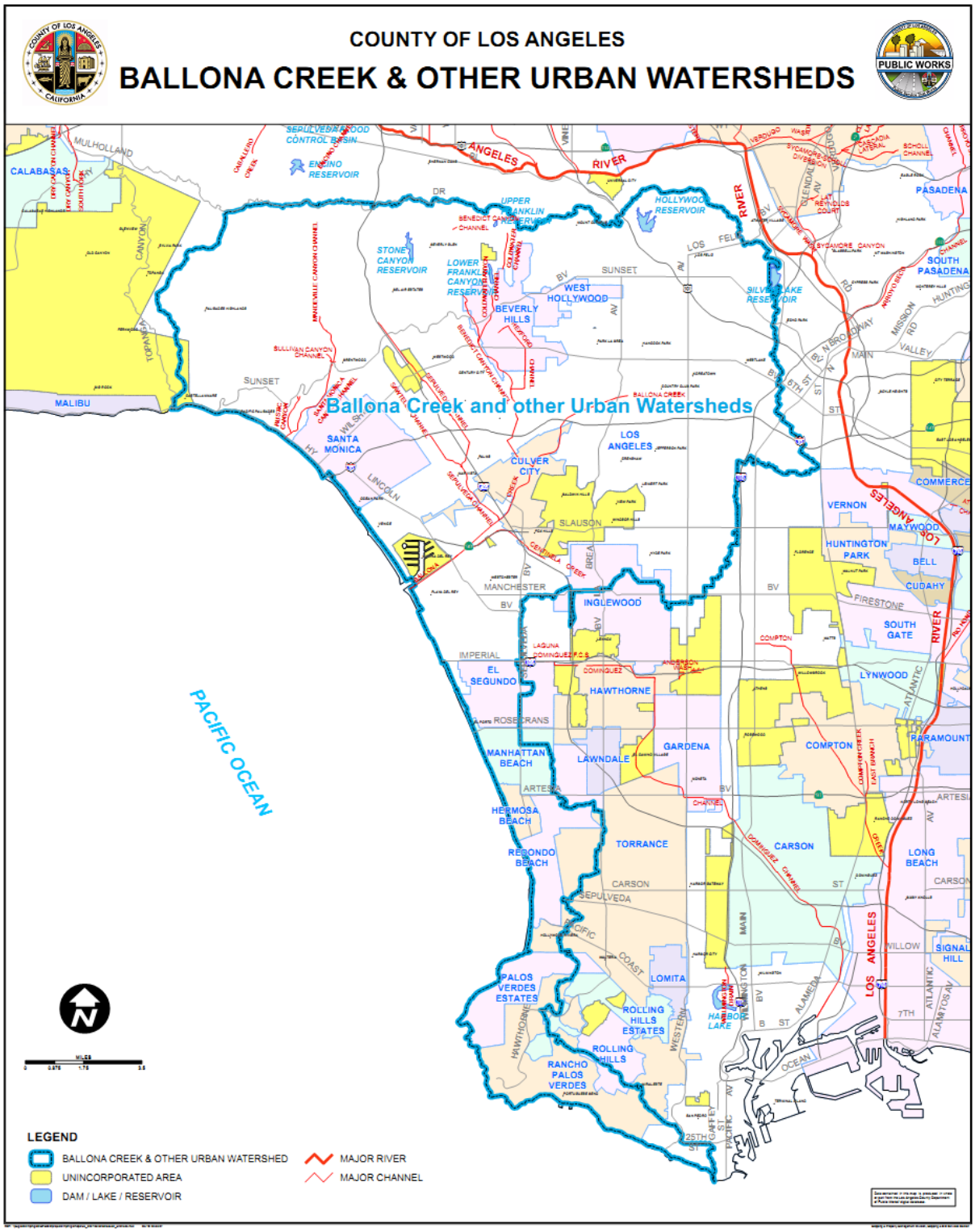
Ballona Creek Watershed

Ballona Creek is a 9-mile-long flood protection channel that drains the Los Angeles basin, from the Santa Monica Mountains on the north, the Harbor Freeway (110) on the east, and the Baldwin Hills on the south. The Ballona Creek watershed totals about 130 square miles. Its land use consists of 64% residential, 8% commercial, 4% industrial, and 17% open space.

The major tributaries to the Ballona Creek include Centinela Creek, Sepulveda Canyon Channel, Benedict Canyon Channel, and numerous storm drains. Ballona Creek is designed to discharge to Santa Monica Bay approximately 71,400 cubic feet per second from a 50-year frequency storm event. The watershed consists of all or parts of the cities of Beverly Hills, Culver City, Inglewood, Los Angeles, Santa Monica, West Hollywood, and unincorporated Los Angeles County.

Table 9-10: Ballona Creek Watershed Statistics

Watershed Size:	**130 square miles**
Supervisorial District:	2, 3, 4
Cities within Watershed:	Beverly Hills, Culver City, Inglewood, Los Angeles, Santa Monica, West Hollywood, unincorporated Los Angeles County
Land Use:	64% residential 8% commercial 4% industrial 17% open space


COUNTY OF LOS ANGELES
BALLONA CREEK & OTHER URBAN WATERSHEDS
PUBLIC WORKS
Ballona Creek and other Urban Watersheds
PACIFIC OCEAN
LEGEND
BALLONA CREEK & OTHER URBAN WATERSHED
UNINCORPORATED AREA
DAM / LAKE / RESERVOIR
MAJOR RIVER
MAJOR CHANNEL

Santa Monica Bay Watershed

The Santa Monica Bay watersheds include the North Santa Monica Bay, South Santa Monica Bay, and Marina del Rey watersheds. The North Santa Monica Bay includes the Malibu Creek watershed, the Topanga Creek watershed, and other rural Santa Monica Mountains watersheds. The South Santa Monica Bay watersheds span from the Castlerock watershed near Malibu to Palos Verdes Peninsula watersheds on the south. The Marina del Rey watershed encompasses all areas that drain to the marina. Portions of these watersheds are very rural and undeveloped, and other portions are very urbanized. These watersheds include all or parts of the cities of Westlake Village, Agoura Hills, Calabasas, Hidden Hills, Malibu, Los Angeles, Santa Monica, Culver City, El Segundo, Manhattan Beach, Hermosa Beach, Redondo Beach, Torrance, Palos Verdes Estates, Rolling Hills Estates, Rolling Hills, and unincorporated Los Angeles County. The Santa Monica Bay section is tasked primarily with enhancing the water quality in the bay—while still providing adequate flood protection.


COUNTY OF LOS ANGELES
SANTA MONICA BAY WATERSHEDS
PUBLIC WORKS
SANTA MONICA BAY WATERSHED
PACIFIC OCEAN
MALIBU
CALABASAS
HIDDEN HILLS
LOS ANGELES
BURBANK
BEVERLY HILLS
WEST HOLLYWOOD
SANTA MONICA
CULVER CITY
INGLEWOOD
HAWTHORNE
EL SEGUNDO
MANHATTAN BEACH
LAWNDALE
GARDENA
HERMOSA BEACH
REDONDO BEACH
TORRANCE
PALOS VERDES ESTATES
ROLLING HILLS ESTATES
ROLLING HILLS
RANCHO PALOS VERDES
LOMITA
AVALON
VENTURA
LEGEND
SANTA MONICA BAY WATERSHEDS
UNINCORPORATED AREA
DAM / LAKE / RESERVOIR
MAJOR RIVER
MAJOR CHANNEL

Dominguez Watershed

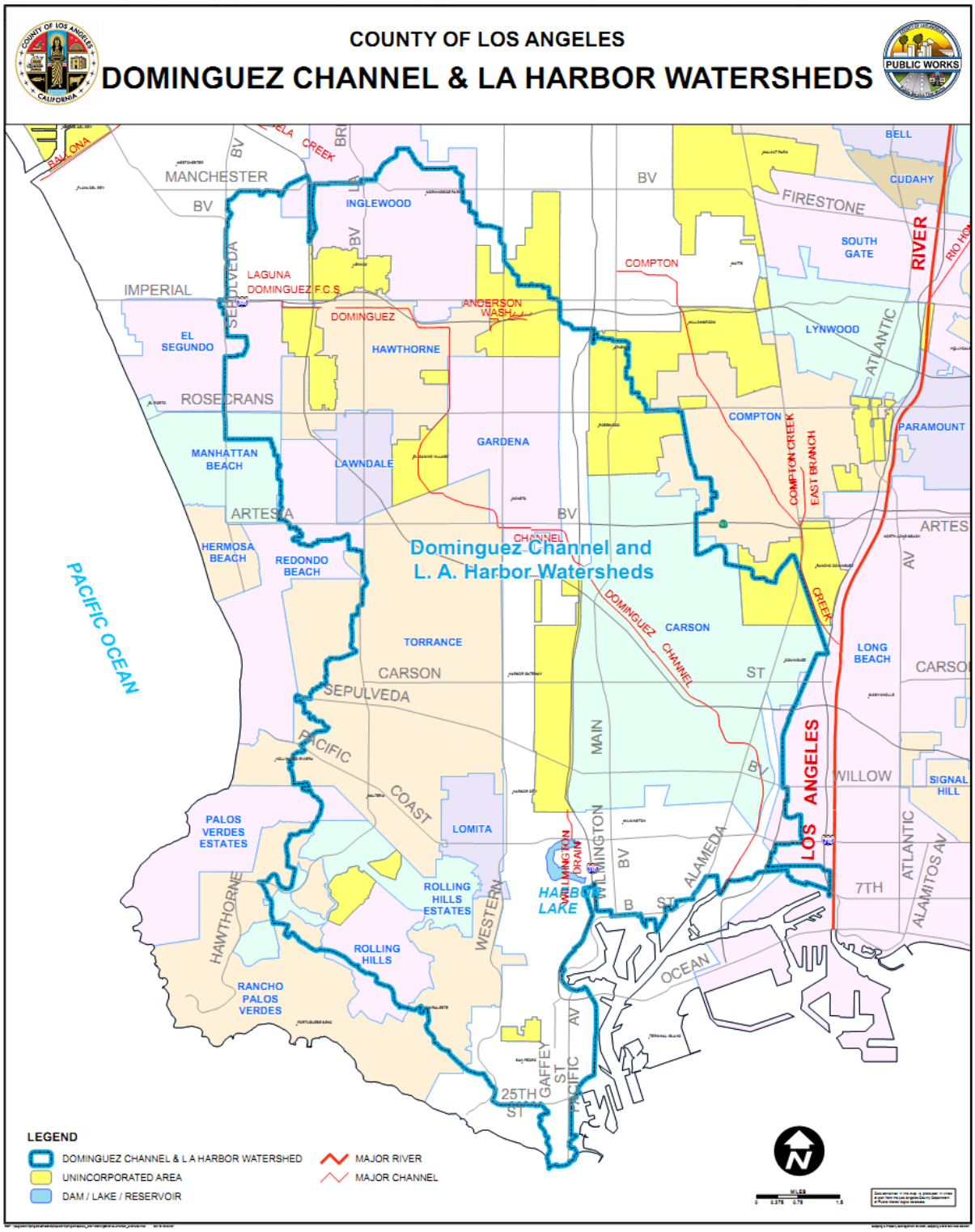
The Dominguez watershed is located within the southern portion of Los Angeles County, California, and encompasses approximately 133 square miles of land and water. Approximately 81% of the watershed or 93% of the land is developed. Residential development covers nearly 40% of the watershed, and another 41% is made up by industrial, commercial, and transportation uses. With a population of nearly 1 million, considerable demands are made on infrastructure and services within the watershed. Water supply is limited and the majority of water use is from imported sources. Parkland and open space are in short supply and generally are deficient.

Existing efforts to address the constraints of the watershed are included in the Dominguez Watershed Management Master Plan (DWMMP). The DWMMP was developed by the Dominguez Watershed Advisory Council (DWAC), which consisted of local governmental representatives, environmental groups, regulating agencies, members of business and industry, water and sewer service providers, and private citizens.

The DWMMP can be used to assist in the development of project concepts for the Dominguez watershed to protect and enhance water quality; conserve, reuse, and recharge the water supply; protect, enhance, and restore native habitats and biological resources; and promote public awareness and involvement. The DWAC continues to meet on a quarterly basis to promote and implement the principles and practices of the DWMMP.

Table 9-11: Dominguez Watershed Statistics

Watershed Size:	**133 square miles**
Supervisorial District:	2, 4
Cities within Watershed:	Carson, Compton, El Segundo, Gardena, Hawthorne, Inglewood, Lawndale, Lomita, Long Beach, Los Angeles, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Torrance, Port of Long Beach, Port of Los Angeles, Los Angeles County
Land Use:	93% of the land is developed and residential development covers nearly 40%; another 41% is made up by industrial, commercial, and transportation uses.
Total Population:	1,000,000


COUNTY OF LOS ANGELES
DOMINGUEZ CHANNEL & LA HARBOR WATERSHEDS
PUBLIC WORKS
Dominguez Channel and
L. A. Harbor Watersheds
PACIFIC OCEAN
MANCHESTER
INGLEWOOD
IMPERIAL
LAGUNA
DOMINGUEZ F.C.S.
DOMINGUEZ
ANDERSON WASH
HAWTHORNE
EL SEGUNDO
ROSECRANS
MANHATTAN BEACH
LAWNDALE
GARDENA
COMPTON
LYNWOOD
FIRESTONE
SOUTH GATE
CUDAHY
BELL
PARAMOUNT
ARTESIA
HERMOSA BEACH
REDONDO BEACH
TORRANCE
CARSON
SEPULVEDA
PACIFIC COAST
PALOS VERDES ESTATES
LOMITA
ROLLING HILLS ESTATES
ROLLING HILLS
RANCHO PALOS VERDES
HARBOR LAKE
WILMINGTON DRAIN
WILMINGTON
MAIN
ALAMEDA
WESTERN
HAWTHORNE
LONG BEACH
WILLOW
SIGNAL HILL
7TH
ATLANTIC
ALAMITOS AV
OCEAN
GAFFEY ST
25TH ST
COMPTON CREEK
EAST BRANCH
DOMINGUEZ CHANNEL
LOS ANGELES RIVER
LEGEND
DOMINGUEZ CHANNEL & L A HARBOR WATERSHED
UNINCORPORATED AREA
DAM / LAKE / RESERVOIR
MAJOR RIVER
MAJOR CHANNEL

Santa Clara River Watershed

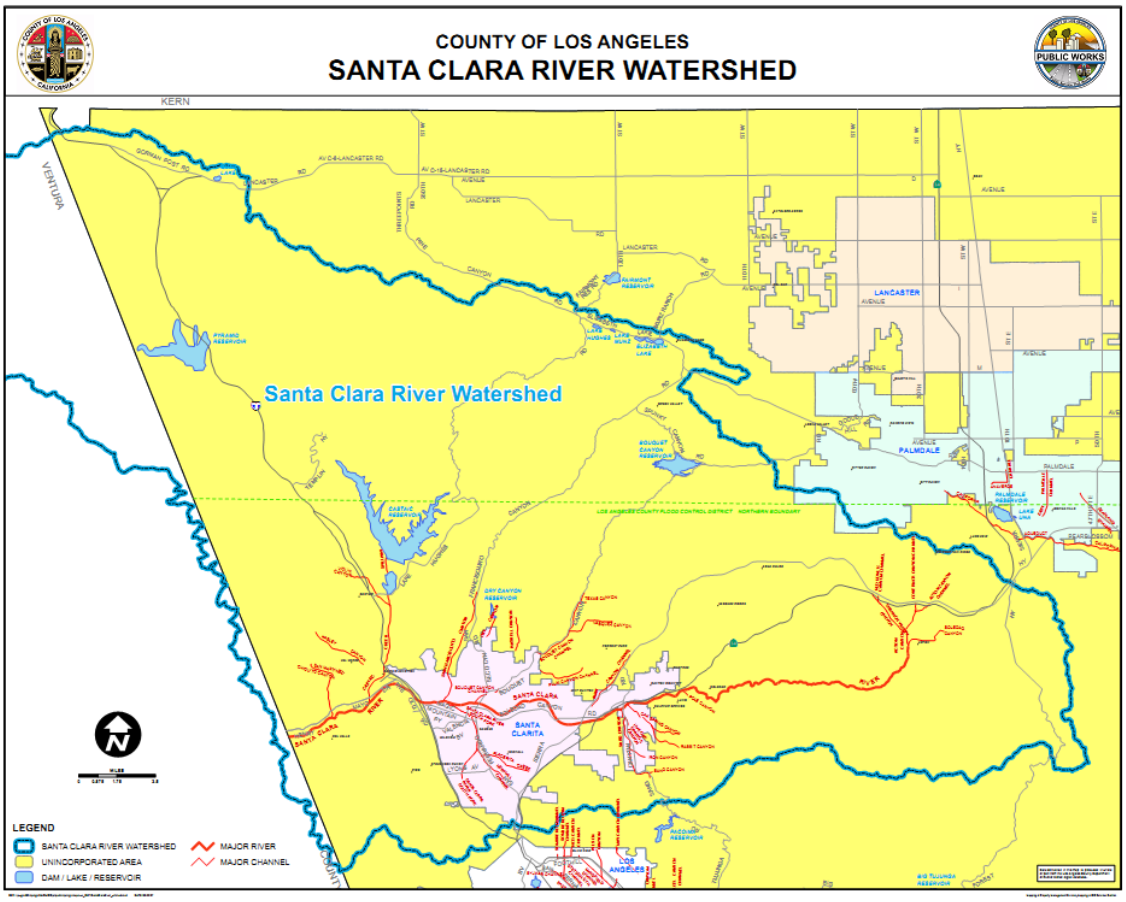
The Santa Clara River watershed encompasses approximately 1,634 square miles. The Upper Santa Clara River watershed is approximately 786 square miles within County of Los Angeles limits, with approximately 980 square miles within Ventura County. The Santa Clara River is one of the few natural river systems remaining in Southern California.

The river originates in the Angeles National Forest near the community of Acton, and flows from the headwaters westwardly for approximately 84 miles to the Pacific Ocean. Throughout its length, the river crosses through cities, farmland, and undeveloped lands within both counties. The upper portion of the watershed is home to a population of approximately 250,000, of which 170,000 reside within the City of Santa Clarita.

Table 9-12: Santa Clara River Watershed Statistics

Watershed Size:	**786 square miles**
Supervisorial District:	5
Cities within Watershed:	Santa Clarita, small portion of Palmdale
Land Use:	31.6% residential 2.6% commercial .5 % industrial 57 % open space / national forest
Total Population:	252,000

Map 9-2: Santa Clara River Watershed
(Source: http://ladpw.org/wmd/watershed/sc/docs/SantaClaraRiver_wtrshed.pdf)



Antelope Valley Watershed

The Antelope Valley watershed is geographically unique since it does not outlet to the Pacific Ocean. The watershed straddles the Los Angeles–Kern county line and encompasses approximately 1,200 square miles within Los Angeles County. Numerous streams originating in the mountains and foothills flow across the valley floor and eventually pond in the dry lakes (Edwards Air Force Base) adjacent to the Northern County line. The valley lacks defined natural and improved channels outside of the foothills and is subject to unpredictable sheet flow patterns.

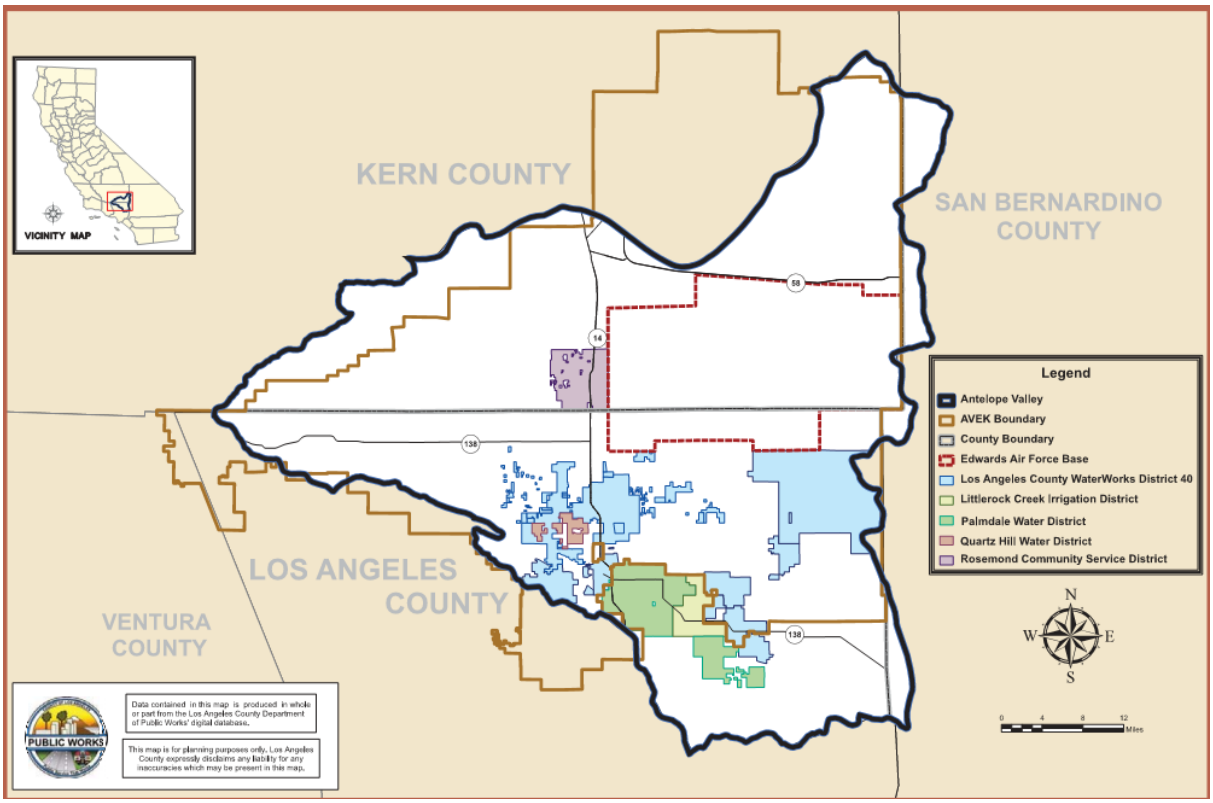
Existing constraints include the LACFCD not serving the portion of the county north of Avenue S. Existing efforts include the Antelope Valley Integrated Regional Water Management Plan, which aims to develop project concepts for areas within and outside the LACFCD boundaries, continuing to seek funding sources for the entire region, and ultimately implementing all facilities identified in the Antelope Valley Comprehensive Plan (Amendment No. 1) (Amendment No. 2) of Flood Control and Water Conservation.

Table 9-13: Antelope Valley Watershed Statistics

Watershed Size:	1,237 square miles
Supervisorial District:	5
Cities within Watershed:	Palmdale, Lancaster
Land Use:	10% developed 90% undeveloped
Total Population:	462,000 est.

Map 9-3: Antelope Valley Service Projects

(Source: http://dpw.lacounty.gov/wmd/watershed/av/docs/AntelopeValleyMap.pdf)



The Small Watershed Program in California - PL 83-566 and PL 73-534

The USDA's Small Watershed Program assists local organizations in conducting watershed surveys and investigations, and in planning and installing structural and land treatment measures for watershed protection and flood prevention. In California, the watershed planning and engineering staffs are responsible for implementation of these programs.

The watershed is the unit of landscape and framework around which to think together about the land and its role in people's lives. The lessons learned through the implementation of PL 78-534 and PL 83-566—the ability to work with private landowners and communities to plan and install conservation measures on a watershed scale—form the foundation upon which locally led conservation is built and supported by NRCS.

Background

USDA's Small Watershed Program was authorized by the Flood Control Act of 1944, Public Law 78-534, and the Watershed Protection and Flood Prevention Act of 1954, Public Law 83-566. The original program, PL 78-534, was established for 11 selected watersheds throughout the country, including the Los Angeles River and Santa Ynez River in California. The subsequent legislation, PL 83-566, was passed to expand the program to all of the nation's watersheds.

USDA's Small Watershed Program has three general purposes: (1) preventing damage from erosion, floodwater, and sediment, (2) furthering the conservation development, utilization, and disposal of water, and (3) furthering the conservation and proper utilization of land.

The program applies to watersheds 250,000 acres and smaller. At least 20% of any project benefits must be related directly to agriculture, including rural communities. A local sponsoring organization is needed to carry out, maintain, and operate works of improvement.

The program has two main components, each of which is funded separately: (1) watershed surveys and planning, and (2) watershed and flood prevention operations and construction.

Status of the Program in California

The Small Watershed Program in California has been used primarily for flood control, agricultural water management, and watershed protection work. There are 30 completed watershed projects in California and 15 operational projects. About 30 watersheds are currently receiving technical assistance for local planning activities.

From 1978 through 2002, over $100 million was spent in California under PL83-566 operations to install conservation measures. During this same time period, over $120 million was spent in 45 counties in California under “emergency watershed protection” to provide emergency flood and fire repair work.

In fiscal year 2002, California received PL83-566 annual appropriations of $950,000 for watershed planning, $1,390,000 for technical assistance, and $3,351,136 for installing practices.

Emergency Response Plans

All water systems serving a population of 3,300 or more (1,000 connections or more) must update their emergency response plan (ERP) and send a completed certification form to EPA within six months of completing their Security Vulnerability Assessment (Security VA). All water systems are required to have an emergency notification plan (ENP). CRWA is putting on a series of free ERP classes, which will include a free manual and a free CD that will assist you in updating or creating an emergency response plan for your water system. It also includes a special section on how to prepare a drought response plan as a key component of your ERP. All systems, no matter what size, are invited to attend and will benefit from this class, and attendees will earn contact hours for distribution and water treatment certification renewal.

Groundwater

Groundwater is an important component of our nation's fresh water resources. The use of groundwater is of fundamental importance to human life, and is also significant to economic vitality. Inventories of groundwater and surface water use patterns in the United States emphasize the importance of groundwater. The United States Geological Survey (USGS) compiles national water use information every five years, and publishes a report that summarizes this information.

Groundwater is a hidden resource. At one time, its purity and availability were taken for granted. Now contamination and availability are serious issues. The following should be considered:

- Scientists estimate groundwater accounts for more than 95% of all fresh water available for use.
- Approximately 50% of Americans obtain all or part of their drinking water from groundwater.
- Nearly 95% of rural residents rely on groundwater for their drinking supply.
- About half of irrigated cropland uses groundwater.
- Approximately one third of industrial water needs are fulfilled by using groundwater.
- About 40% of river flow nationwide (on average) depends on groundwater.

Thus, groundwater is a critical component of management plans developed by an increasing number of watershed partnerships.

Definition

Groundwater is the water that saturates the tiny spaces between alluvial material (e.g., sand, gravel, silt, clay) or the crevices or fractures in rocks.

Aeration zone: The zone above the water table is known as the zone of aeration (unsaturated or vadose zone). Water in the soil (in the ground but above the water table) is referred to as soil moisture. Spaces between soil, gravel, and rock are filled with water (suspended) and air.

Capillary water: Just above the water table, in the aeration zone, is capillary water that moves upward from the water table by capillary action. This water can move slowly in any direction, from a wet particle to a dry one. While most plants rely on moisture from precipitation that is present in the unsaturated zone, their roots may also tap into capillary water or into the underlying saturated zone.

Aquifer: Most groundwater is found in aquifers—underground layers of porous rock that are saturated from above or from structures sloping toward it. Aquifer capacity is determined by the porosity of the subsurface material and its area. Under most of the United States, there are two major types of aquifers: confined and unconfined.

Confined aquifers (also known as artesian or pressure aquifers) exist where the groundwater system is between layers of clay, dense rock, or other materials with very low permeability.

Water in confined aquifers may be very old, arriving millions of years ago. It is also under more pressure than unconfined aquifers. Thus, when tapped by a well, water is forced up, sometimes above the soil surface. This is how a flowing artesian well is formed.

Unconfined aquifers are more common and do not have a low-permeability deposit above them. Water in unconfined aquifers may have arrived recently by percolating through the land surface. This is why water in unconfined aquifers is often considered very young, in geologic time. The top layer of an unconfined aquifer is the water table. It is affected by atmospheric pressure and changing hydrologic conditions. Discharge and recharge rates depend on the hydrologic conditions above them.

Saturation zone: The portion that is saturated with water is called the zone of saturation. The upper surface of this zone, open to atmospheric pressure, is known as the water table (phreatic surface).

Water-bearing rocks: Several types of rocks can hold water, including the following:

- Sedimentary deposits (i.e., sand and gravel)
- Channels in carbonate rocks (i.e., limestone)
- Lava tubes or cooling fractures in igneous rocks
- Fractures in hard rocks

Groundwater and Surface Water Connection

Groundwater and surface water are fundamentally interconnected. It is often difficult to separate the two because they "feed" each other. This is why one can contaminate the other.

Hydrologic (water) Cycle

As rain or snow falls to the earth's surface:

Some water runs off the land to rivers, lakes, streams and oceans (surface water).

Water also can move into those bodies by percolation below ground.

Water entering the soil can infiltrate deeper to reach groundwater, which can discharge to surface water or return to the surface through wells, springs, and marshes. Here it becomes surface water again. Upon evaporation, it completes the cycle. This movement of water between the earth and the atmosphere through evaporation, precipitation, infiltration, and runoff is continuous.

How Groundwater "Feeds" Surface Water

One of the most commonly used forms of groundwater comes from unconfined shallow water table aquifers. These aquifers are major sources of drinking and irrigation water. They also interact closely with streams, sometimes flowing (discharging) water into a stream or lake and sometimes receiving water from the stream or lake.

An unconfined aquifer that feeds streams is said to provide the stream's base flow. (This is called a gaining stream.) In fact, groundwater can be responsible for maintaining the hydrologic balance of surface streams, springs, lakes, wetlands, and marshes.

This is why successful watershed partnerships with a special interest in a particular stream, lake, or other surface water body always have a special interest in the unconfined aquifer adjacent to the water body.

How Surface Water "Feeds" Groundwater

The source of groundwater (recharge) is through precipitation or surface water that percolates downward. Approximately 5%–50% (depending on climate, land use, soil type, geology, and many other factors) of annual precipitation results in groundwater recharge. In some areas, streams literally recharge the aquifer through stream bed infiltration, called losing streams. Left untouched, groundwater naturally arrives at a balance, discharging and recharging depending on hydrologic conditions.

Defining Combined Boundaries

Partnerships using the watershed approach to protect natural resources identify and understand the individual resources—water, soil, air, plants, animals, and people—early in the process. This is why watershed partnerships select or define boundaries to address all natural resources—not just one. They realize that groundwater, surface water, air quality, and wildlife and human activities all affect each other.

Occasionally watershed partnerships run into difficulty combining boundaries of surface water (watersheds) and recharge areas (groundwater). If this occurs, consider combining surface and groundwater into a single, larger area. In other situations—for example, if water is being transferred from one watershed or aquifer to distant users—there can be, and should be, two distinct areas. Thus, watershed partnerships' boundaries may combine the wellhead area, aquifer, watershed, or many other areas, depending on the issues.

Common Boundaries

Aquifers are often difficult to delineate. It requires someone with an understanding of the aquifer, the geology, the surface above it, and the land that drains toward the surface.

An unconfined aquifer area often extends to the surface water body's (e.g,, lake, river, estuary) watershed. When determining an aquifer protection area, pumping (working) wells are not considered. The biggest risk to an unconfined aquifer is contaminated water moving through the permeable materials directly above it. This area is known as the primary recharge area. Depending on the depth and overlying geologic characteristics, travel time from the surface to the aquifer can be relatively short.

Less permeable deposits located at higher elevations than the aquifer form a secondary recharge area. These areas also recharge the aquifer through both overland runoff and groundwater flow. Because they are less permeable and tend to be a greater distance from the aquifer, they often filter out contaminants.

Additional recharge areas to consider include an adjacent stream that potentially contributes to the aquifer through infiltration. When pumping wells are located near a stream or lake, infiltration can be increased. Infiltrating streams typically provide an aquifer with large quantities of water and a pathway for bacteria, viruses, and other contaminants.

A confined aquifer area may be limited to the outcrop of the aquifer unit and its immediate contributing area. This area may actually be isolated from the location of water supply wells within the aquifer.

Semi-confined aquifers may receive water from both outcrop areas and overlying aquifers. Delineating the aquifer protection area can be extensive and complex.

Sole-source aquifers are delineated based on aquifer type—confined, semi-confined, or unconfined—and local geologic and hydrologic conditions. Defined as providing a minimum of 50% of the water for its users, sole-source aquifers usually exist only where there simply are no viable alternative water sources.

Wellhead protection areas (also known as zone of contribution and contributing areas) are the surface and subsurface areas surrounding a well or field of wells (well field) supplying a public water system.

The area is calculated by determining the distance contaminants are reasonably likely to move before reaching a well. Common methods for determining the wellhead protection area include the following:

- Arbitrary fixed radius
- Calculated fixed radius
- Simplified variable shapes
- Analytical method
- Numerical method
- Hydro-geologic mapping

When selecting the best method, consider available funds and the level of concern. Other factors to consider include the cone of depression and drawdown.

Surface watersheds are defined by a simple process of identifying the highest elevations in land that drains to the surface water body (e.g., lake, pond, river, estuary). Watersheds are all shapes and sizes, ranging from just a few acres to several million acres, with many smaller watersheds "nested" inside a larger watershed.

Most successful watershed partnerships work with a manageable size yet encompass all the different, but integrated, areas. This enables faster measurable progress and stronger ties between stakeholders and the water body they affect.

Threats to Groundwater

Threats to Quantity

An increased quantity of groundwater is being withdrawn to meet the demands of a growing population. Some of the typical threats associated with this include overdraft, drawdown, and subsidence.

Overdraft occurs when groundwater is removed faster than recharge can replace it. This can result in

- A permanent loss of a portion of its storage capacity.
- A change that can cause water of unusable quality to contaminate good water. In coastal basins, salt water intrusion can occur.

Generally, any withdrawal in excess of safe yield (the amount that can be withdrawn without producing an undesirable result) is an overdraft.

Drawdown differs significantly from overdraft. It results in a temporarily lowered water table generally caused by pumping. In this situation, the water table recovers when the supply is replenished.

Subsidence is one of the dramatic results from over-pumping. As the water table declines, water pressure is reduced. This causes the fine particles that held water to become compacted. In addition to permanently reducing storage capacity, the land above the aquifer can sink—from a few inches to several feet—causing a sinkhole. This can damage property and fields.

Inorganic compounds, pathogens, and organic compounds can harm water quality, affecting the health of humans, fish, and wildlife. Scientists continually learn more about contaminants, their sources, and prevention practices.

Each state is responsible for designating uses for groundwater, surface waters, wetlands, etc. Designated uses include fishable, swimmable, drinkable, recreational, agricultural, aquatic life, and more. Each state is also responsible for developing water quality standards for each use. For example, while most rivers are designated to be used for fishing, a few river sections are designated to be used for drinking water. The same is true for groundwater. Uses are defined and standards identified. A few groundwater uses and standards are as follows:

- Drinking water
- Meet MCL* for pollutants
- Industrial process
- Quality and quantity criteria
- Stream base flow
- Discharge quantity and quality
- *MCL: Maximum Contaminant Level

Note that for most groundwater uses, quality and quantity are important, while for surface water uses, generally quality is the primary concern (with the realization that quantity also affects quality).

Inorganic Compounds include all compounds that do not contain carbon. Nutrients (nitrogen and phosphorus) and heavy metals are two examples.

Nitrates can cause problems in drinking water or marine waters

Phosphorus can reduce uses of fresh surface waters

Heavy metals include selenium, arsenic, iron, manganese, sulfur, cadmium, chromium, and others. Some (e.g., iron, manganese, and arsenic) occur naturally.

Pathogens, including bacteria and viruses, have been credited with causing more than 50% of the waterborne disease outbreaks in the United States. *Cryptosporidium Parvum* and *Giardia* both commonly cause illnesses when consumed.

Organic Compounds include volatile organic compounds (VOCs) like benzene, toluene, xylene; semi-volatile compounds like napthaline and phenol; PCBs, and pesticides.

Potential Sources

Point sources are easily identified because they usually come out of a "pipe." Examples include sewage treatment plants, large injection wells, industrial plants, livestock facilities, landfills, and others. Regulated by the state water quality agency and the U.S. EPA, point sources are issued a National Pollutant Discharge Elimination System (NPDES) permit when they meet regulations.

Many point sources were established generations ago, before the threat they posed was understood. Some of these sources have been "grandfathered" into compliance with some regulations. Thus, you may find some point sources located in areas that would be considered inappropriate now.

Nonpoint sources refer to widespread, seemingly insignificant amounts of pollutants which, cumulatively, threaten water quality and natural systems. Examples of nonpoint sources include septic systems, agriculture, construction, grazing, forestry, recreational activities, careless household management, lawn care, and parking lot and other urban runoff.

Nonpoint sources are not required to have a permit. Individually each may not be a serious threat, but together they may be a significant threat.

Other sources that aren't classified under point or nonpoint sources include underground petroleum storage systems and many large and small businesses like dry cleaners, restaurants, and automotive repair shops. Although a large number of underground storage tanks have been removed or upgraded, a significant number remain. Businesses can threaten groundwater with a wide variety of potentially contaminating substances.

Groundwater Contaminant Sources

Source	Contaminant
Salting practices and storage	Chlorides
Snow dumping	Chlorides
Agricultural fertilizers	Nitrates
Manure handling	Nitrates, pathogens
Home fertilizer	Nitrates
Septic systems	Nitrates, pathogens
Urban landscapes	Hydrocarbons, pesticides, pathogens
Agricultural dealers	Hydrocarbons, pesticides, nitrates
Agricultural feedlots	Nitrates, pathogens
Solid waste landfills	Hazardous materials
Industrial uses RCRA “C”	Hazardous materials
Industrial uses RCRA “D”	Hazardous materials
Small quantity generators	Hazardous materials
Households	Hazardous materials
Gas stations	Hydrocarbons
Auto repair shops	Hydrocarbons
Recycling facilities	Hydrocarbons
Auto salvage yards	Hydrocarbons
Underground storage tanks	Hydrocarbons
Industrial floor drains	Hydrocarbons
Injection wells	Hydrocarbons
Junkyards	Hydrocarbons

Mitigation

The Watershed Management Approach

A quick review of key components of the local, voluntary watershed approach to protecting natural resources will help you evaluate groundwater management approaches and how they may be used in your particular situation. The most critical component to the watershed management approach is the involvement and consensus of all key stakeholders (or organizations representing them) at each step in the process. Other key components include the following:

- Assess natural resources-soil, water (including groundwater), air, plants, animals, and people.
- Identify and prioritize problems.
- Develop measurable objectives based on local environmental, economic, and social goals.
- Identify and agree on strategies for reaching objectives.
- Implement strategies and assess results.
- Some of the activities, as they pertain to groundwater, are described in this guide. For example:
- Determining boundaries of the groundwater and watershed areas is typically part of assessment.
- Discussing existing and future uses of water is part of setting goals.
- Defining pollutants and sources is part of assessment, goal setting and solution identification.
- Understanding various tools is part of identifying and implementing solutions.

Existing Groundwater Programs

Over the past 20 years many federal and state programs have been developed to improve management of groundwater. Four of the most useful can also easily be incorporated into your watershed plan. These include the following:

Comprehensive State Groundwater Protection Program

Sole Source Aquifer Program

Source Water Protection Program

Wellhead Protection Program

These approaches can be used in a complementary fashion to manage all resources, including groundwater, for multiple uses—ranging from human consumption to industrial processes to maintaining ecological integrity within a wetland.

The **Comprehensive State Groundwater Protection Program** is a statewide program that looks at groundwater's uses, including drinking water, and its role in sustaining the health of surface water bodies (rivers, streams, wetlands, marshes).

The **Sole Source Aquifer Program, Source Water Protection Program, and Wellhead Protection Program** are all intended to protect a drinking water supply. The programs generally are compatible with the Comprehensive State Groundwater Protection Program, but are applied to very defined geographic areas:

The Sole Source Aquifer Program applies to the aquifer boundaries.

The Source Water Protection Program applies to water that drains into a reservoir (used as a drinking water source) or intake.

The Wellhead Protection Program applies to defined wellhead areas.

Special Issues

Although groundwater programs are often used within the watershed framework, there are some issues that may arise as you attempt to integrate them. These issues have been listed simply to make you aware of them. Each is best addressed through cooperation and consensus. Water quality use designations often do not reflect the presence of groundwater intakes for drinking water. Water quality criteria and drinking water maximum contaminant levels (MCLs) often are not consistent in terms of chemical specific values and parameters.

Minor dischargers and permitted management measures under the NPDES program may not sufficiently reduce the risk to drinking water intakes. Where agriculture activities are reducing drinking water quality, changes in management practices may or may not take a long time to result in water quality improvements depending on weather, geography, etc. Source water areas for groundwater drinking supplies (wellhead areas) generally do not coincide with surface water drainage areas. Long-term drinking water treatment may be necessary for certain public water supply systems because of the nature of the contaminant sources and the size of the contributing area.

Mitigation and Management Tools

There are many, many tools that can be used to manage groundwater resources:

Zoning: Regulations are used to segregate different, and possibly conflicting, activities into different areas of a community. This approach can be limited in its ability to protect groundwater due to "grandfather" provisions.

Overlay Water Resource Protection Districts: Similar to zoning regulations in their goals of defining the resource, these ordinances and bylaws map zones of contributing boundaries and enact specific legislation for land uses and development within these boundaries.

Prohibition of Some Land Uses: These are not typically considered very creative tools. However, prohibition of land uses such as gas stations, sewage treatment plants, landfills, or the use/storage/transport of toxic materials is a first step toward the development of a comprehensive groundwater protection strategy.

Special Permitting: The special permitting process can be used to regulate uses and structures that may degrade water and land quality.

Large Lot Zoning: Large lot zoning seeks to limit groundwater resource degradation by reducing the number of buildings and septic systems within a groundwater protection area.

Eliminating/Modifying Septic Systems: Septic system problems can be reduced or eliminated by extending or developing community sewage treatment systems. Other options include specifying minimum design requirements like mound systems.

Transfer of Development Rights: A government entity prepares a plan designating land parcels from which development rights can be transferred to other areas. This allows land uses to be protected (e.g., for a gas station) while ensuring that these uses are outside sensitive areas.

Growth Control/Timing: Growth controls are used to slow or guide a community's growth, ideally in concert with its ability to support growth. One important consideration is the availability of groundwater.

Performance Standards: This assumes that any given resource has a threshold, beyond which it deteriorates to an unacceptable level. Performance standards assume that most uses are allowable in a designated area, provided that the use or uses do not and will not overload the resource. With performance standards, it is important to establish critical threshold limits as the bottom line for acceptability.

Underground Storage Tanks: Three additional protection measures are often adopted to enhance local water resource protection. They include the following:

- Prohibit new residential underground storage tanks
- Remove existing residential underground storage tanks
- Prohibit all new underground storage tank installation in groundwater and surface water management areas

Septic System Maintenance: Septic system maintenance is frequently overlooked. Many times the system will not function properly, causing "breakout" of solids at the surface, which can lead to bacterial contamination. In addition, when systems fail, any additives used can become contaminants.

Land Donations: Land owners are often in the position of being able to donate some land to the community or to a local land trust.

Conservation Easements: Conservation easements allow for a limited right to use the land. Easements can effectively protect critical lands from development.

Purchase Lands: Many communities purchase selected parcels of land that are deemed significant for resource protection.

Well Construction/Closure Standards: Wells are a direct conduit to groundwater. Standards for new well construction, as well as identification and closure of abandoned wells, can prevent groundwater from being contaminated.

Groundwater Protection Tools

Technique	Tool
Zoning districts	Overlay groundwater protection
Prohibit various land uses	Special permitting
Large lot zoning	Transfer of development rights
Cluster/PUD design	Growth controls/timing
Performance standards	Geographic information systems
Overlay wetlands	Identify local wellhead protection areas
Subdivision control	Drainage requirements
Growth management in sensitive areas	Health regulations
Underground fuel storage systems	Small sewage treatment plants
Septic cleaner bans	Septic system upgrades
Toxic and hazardous material regulations	Private well protection
Voluntary restrictions	Sale, donation, or trust
Conservation easements	Limited development
Other non-regulatory contingency plans, hazardous waste collection, public education, land banking	Monitoring

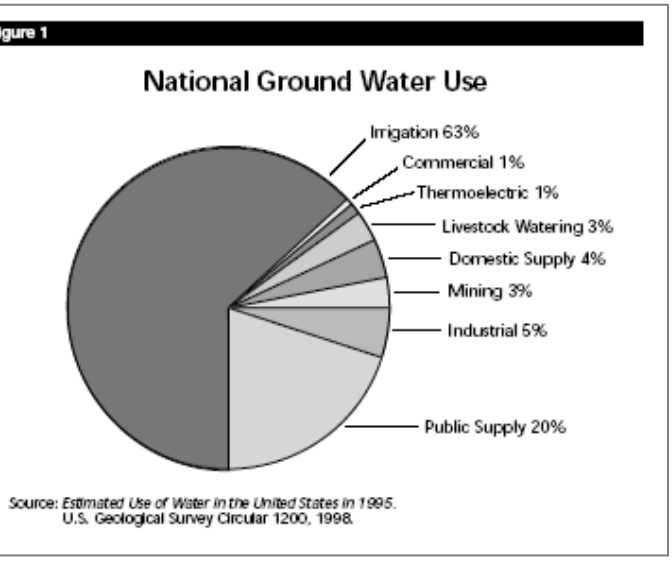
Groundwater Management Practices

Zoning Districts	Practices
Groundwater recharge	Impervious area restriction
Artificial wetlands	Grass lined channels
Impoundment structures (ponds)	Subsurface drains (tiles)
Infiltration trenches	Native tree and shrub plantings
Pollutant reduction	Buffer strips
Filter strips	Riparian zones
Pollution prevention	Soil nitrate testing
Integrated pest management	Manure testing
Variable rate applications	Abandoned well closure

The latest USGS report was issued in October 1998 for the 1995 water year. The USGS report shows that ground water provides water for drinking and bathing, irrigation of crop lands, livestock watering, mining, industrial and commercial uses, and thermoelectric cooling applications.

Figure 1 illustrates how groundwater use is proportioned among these categories. As shown, irrigation (63%) and public water supply (20%) are the largest uses of groundwater. About 77,500 million gallons of groundwater are withdrawn daily.

Figure 1



Source: *Estimated Use of Water in the United States in 1995.* U.S. Geological Survey Circular 1200, 1998.

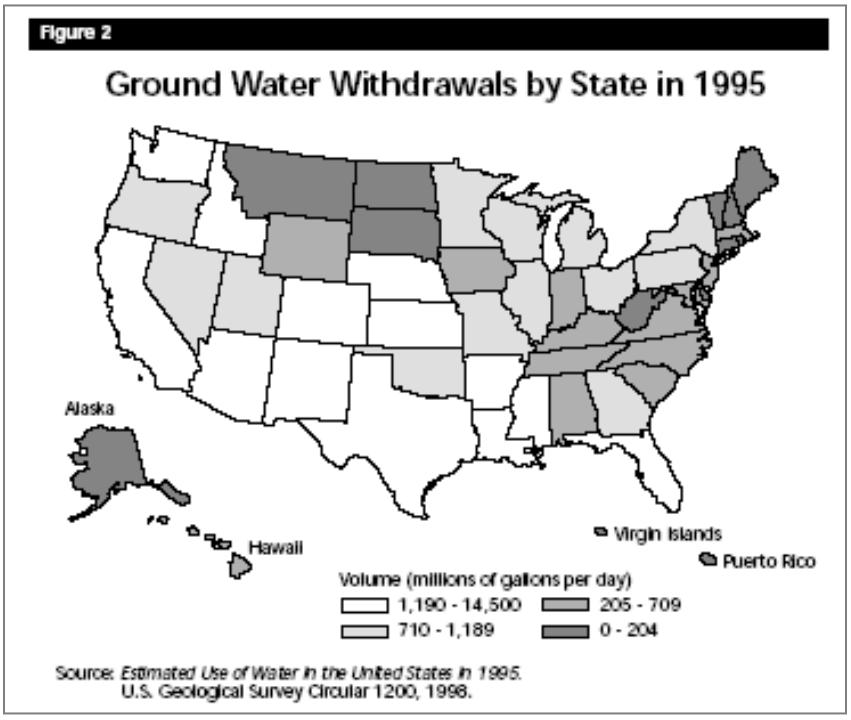
In 1995, the USGS reported that groundwater supplied 46% of the nation's overall population—and 99% of the population in rural areas—with drinking water. Our nation's dependence on this valuable resource is clear.

Every state uses some amount of groundwater. Nineteen states obtain more than 25% of their overall water supply from groundwater. Ten states obtain more than 50% of their total water supply from groundwater.

Each state uses its groundwater differently. Groundwater use in individual states is a result of numerous interrelated factors generally associated with geography and climate, the principal types of business activities occurring in the state, and population distribution. Fresh groundwater withdrawals during 1995 were highest generally in the western states, primarily to supply an increasing population and to sustain important agricultural activities.

Figure 2 shows the volume of groundwater withdrawn by states. The 13 states that have the greatest withdrawals account for 69% of all groundwater that is withdrawn nationally.

Figure 2



Source: *Estimated Use of Water in the United States in 1995.* U.S. Geological Survey Circular 1200, 1998.

Sources of Groundwater Contamination

Groundwater quality may be adversely affected by a variety of potential contaminant sources. It can be difficult to identify which sources have the greatest impact on groundwater quality because each source varies in the amount of groundwater it contaminates. In addition, each source affects water quality differently.

An EPA/state work group developed a list of potential contaminant sources and asked each state to indicate the 10 top sources that potentially threaten their groundwater resources. States added sources as was necessary, based on state-specific concerns. When selecting sources states considered numerous factors, including the number of each type of contaminant source in the state:

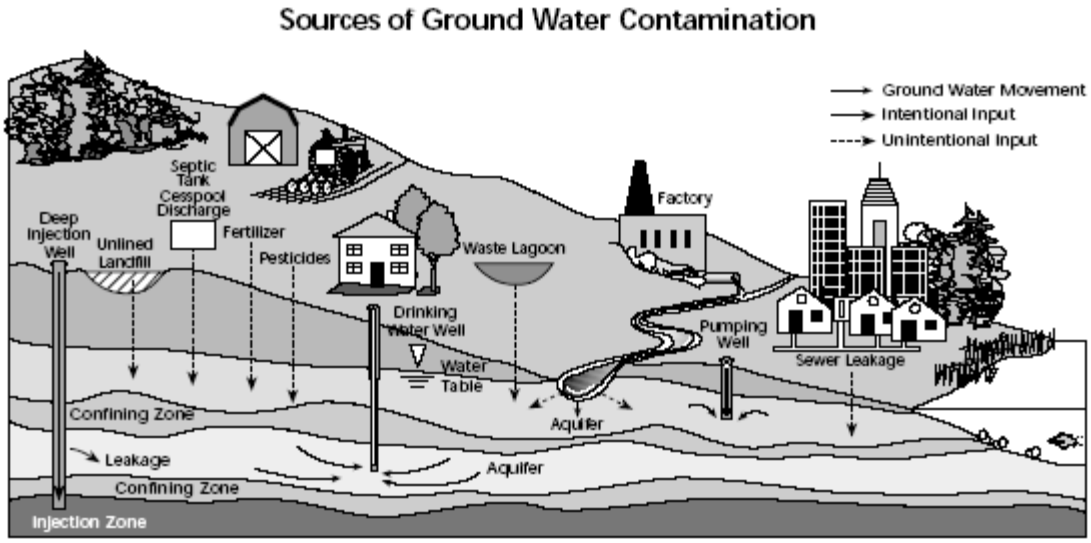
The location relative to groundwater sources used for drinking water purposes

The size of the population at risk from contaminated drinking water

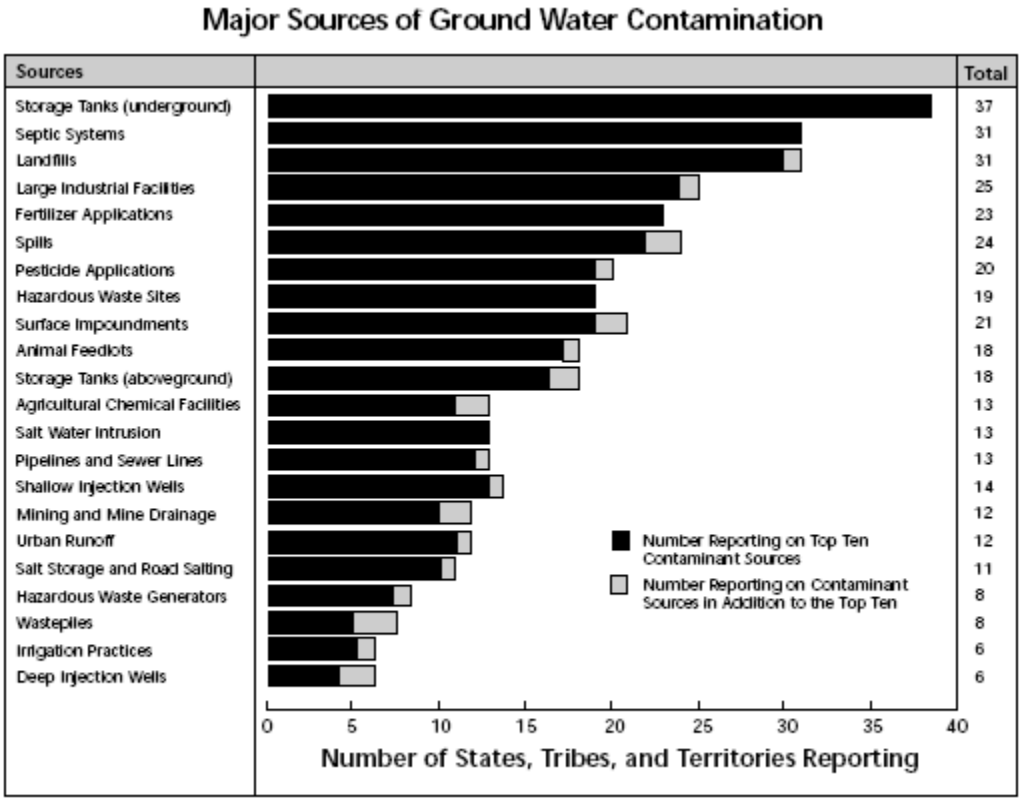
The risk posed to human health and/or the environment from releases

Hydro-geologic sensitivity (the ease with which contaminants enter and travel through soil and reach aquifers)

The findings of the state's ground water assessments and/or related studies



EPA, "National Water Quality Inventory"



Methyl Tertiary Butyl Ether (MTBE)

Senate Bill 521 was introduced on February 24, 1997, in response to a growing awareness of the possible environmental and health effects associated with the use of methyl tertiary butyl ether (MTBE) as an oxygenate blending agent in gasoline fuels throughout California (Appendix A). Since 1979, MTBE had been used in the state as a replacement for tetraethyl lead and as an octane booster. Although used in California since 1979, in volumes ranging from 0.5% to 3.5%, the volumes of MTBE in gasoline have increased to 11% since 1996. SB 521, which became effective January 1, 1998, called for the University of California to perform an assessment of the benefits and risks associated with the uses of MTBE in California.

This assessment report addresses (1) the current impacts of MTBE on the state's groundwater used for drinking; (2) risks to the state's groundwater resources associated with MTBE leaking from storage tanks and other petroleum storage and conveyance facilities; and (3) potential future risks to the state's groundwater should MTBE continue to be used.

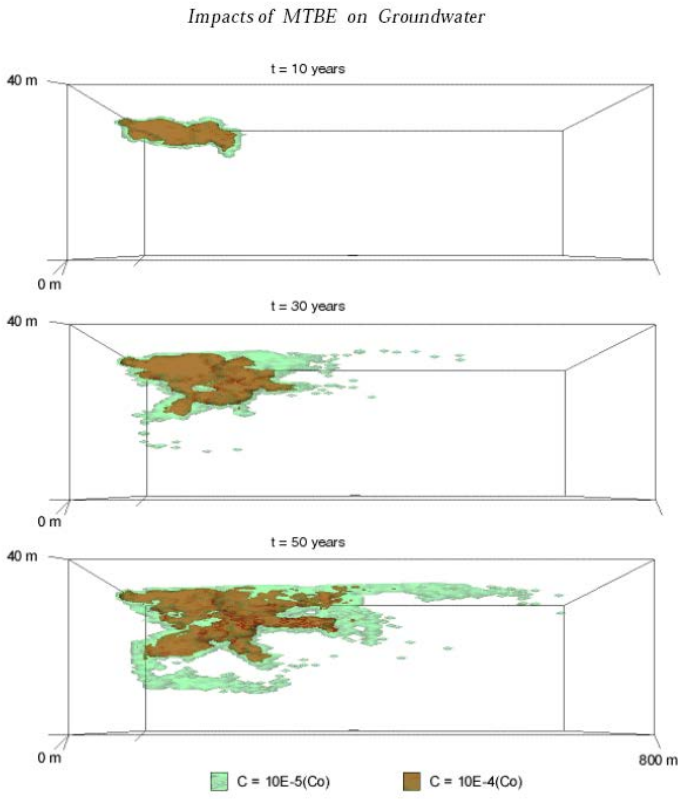
The general approach was to compile statewide data on the occurrence of MTBE groundwater contamination. The data consisted of MTBE detections and concentrations at leaking underground storage tank sites from regional water quality control boards, and MTBE detections and concentrations in water supply wells based on information from the Department of Health Services, local primacy agencies, and regional water quality control boards. We used various modeling approaches to then assess potential future impacts of MTBE on groundwater resources, focusing primarily on plume behavior in aquifer systems consisting of alluvial materials (e.g., sand, gravel, silt, and clay). This report also includes specific information on MTBE impacts on groundwater in the Tahoe Basin.

A recent investigation into the impacts of MTBE on California groundwater by Happel et al. (1998) provided an important foundation for this study. The analysis of groundwater impacts contained herein complements that work by accumulating more recent statewide information with broader geographic coverage. Moreover, we use plume length statistics compiled by Happel et al. (1998) as a basis for calibrating models that simulate future MTBE plume growth.

The use of MTBE in gasoline has increased steadily since it was first approved for use in gasoline by the United States Environmental Protection Agency (USEPA) in 1979. MTBE is produced from isobutene, a waste product of the petroleum refining process. In 1994, MTBE was ranked as the eighteenth most produced chemical in the United States. By 1995 it was ranked twelfth, and by 1997 it was ranked second (OEHHA, 1998). MTBE was used in California's lead phaseout program in 1979, at volumes up to 2%, as a lead substitute and octane booster.

The USEPA approved use of MTBE in 1981 up to 10%, and in 1988 approved its use up to 15% by volume (CAEPA, 1998). As early as 1988, MTBE use in Southern California had begun to increase. In 1988, a refiner introduced an environmentally clean fuel in California that included 6% to 8% MTBE by volume. This refiner reportedly supplied 30% of the fuel in California; approximately 20% of this refiner's sales were the environmentally clean fuel. This fuel was sold principally in Southern California (D. Simeroth, personal communication, 1998).

The complete phaseout of lead in fuel occurred in 1992, at which time the Wintertime Oxygenate Program began in California. There was an increased use of MTBE in the southern part of the state, with longer wintertime intervals and an earlier commencement of the year-round oxygenate program starting in 1995 rather than 1996. After March 1, 1996, all gasoline sold in California was Phase 2 reformulated gas containing 11% by volume MTBE.



Approximately 92 billion gallons of MTBE was produced in 1997 (Zogorski et al., 1998). California is reportedly the third largest worldwide consumer of MTBE, second only to the rest of the United States and the former Soviet Union (OEHHA, 1998).

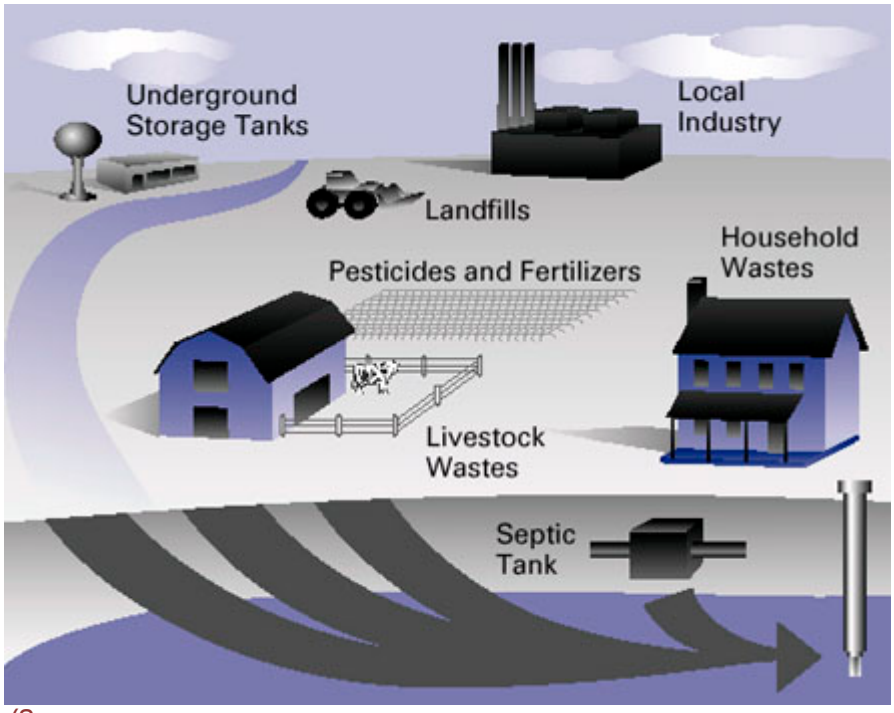
3-D simulated MTBE plume snap shots at (top to bottom) 10, 30, and 50 years. Total thickness of the box is 40.5 m, and total length is 810 m. Regional flow is left to right. Screened interval of the pumping well is located in the center of the domain at a depth of 20 m.

University of California at Davis; "Impacts of MTBE on California Groundwater"

Sources of MTBE in Groundwater

MTBE sources of groundwater contamination include leaking underground fuel tanks (LUFTs), aboveground storage tanks, farm tanks, leaking petroleum fuel pipelines, underground storage tanks containing fuels other than gasoline, surface spills due to automobile or tanker truck accidents, surface spills due to abandoned or parked vehicles, MTBE-contaminated surface water, and precipitation. The LUFT sites are numerous, widely dispersed, proportional to the state's population, and involve enormous volumes of fuel products. As of June 30, 1998, there were 32,779 known sites where chemical compounds, including gasoline and non-gasoline products, were discharged to the environment from underground storage tanks. Ninety percent of these discharges involve petroleum products.

University of California at Davis; "Impacts of MTBE on California Groundwater"



(Source: http://www.thegreenestdollar.com/wp-content/uploads/2009/02/septictank450.jpg)

Groundwater Protection

The responsibility for groundwater protection collectively belongs to government agencies at the federal, state, and local levels. Federal and state governments regulate groundwater through laws, regulations, and policies. In many cases, state and local laws are stricter versions of federal legislation, which serves as a valuable baseline on which state and local laws can build.

At the federal level, the Clean Water Act (CWA) ensures protection of surface waters designated, in part, for use as drinking water. Other environmental laws—the Safe Drinking Water Act (SDWA) (which includes the Wellhead Protection [WHP] Program, the Sole Source Aquifer [SSA] Program, and the Underground Injection Program); the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)—provide authorities, financial support, and technical assistance to protect sources of drinking water, especially groundwater.

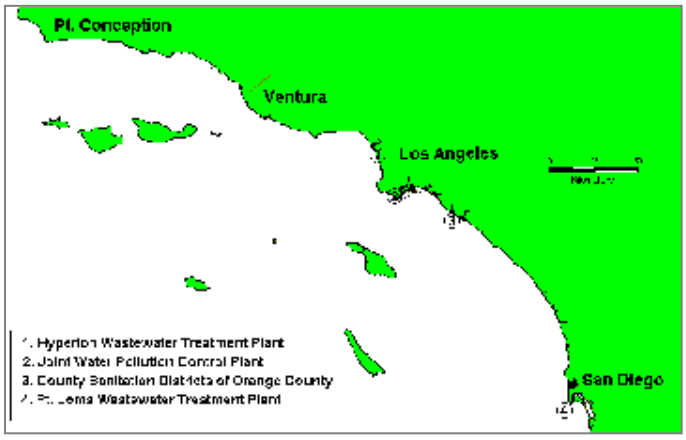
USEPA is developing a regulation on groundwater that specifies the appropriate use of disinfection and addresses other components of groundwater systems to ensure public health protection. Various studies seem to indicate that the number of groundwater sources with evidence of fecal contamination is significant. EPA is analyzing the data to determine if they represent public wells nationally. The proposed rule also encourages the use of alternative approaches, including best management practices and source control.

EPA, “National Water Quality Inventory”

Waste Water

Characteristics of Effluents from Large Municipal Wastewater Treatment Facilities

Effluents from the Hyperion Treatment Plant (HTP) of the City of Los Angeles, the Joint Water Pollution Control Plant (JWPCP) of County Sanitation Districts of Los Angeles County (CSDLAC), Wastewater Treatment Plants 1 and 2 of County Sanitation Districts of Orange County (CSDOC), and the Point Loma Wastewater Treatment Plant (PLWTP) of the City of San Diego comprise 90% of municipal wastewater discharged directly to the Southern California bight. These agencies have routinely measured the characteristics of their effluents for at least two decades. Each year during this period, the Southern California Coastal Water Research Project (SCCWRP) has summarized these measurements and reported on discharge and constituent trends. In this report, we summarize the concentrations of effluent constituents and estimate the mass emissions for these four agencies for 1993; we also discuss trends in the mass emissions of contaminants from 1971 to 1993.



Inherent Danger to Waste Water Systems

CALIFORNIA WASTEWATER TREATMENT OPERATOR ADMITS TO WATER TAMPERING

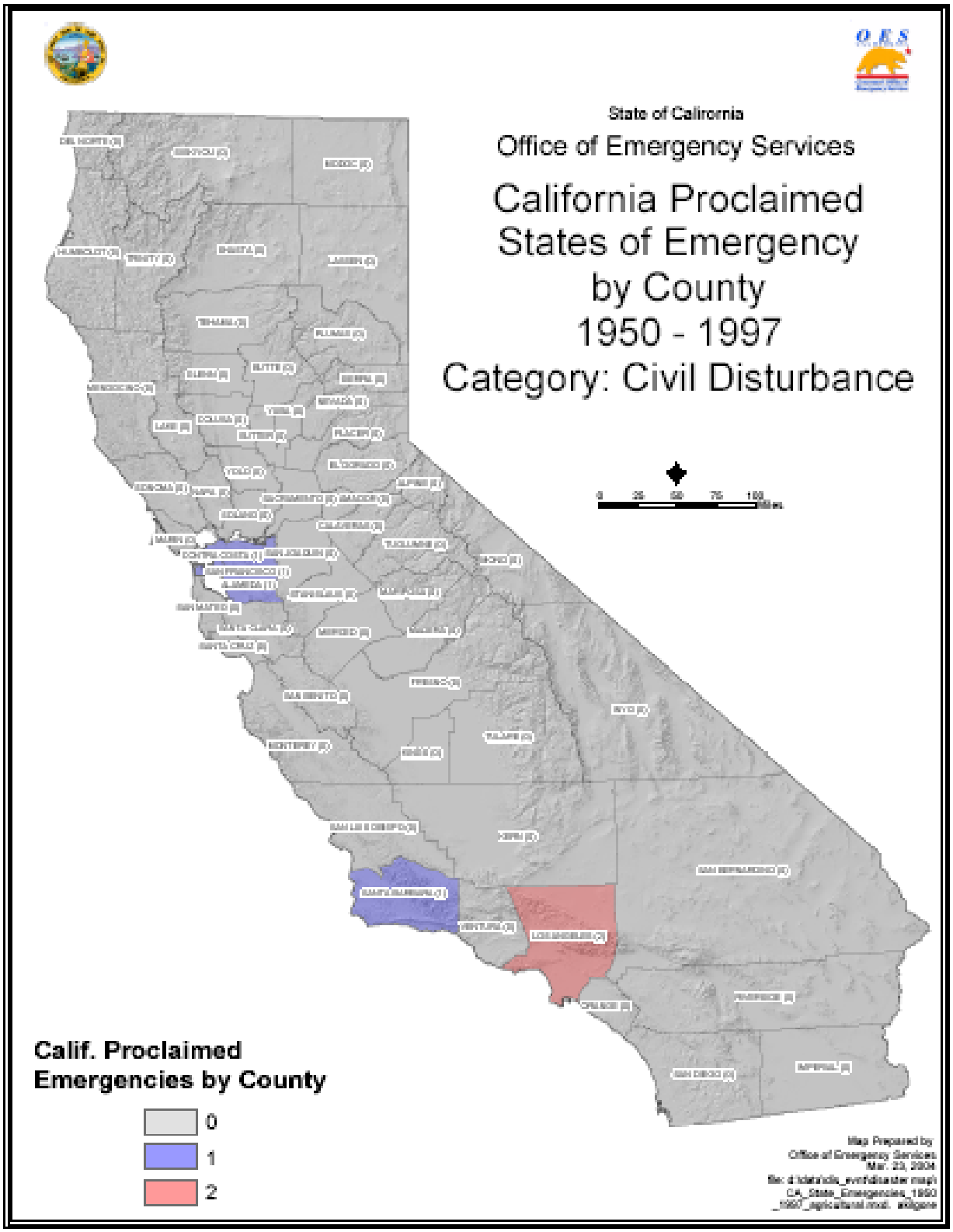
FOR RELEASE: FRIDAY, APRIL 9, 1999

CALIFORNIA WASTEWATER TREATMENT OPERATOR ADMITS
TO WATER TAMPERING

Bernardino Lopez, former wastewater treatment plant operator for the Niland Sanitary District, pleaded guilty on March 29 in U.S. District Court for the Southern District of California in San Diego, to violating the Clean Water Act (CWA). Lopez admitted that in August and September of 1998, he repeatedly added chlorine to wastewater samples that were to be tested for E. coli. bacteria. The samples were used to develop monthly reports to the Regional Water Quality Control Board. Adding chlorine to the samples concealed the fact that both treatment plants were discharging wastewater with E. coli. levels that exceeded the limits allowed in their CWA National Point Discharge Elimination System permits. Human exposure to wastewater containing excessive levels of E. coli. can cause skin and intestinal infections. Wastewater from both plants flows into the Salton Sea. When sentenced, Lopez faces a maximum penalty of two years imprisonment and/or a $10,000 fine. This case was investigated by the Imperial County Environmental Task Force, which includes EPA's Criminal Investigation Division, and was prosecuted by the U.S. Department of Justice.

Civil Unrest

Civil disturbances can occur almost anywhere. However, the most significant ones in California have historically taken place in large urban centers. Deaths and injuries occurred to individuals who were in or around the disturbances while they were happening. Damage was caused by thrown objects, fires, and looting.


State of California
Office of Emergency Services
California Proclaimed
States of Emergency
by County
1950 - 1997
Category: Civil Disturbance
Calif. Proclaimed
Emergencies by County
0
1
2
Map Prepared by
Office of Emergency Services
Mar. 23, 2004

History of Civil Unrest in Los Angeles County

Watts Riot (1965)

The **Watts Riot** began on August 11, 1965 in Los Angeles, California when the Los Angeles Police pulled over Marquette Frye, whom they suspected of driving drunk. While police questioned Frye and his brother, a group of people began to gather around the scene. A struggle ensued shortly after Frye's mother Rena arrived on the scene, resulting in the arrest of all three family members. Police used their batons to subdue Frye and his brother, angering the growing crowd. Shortly after police left, tensions boiled over and the rioting began. What followed was six days of rioting that claimed the lives of 34 people, injured 1,100 and caused an estimated $100 million in damage.

One of the few structures in Watts that remained untouched by the damage was the Watts Towers, a group of tall steel sculptures constructed by Italian immigrant Sam Rodia (often erroneously called Simon Rodia).

Rodney King Riot (1992)

On April 29, 1992, following the not guilty verdicts of four Los Angeles Police Officers accused of beating motorist Rodney King, violence erupted at the intersection of Florence and Normandie in South Los Angeles. At the same time, individuals at the corner of 67th Street and 11th Avenue were revolting against passersby and motorists. Black residents were outraged that four LAPD officers received not guilty verdicts from an all-white jury in Simi Valley, despite the videotape evidence of the beating of Rodney King, and the testimonial by veteran police officers on behalf of the prosecution. From April 29, 1992 at approximately 3:30 p.m. until May 1st, the violence raged on. The National Guard were called in to bring calm to the city, and by Friday afternoon the violence and looting were subdued. The most violent urban revolt that the United States had ever experienced in the twentieth century resulted in 52 deaths, 2,499 injuries, 6,559 arrests, 1,120 building damaged, 2,314 stores damaged and close to 1 billion in damages.

If we go back to 1992 and examine the precipitating factor of the riot, economics actually played a small role influencing the revolt. Yes, there was a recession in Los Angeles and around the country, unemployment was at an all-time high, high levels of poverty probably exacerbated the riots that took place, but the critical events and underlying factors to the revolt were the beating of Rodney King in 1991, the probation sentence handed down on Sun Ja Doo, a Korean store clerk that shot Latasha Harlins, a 15 year old black girl, in the back of the head after a dispute over orange juice, and the acquittal of the four LAPD officers. In the Sun Ja Doo incident the jury came back with a second-degree murder conviction, but Judge Joyce Karlin, a white woman, did the unheard of when she sentenced Doo to five years probation. This is what I believe paved the way for the worst urban riot in contemporary history and the fact that over 50% of the damaged or destroyed property was Korean owned was no accident, and is the reason why many characterize this event as an uprising or a revolt. Although many of the images captured certainly show those acting as opportunists taking advantage of an unfortunate situation, at the same time there was an organized attack against Korean establishments within South L.A. and outside of the black community along Vermont and Western Avenues, north of the black community. Relations between blacks and Koreans in Los Angeles have often been full of tension and there is housing evidence that suggests that those tensions are still present in 2002.

The critical factors that influenced the events of April 29, 1992, all took place within the criminal justice sector of society with the police department central to the events. This is where he must look to address the question of a potential third Los Angeles riot. Chief Daryl Gates was held accountable for the type of relationship that was created between the police and minority communities in South L.A. and his response to the first day of the riot was considered dismal. Also let us not forget history, when in 1965 people took to the streets of Los Angeles in protest the day following alleged police abuses after the arrest of a Marquette Frye on 116th Street and Avalon.

Chief William Parker was also highly criticized for the sharp divide that was created between the black community and the militaristic police, and resentment towards the police grew worse every year since Parker took over as Chief in 1950 up until the violence erupted in 1965. One indication of the increasing tension between the police and the community was the number of complaints that blacks filed between 1950 and 1965. Parker claimed no responsibility during a commission and when asked what sparked the riot he replied "someone threw a rock, and like monkeys in a zoo, they all started throwing rocks."

All of the seven race riots of 1964 were also sparked by an incident of police misconduct. The Otto Kerner Commission of 1968 stated that police actions led to outbreaks in half of the cases studied and those that believe that another revolt will take place will need to examine law enforcement and the criminal justice system. If the LAPD of LASD engage in any inappropriate activity such as excessive force or unlawful officer involved shootings, an outbreak of violence is definitely possible. Let us not forget what happened in Cincinnati in April 2001 when the shooting death of Timothy Thomas, 19, whose death touched off three days of riots. Cincinnati police officer Steven Roach was later found not guilty of negligent homicide in the shooting, but these are the types of events that will determine if Los Angeles will see part three. Under Bernard Parks inappropriate activity from the rank and file was highly unlikely with the disciplinary system that he had in place, but the actions of the next police chief may determine if what happened in 1965 and 1992 will occur again.

Alejandro A. Alonso, Los Angeles Riots 10 Years Later and the Likelihood of Another Revolt, April 29, 2002 (et seq.)

Chronology of the 1992 Los Angeles Riots		
29 April	1515	Acquittal verdicts announced in the trial of police officers accused of beating Rodney King.
	1850	Rioters beat and nearly kill truck driver Reginald Denny as a television crew captures both the horror of the incident and the absence of Los Angeles Police Department (LAPD) officers. Hundreds of arson and looting incidents begin.
	2100	The California governor's office informs the adjutant general that the governor has decided to mobilize (call to state active duty) 2,000 California National Guard (CANG) troops at the request of the L.A. mayor.
30 April	-	A dusk-to-dawn curfew is imposed in large portions of the city of Los Angeles and the surrounding county.
	0400	Approximately 2,000 CANG soldiers have reported to armories.
	1100	Los Angeles County requests 2,000 more CANG personnel; the governor approves the request.
	1350	Ammunition from Camp Roberts (in central California) arrives in L.A. area via CH-47 helicopter.
	1435	The first CANG elements (two military police companies) deploy in support of the LAPD and the L.A. Sheriff's Department (LASD).
	2000	About 1,000 CANG troops are currently deployed "on the street," with more than 1,000

Chronology of the 1992 Los Angeles Riots		
		more prepared to deploy and awaiting mission requests from law enforcement agencies.
	2356	LAPD and LASD request 2,000 additional CANG troops, for a total of 6,000.
1 May	0100	Perceiving the CANG deployment to be too slow, the governor requests federal troops.
	0515	The president agrees to deploy 4,000 federal troops to L.A.
	0630	Approximately 1,220 CANG soldiers are deployed in support of LAPD; 1,600 are deployed in support of LASD; and 2,700 are in reserve awaiting missions.
	1430	Active component marines from Camp Pendleton, California, begin arriving in the L.A. area via convoy.
	1630	Commander, Joint Task Force-Los Angeles (JTF-LA), arrives in L.A. area.
	1730	Active component soldiers from Ft. Ord, California, begin arriving in the L.A. area via C-141 aircraft.
	1800	The president announces that the CANG will be federalized.
2 May	0400	Final plane with active component soldiers arrives.
	1100	Approximately 6,150 CANG troops are deployed on the street, with 1,000 more in reserve; 1,850 soldiers from the 7th Infantry Division are in staging areas; marines prepare for deployment.
	1900	First active component troops deploy on the street; a battalion of marines replaces 600 CANG soldiers.
	2359	More than 6,900 CANG soldiers are deployed, with 2,700 more in reserve. Approximately 600 marines are deployed, but most active component U.S. Army and U.S. Marine Corps personnel remain in staging areas.
9 May	1200	CANG reverts to state status, ending federalization; active component forces begin redeploying home.
13-27 May	-	CANG releases troops from state active duty, returning them to "part time" status.
Source: Compiled from Harrison (1992), Delk (1995), and various CANG after-action reports.		

Large Venue Structure Fires (Conflagrations)

A conflagration is a fire occurring primarily in cities or towns, with the potential to rapidly spread to adjoining structures. These fires have the potential to damage and destroy homes, schools, commercial buildings, and vehicles. Conflagrations are rare in modern developed cities, but could happen after an earthquake or during civil unrest. Ignitions could occur throughout the city simultaneously. Studies estimate that 100–200 fires could follow a large earthquake in the Los Angeles County area. Such a large number of fires would easily overwhelm the capabilities of the fire department. Fires in the county's power distribution network can create large power outages.

Large Venue Fires Secondary to Urban Structure Fires

A large percentage of structure fires in Los Angeles County occur in places where people live. The leading cause of these fires is heat from electrical equipment, matches and lighters, electrical short-circuit or arc, and heat from wood- or paper-fueled equipment. Such equipment includes electric stoves, portable space heaters, and electric heaters.

Most cities in Los Angeles County have hotels, businesses, and educational buildings, the second leading type of buildings in which fires occur. In the core of the population centers, buildings are situated closely together.

At times, fire separation walls have been modified in such a way that fire walls could be breached, so the spread of fire due to the lack of firewalls could be a problem. Most of Los Angeles County's population centers consist of closely situated multiple office buildings, small businesses, warehouses, and restaurants. In these areas, there is a moderate risk of a fast-spreading multiple-structure fire. Other parts of the county are spread out enough so that the chances of a large structural fire traveling from one building to another, or to multiple other buildings, is relatively low.

Large Venue Fires Secondary to Wildland-Urban Interface Fires

Although new emphasis has been placed on the problem of structure loss and damage associated with wildland fires, the problem is an old one. During the past 30 years, frequent conflagrations in California have resulted in losses of structures, primarily homes. After major California fires, reports that identified the fire problem and provided guidance for mitigation were generated (California Department of Conservation, 1972; California Department of Forestry, 1980; County Supervisors Association of California, 1965; Howard and others, 1973; Moore 1981; Radtke 1983). Generally, these reports were commissioned by state and local government agencies. With some exceptions (Dell [n.d.]; Radtke 1982), the target audiences were public officials and fire professionals. Many of these wildland/urban fire reports were comprehensive, providing recommendations, including technical specifications, for urban planning, fire suppression capabilities, vegetation management, and building construction. However, despite the production of these reports, the wildland/urban interface fire problem has continued with little abatement.

Structure survivability is the probability that a building will not suffer major structural damage during a fire. A structure's survivability depends on the structure's resistance to ignition, and on the ability to suppress any ignitions that might occur. Thus, theoretically, for a given likelihood of structure survival, a variety of ignition resistance levels can he balanced by compensating suppression capabilities. This introduces the idea of trade-offs—in this case, ignition resistance for suppression capabilities, and vice versa.

Structure survival can be examined in greater detail. The ignition aspect of structure survival can be further defined in terms of the structural fire performance, the fire exposure, and the fire severity conditions. Similarly, the suppression aspect can be defined in terms of suppression availability, safe access to the structure, and fire severity conditions.

Universal Studios Fire, 2008

It was the second fire at the historic site in nearly two decades, leveling facades, hollowing out buildings, and creating the kind of catastrophe filmmakers relish recreating. This time around, thousands of videos chronicling Universal's movie and TV shows were destroyed in the blaze.

The blaze broke out on a sound stage featuring New York brownstone facades around 4:30 a.m. at the 400-acre property, Los Angeles County Fire Chief Michael Freeman said. The fire was contained to the lot but burned for more than 12 hours before the final flames were extinguished.

The iconic courthouse square from "Back to the Future" was destroyed, and the famous clock tower that enabled Michael J. Fox's character to travel through time was damaged, fire officials said. Two mock New York and New England streets used both for movie-making and as tourist displays were a total loss, Los Angeles County Fire Inspector Darryl Jacobs said.

An exhibit housing a mechanically animated King Kong that bellows at visitors on a tram also was destroyed.

All three sites were either damaged or destroyed during another fire at Universal Studios in November 1990. That fire caused $25 million in damage and was started by a security guard who was sentenced to four years in prison after pleading guilty to arson.

Concerns for air quality due to the acrid smoke prompted the South Coast Air Quality Management District to send a chemist to take air samples at the scene, said spokesman Sam Atwood.

The fire broke out along New York Street, where firefighting helicopters swept in for drops and cranes dumped water on the flames. A thick column of smoke rose thousands of feet into the air and could be seen for miles.

Several firefighters suffered minor injuries. One firefighter and a Los Angeles County sheriff's deputy were slightly hurt when a pressurized cylinder exploded inside the building housing the videos.

Meyer estimated there were 40,000 to 50,000 videos and film reels in a vault that burned but said duplicates were stored in a different location. Firefighters managed to recover hundreds of titles.

Universal Studios, nine miles north of downtown Los Angeles, has thrill rides and a back lot where movies and television shows are filmed, including scenes from "War of the Worlds," "When Harry Met Sally" and "Scrubs." (Associated Press).

Transportation Incidents

Because of the tremendous volume of transportation (commercial and private) into and out of Los Angeles County, the potential for a disastrous transportation-related event exists. Generally, transportation accidents are incidents that are handled by local jurisdictions or by jurisdictional mutual aid responses. A transportation accident, combined with a volatile hazardous substance or a large number of people, has the potential for becoming an event that requires a major mobilization of local, county, state, and federal agencies.

According to the Department of Transportation, from 1994 to 2000 there were more than 1,800 fatal tractor-trailer accidents in the state, and from 1990 to 2001 more than 4,200 train accidents.

Aircraft Accident

Airline crashes are listed as a less significant hazard because individually they are less likely to result in a state or federal disaster declaration. However, the state OES recognizes the severity of these incidents because they often lead to deaths and injuries.

Current Synopsis	PDF Report(s) (Published)	Event Date	Probable Cause Released	Location	Make / Model	Regist. Number	Event Severity	Type of Air Carrier Operation and Carrier Name (Doing Business As)
Probable Cause	Factual (8/25/2003) , Probable Cause 9/29/2009)	2/16/2000	9/17/2003	Rancho Cordova, CA	Douglas DC-8-71F	N8079U	Fatal (3)	NSCH Part 121: Air Carrier Emery Worldwide Airlines Inc.
Probable Cause	Factual (5/22/2003) , Probable Cause (5/29/2003)	1/31/2000	5/29/2003	Port Hueneme, CA	Douglas MD-83	N963AS	Fatal(88)	SCHD Alaska Airlines Inc.
Probable Cause	Factual (5/29/2003) , Probable Cause (8/5/1993)	2/1/1991	8/5/1993	Los Angeles, CA	Boeing 737-300	N388US	Fatal (34)	SCHD USAir
Probable	Factual (8/5/1993) ,	12/7/1987	1/4/1989	San Luis Obispo,	British Aerospace	N350PS	Fatal	SCHD Pacific

Current Synopsis	PDF Report(s) (Published)	Event Date	Probable Cause Released	Location	Make / Model	Regist. Number	Event Severity	Type of Air Carrier Operation and Carrier Name (Doing Business As)
Cause	Probable Cause (1/4/1989)			CA	BAE-146-200		(43)	Southwest Airlines

Most Recent Accident at LAX

It was just after 6:00 pm on the evening of February 2, 1991, and USAir flight 1493 was preparing to land at Los Angeles International Airport in California. Six crew members and 83 passengers were aboard the 737 during its three-hour flight from Columbus, Ohio. On the ground, SkyWest's flight 5569 was preparing for takeoff. The Metroliner carrying 10 passengers and two crew was bound for Palmdale, California, flying one of the many rush hour commuter flights out of the Los Angeles area. USAir 1493 was cleared for the ILS 24L approach as SkyWest 5569 was taxing away from the gate toward runway 24L. Due to traffic, SkyWest 5569 was cleared to taxi to 24L and enter at the intersection of taxiway 45, some 2,200 feet from the runway threshold.

As the SkyWest Metro awaited its takeoff clearance, USAir 1493 touched down near the threshold of runway 24L and shortly thereafter slammed into 5569. Both aircraft skidded down the runway, the Metro crushed beneath the 737's fuselage. The wreckage came to rest on the far side of the taxiway against an empty building. All 12 in the SkyWest aircraft were killed, as were 21 people in the USAir 737, including the captain.

Clearly both aircraft believed they had sole use of the runway at the time of the crash. In order to determine the origin of the confusion, a careful analysis of radio transcripts and ATC procedures at Los Angeles International was begun. After receiving clearance from Clearance Delivery, the flight strips go directly to the local controller (LC), bypassing the ground controller (GC). While this lessened the GC's workload by not having to mark the flight strips, it actually increased the LCs' workload by denying them information regarding the aircraft's position on the field. Aircraft were allowed to request intersection departures directly from the GCs. Because SkyWest 5569 was taxing from the south side of the airport, it had been in contact with both GC1 and GC2 on its way to runway 24L and had been cleared to hold short at taxiway 45 before contacting LC2.

In its initial call to LC2, it reported "at [taxiway] 45 we'd like to go from here if we can." After the accident, LC2 reported that she had not heard the "at [taxiway] 45" part of the transmission. Because the flight strips bypassed the GCs, there was no indication for LC2 as to the aircraft's position. LC2 then cleared 5569 to taxi up to and hold short of runway 24L, which was acknowledged. During this time, another flight, Wings West 5006, had just landed and was attempting to clear the runway. The crew had inadvertently changed frequencies and was out of contact with LC2. SkyWest 5569 was cleared into position and hold on runway 24L.

Communications with Wings West 5006 was reestablished just after this instruction, and several seconds were spent with unnecessary transmissions regarding the loss of communication. Southwest 725 was also preparing for takeoff at the time and LC2 also cleared it to taxi up to and hold short of runway 24L. Just after this, USAir 1493 called for landing clearance "on the left side, two four left." LC2 confirmed that Southwest 725 was holding short and then cleared 1493 to land. Shortly thereafter, Wings West 5072 called ready for departure. There was no flight strip in front of LC2 for 5072, so she and several others began a search for it.

It was found still at the Clearance Delivery station, believed to still be waiting for initial contact. Just after the strip was found, LC2 saw 1493 touchdown and cleared 725 to taxi into position and hold. Just seconds after this transmission, 1493 collided with 5569 still sitting in position and holding at the intersection of taxiway 45 and runway 24L.

The first officer of 1493 reported that the touchdown was normal. As the nose was being lowered, he reported that the landing lights began to reflect on 5569's propellers and its rear position light became visible. Maximum braking was applied, but there was insufficient space and time to avoid the collision. He did not report hearing that another aircraft had been placed into position on runway 24L even though 1493 had come on to LC2's frequency prior to the instructions.

LC2 was clearly distracted by several events in the few short minutes prior to the accident. Allowing 5569 to make an intersection departure was acceptable and she cleared the flight into position prior to giving 1493 landing clearance. The initial confusion with 5006 caused her to lose awareness of 5569's position. The further confusion regarding the flight strip of 5072 caused her again to avert her attention from the situation on the active runways. She later said she had believed 5072 taxied in front of the tower to runway 24L was actually 5569 and formed a mental picture that all was correct.

The NTSB cited many factors as contributing to the cause of the accident. Primary was Air Traffic Control procedures at Los Angeles International Airport. The FAA later required LAX to revise its flight strip handling to relieve the local controllers (LCs) from carrying the full responsibility of flight strip marking and handling and allowing better awareness during high workloads. LC2 was also cited for becoming distracted and allowing a breakdown in awareness during the incident period. The NTSB also cited lighting placement on the Metro, showing that its light blended with and were not conspicuous against the runway environment background during low-light periods. Although both flight crews were operating within their ATC clearances, they were both still responsible for "see and avoid" operations since conditions were VFR (Airdisasters.com).

Train Accidents

Train derailments are so localized that the incidents themselves would not constitute a disaster. However, if there are volatile or flammable substances on the train and the train is in a highly populated or densely forested area, death, injuries, damage to homes, or wild fires could occur.

The following table shows rail accidents for 2005–2010.

Year	Total Accidents/Incidents	Number of Fatal Accidents/Incidents	Number of Fatalities	Total Nonfatal Conditions
2005	218	14	24	241
2006	216	15	16	144
2007	198	12	13	152
2008	212	5	29	220
2009	173	9	9	129
2010	145	9	10	108

Glendale Derailment

On January 26, 2005, a southbound Metrolink commuter train collided with a sport utility vehicle (SUV) that had been abandoned on the rails near the Glendale/Los Angeles city boundary. The train jackknifed and struck trains on both sides of it, one a stationary freight train and the other a northbound Metrolink train traveling in the opposite direction. The collisions resulted in 11 deaths and 100 to 200 injuries.

The driver of the SUV left the vehicle prior to the crash and was later charged and convicted of 11 deaths and arson.

Subsequent criticism focused on the issue of train configuration. Many commuter trains use a “pusher configuration” to avoid turnaround maneuvers and facilities required to reverse a train’s direction. This means the trains are pushed from the back by the locomotive. There were assertions that this type of configuration made the accident worse, and claims that if the engine had been in the front, the train might not have jackknifed and caused the second Metrolink train to derail.

To increase rider safety, Metrolink temporarily roped off the first cars in all of their trains and allowed passenger seating in the second car and beyond. Metrolink gradually modified this policy. As of 2007, the line permitted passengers to sit in a portion of the first car when in "push mode," but did not allow seating in the forward-most section of the first car.

Chatsworth Derailment

The September 12, 2008, Chatsworth train accident, resulting in 25 deaths and injuring more than half the train’s passengers, spawned significant changes to national rail safety standards. The head-on collision occurred in Chatsworth, a neighborhood of Los Angeles located at the western edge of the San Fernando Valley, and involved a Metrolink commuter train and a Union Pacific freight train. All three locomotives, the leading Metrolink passenger car, and seven freight cars derailed. According to the National Transportation Safety Board (NTSB), the Metrolink train engineer most likely caused the collision because he was distracted by sending text messages while on duty. He failed to obey a red stop signal that indicated it was not safe to proceed from the double track into the single-track section and, thus, collided head-on with the freight train that was traveling on the same single-track section from the opposite direction.



The NTSB also believed that deployment of a positive train control (PTC), which is a safety backup system that can automatically stop a train and prevent train collisions, could have avoided the disastrous collision and derailment. Although not required at the time of the Chatsworth accident, PTCs have been a high priority for the NTSB following similar collisions since the mid-1980s, and voluntary implementation has been uneven and incremental across the country since that time - primarily due to the high costs associated with installation and maintenance. Following the Chatsworth collision, Metrolink expanded the existing automated train stop system used on 30 miles of Metrolink track in Orange County across its 350-mile system. Metrolink's automated train-stop system will automatically apply the brakes to stop a train if the engineer fails to respond to a warning within eight seconds.



(http://wapedia.mobi/en/2008_Chatsworth_train_collision)

In May 2007, prior to the Chatsworth collision, a bill requiring the installation and operation of PTC systems was introduced in the House of Representatives. The bill was passed by the House in October 2007 and moved on to the Senate, where it was being heard at the time of the Chatsworth collision. Following testimony by California Senator Boxer and others regarding the Chatsworth crash and the potential for avoidance of similar events through the mandatory deployment of PTC systems, the Senate passed the bill in October 2008. The legislation signaled that, despite the implementation costs, railroad employee and general public safety warranted mandatory and accelerated installation and operation of PTC systems.

The Railroad Safety Improvement Act of 2008 (RSIA08) requires the installation and operation of PTC systems on all main lines, meaning all intercity and commuter lines—with limited exceptions and on freight-only lines when they are part of a Class I railroad system, carrying at least 5 million gross tons of freight annually, and carrying any amount of poison- or toxic-by-inhalation (PIH or TIH) materials. The RSIA08 mandates that widespread implementation of PTC across a major portion of the U.S. rail industry be accomplished by December 31, 2015. Each subject railroad is required to submit to the Federal Rail Administration by April 16, 2010, an implementation plan indicating where and how it intends to install PTC systems by December 31, 2015.

(http://www.fra.dot.gov/downloads/Pub.%20L.%20No.%20110-432%20in%20pdf.pdf)

Highway Incidents

On any given day, Los Angeles County highways have thousands of large trucks carrying all sorts of cargos (including hazardous materials). The potential for a highway accident involving one or more trucks carrying volatile cargo is great. Generally, these accidents are handled as incidents by the appropriate jurisdiction; however, because of the dense population and sheer volume of vehicular traffic, the risk of a crash becoming a catastrophic event grows.

In 2001, 429,000 large trucks (gross vehicle weight rating greater than 10,000 lbs.) were involved in traffic crashes in the United States: 4,793 were involved in fatal crashes. A total of 5,082 people died (12% of all the traffic fatalities reported in 2001), and an additional 131,000 were injured in those crashes.

In 2000, large trucks accounted for 4% of all registered vehicles and 7% of total vehicle miles traveled (2001 registered vehicle and vehicle miles traveled data not available). In 2001, large trucks accounted for 8% of all vehicles involved in fatal crashes and 4% of all vehicles involved in injury and property-damage-only crashes.

According to a 1999 study performed by the FMCSA (*Cost of Large Truck- and Bus-Involved Crashes*), the average cost per crash involving a large truck is $75,637. With 429,000 large truck-related crashes in 2001, the total monetary expense for 2001 is minimally $32,448,273,000 using 1999 cost estimates.

Chain-reaction accidents on crowded interstate highways that intertwine Los Angeles County are also another consideration. These events can quickly grow into localized disasters that overstrain local responders. Potentially, they could expand into catastrophic incidents involving hazardous materials, mass casualties, fire, and transportation disruption. Depending on the occurrence, the response could involve mass evacuation, mutual aid, and other aspects of managing a disaster.

Maritime Accidents

There is ever-present danger of boat collisions and crashes in the crowded waters off Los Angeles County. There is also the constant potential for plane crashes in the ocean. A recent development was enforcement of FAA policy mandating disaster response plans for planes taking off over the ocean from Los Angeles International Airport. The U.S. Coast Guard, L.A. County Lifeguards, the County Fire Department, the L.A. City Fire Department, the L.A. County Sheriffs, and other allied agencies have developed a response plan for airliner crashes in the Santa Monica Bay.

Part of the plan calls for personnel from L.A. County Fire Station 110, USAR1, and the Air Operations Section to fly rescue swimmers to the crash site, deploy them from helicopters with inflatable life boats, and begin rescue operations while other agencies respond with boats and helicopters to remove people from the water. These "Blue Water Rescue" teams may also be dispatched to boating accidents in the open ocean.

U.S. ports host many foreign-flag vessels. Operators of shallow-draft vessels are more likely to be U.S. corporations. In many ports, there are more shallow-draft vessel movements than deep-draft arrivals. In 1993, nearly 5,200 towing vessels, 26,800 dry cargo barges, and 4,000 tank barges traveled through U.S. waterways (U.S. Army Corps of Engineers, 1993), most of them stopping at coastal ports while on canal or river voyages.

Many commercial vessels carry passengers, heightening the need for attention to safety. Ferries and specialty vessels, such as casino ships and sport fishing boats, number in the thousands and may carry several hundred passengers at once (National Research Council, 1995).

The cruise industry is a growing maritime presence, with single ships carrying as many as 3,300 persons and many of the leading cruise markets in or adjacent to U.S. waters (National Research Council, 1995).

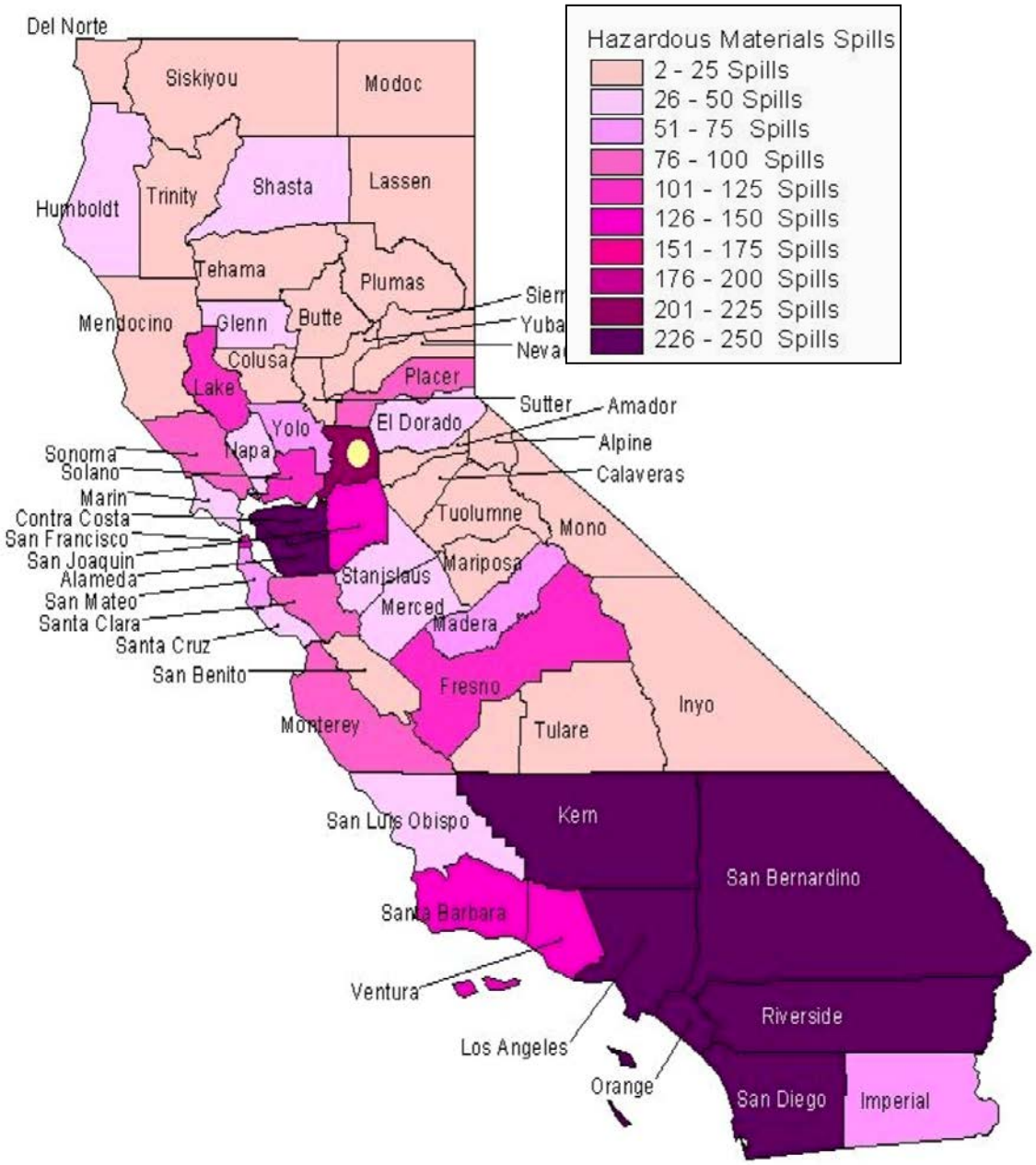
Public reaction to major ship accidents and resulting catastrophic oil spills have been the driving force behind major government initiatives to develop new or improved VTS systems in U.S. ports. In 1971, two tankers collided in the fog near the Golden Gate Bridge in San Francisco, spilling about 3,000 tons of heavy oil and setting in motion legislation that led to the VTS systems now installed in San Francisco, Puget Sound, New York, and Houston. A subsequent report stated that the overriding cause of the accident was the lack of U.S. Coast Guard authority to control traffic, a situation that allowed vessels to forgo communications with traffic advisers (Office of Technology Assessment, 1975). Instead of counting on radar and radio technologies, the ships used only foghorns, which went unheard (Office of Technology Assessment, 1975).

The years following that accident were marked by many maritime safety initiatives, including improvements in navigation information technologies and the deployment of VTS systems. But in 1989, when the **Exxon Valdez** ran aground outside the Prince William Sound VTS surveillance area and spilled 35,000 tons of Alaskan crude oil, the resulting damage and clean-up costs totaled several billion dollars (Office of Technology Assessment, 1990) and provoked enduring public distrust of assurances about tanker safety. This accident and its aftermath led to the congressional legislation that, in turn, resulted in the VTS-2000 program.

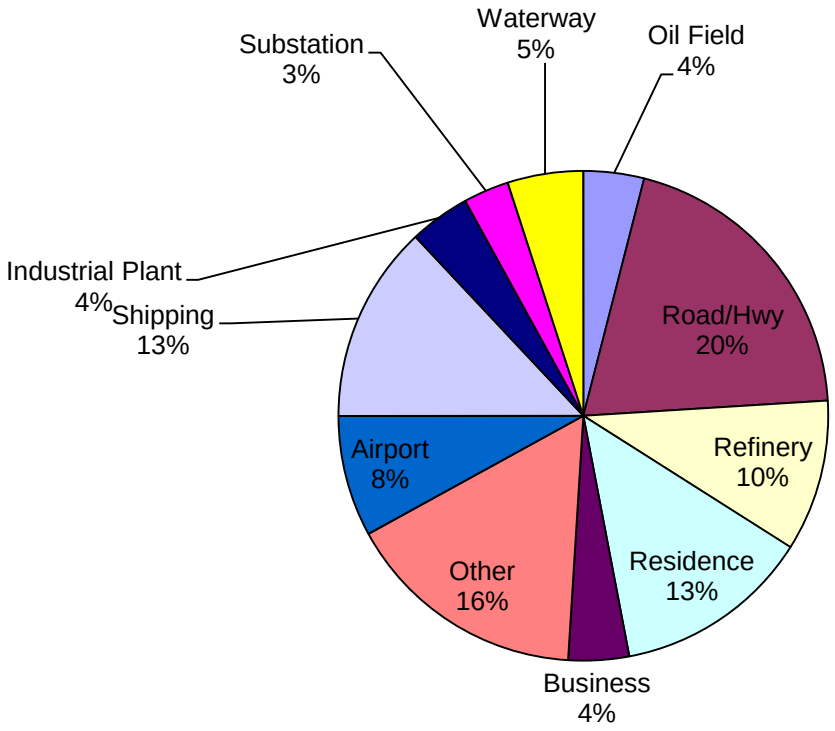
The public outcry over maritime safety tends to run in cycles, reaching a peak just after major accidents and then appearing to diminish with time. However, with major oil spills occurring around the world and spills reported regularly in the United States, the safety of U.S. ports and waterways is likely to remain a continuing concern.

Hazardous Materials

Hazardous materials are everywhere and are accidentally released or spilled many times during any given day. The attached chart lists the most common sites for spills in California, based on an analysis of 173 reports for spills occurring between October 9 and October 17, 2002.



Locations of California Hazardous Material Spills Between October 9-17, 2002



Regulatory Programs

Hazardous materials are substances that are flammable, combustible, explosive, toxic, noxious, and corrosive, an oxidizer, an irritant, or radioactive. A hazardous material spill or release can pose a risk to life, health, or property. An incident can result in the evacuation of a few people, a section of a facility, or an entire neighborhood.

Applicable Laws and Regulatory Programs

There are a number of federal laws that regulate hazardous materials, including the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Resource Conservation and Recovery Act of 1976 (RCRA), the Hazardous Materials Transportation Act (HMTA), the Occupational Safety and Health Act (OSHA), the Toxic Substances Control Act (TSCA), and the Clean Air Act.

Title III of SARA, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), was established to encourage and support emergency planning efforts at the state and local levels, and to provide the public and local governments with information concerning potential chemical hazards present in their communities.

The law requires facilities to furnish information about the quantities and health effects of chemicals used at the facility, and to promptly notify local and state officials whenever a significant release of hazardous materials occurs.

California law established the Unified Program which consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs. The programs are the Hazardous Materials Business Plan/Emergency Response Plan, Hazardous Waste/Tiered Permitting, Underground Storage Tanks, Above-Ground Storage Tanks, California Accidental Release Prevention Program, and the Uniform Fire Code Hazardous Materials Management Plan. The state agencies responsible for these programs set the standards for their programs, while local governments implement and enforce the standards. Cal EPA oversees the implementation of the program as a whole (California Code of Regulations, Title 27, Division I, Subdivision 4, Chapter 1, Sections 15100–15620).

The Unified Program is implemented at the local level by government agencies certified by the Secretary of the California EPA. These certified unified program agencies (CUPAs) have typically been established as a function of a local environmental health or fire department. Some CUPAs also have contractual agreements with one or more other local agencies, "participating agencies" (PAs) that implement one or more program elements under the oversight of the CUPA.

At the state level, Hazardous Materials Business Plan/Emergency Response Plans (California Health and Safety Code, Chapter 6.95) seek to prevent or minimize the damage to public health and safety and the environment from a release or threatened release of hazardous materials, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle hazardous materials in quantities equal to or greater than 55 gallons, 500 pounds, or 200 cubic feet of gas or extremely hazardous substances above the threshold planning quantity (40 CFR, Part 355, Appendix A) to:

- Inventory their hazardous materials
- Develop an emergency plan
- Implement a training program for employees

It should also be noted that a hazardous materials business plan regulates most hazardous materials facilities in the state. There are approximately 140,000 such businesses, which range from the smallest gas station to the largest chemical facility.

There are a number of legally mandated programs requiring businesses to conduct hazard analysis and risk assessment. The existing requirements include the following:

California Accidental Release Prevention Program (Ca1ARP) required pursuant to H&SC 25531, et seq., implements the federal Accidental Release Prevention program, with additional California-specific requirements. This program requires any business with more than a threshold quantity of a regulated substance in a process, unless exempted, to implement an accidental release prevention program. There are three levels for the program, with businesses subject to levels two and three required to conduct a hazard assessment. Businesses may be required to prepare and implement a risk management plan (RMP). A map of facilities that have prepared a risk management plan or Ca1ARP document follows this section of the emergency plan. This map was developed through the Environmental Protection Agency (EPA) for facilities that submitted RMP documents to EPA by June 21, 1999. A map is provided in attachment 10, along with a list of Certified Unified Program Agency (CUPA) and Participating Agencies (PAs) in LEPC Region 1.

Air Toxics "Hot Spots" Information and Assessment Act required pursuant to H&SC 44300, et seq., requires emitters of hazardous air contaminants to conduct health risk assessments to evaluate those emissions. This program is designed to identify, assess, and control ambient levels of hazardous air pollutants. It seeks to collect and evaluate information concerning the amounts, exposures, and short- and long-term health effects of hazardous substances released into the atmosphere.

California Refinery and Chemical Plant Worker Safety Act, required pursuant to California Labor Code § 7850 et. seq., evaluates chemical process safety when dealing with the risks associated with handling or working near hazardous chemicals. It is intended to prevent or minimize the consequences of catastrophic releases of acutely hazardous, flammable, or explosive chemicals. The law requires the employer to conduct a hazard analysis for identifying, evaluating, and controlling hazards involved in a process. While focused on employee protection, a successful program will have the effect of also protecting the surrounding community.

Worker Health and Safety Regulations (federal: 29 CFR 1910.120, and state: 8 CCR 5192) require employers to identify, evaluate, and control hazards employees may encounter during hazardous waste operations and emergency response.

Hazardous Materials Transportation

Federal emergency planning requirements include the formation of local emergency planning committees (LEPCs). The LEPC is required to evaluate facilities using threshold quantities of extremely hazardous substances (EHS), and determine which facilities are at risk of a release or subject to additional risk due to their proximity to another facility using EHS. The LEPC is also required to identify hazardous materials transportation routes. This requirement has led Region I LEPC to develop a specific transportation element to its plan. The following represents the Region I transportation element:

Transportation of hazardous materials by air, land, or water poses a significant need to plan and coordinate emergency resources necessary to respond to hazardous materials spills and releases. These types of incidents could affect several million Californians and are potentially hazardous to both the local community, and to those traveling near the incident site. First, we will discuss the different modes of transportation and the unique challenges presented for planners and emergency responders.

Air

The Southern California region has several major air transportation facilities. In some instances, there may be hazardous materials incidents involving air cargo either on the aircraft or on the ground. Initial response to these incidents would be provided by airport emergency response personnel. The need may arise for additional resources to respond. Response efforts must be coordinated to ensure all personnel are made aware of the material involved and of the potential hazards. In the event of a crash of an aircraft, the major hazardous materials concerns will be fuel from the aircraft, hydraulic fluid, and oxygen systems. The threat posed by onboard hazardous cargo will be minimal. Regulations on hazardous materials shipments by air are found in 49 CFR Section 175.

Water

Two major ports serve the Southern California region. These are the Port of Los Angeles and the Port of Long Beach. The prime concern for these two major ports would be releases of petroleum products from both oil tankers and other large oceangoing vessels. Not only is there a significant potential from fire and explosion, the environmental effects could be catastrophic. Additionally, many other types of hazardous materials may be shipped by bulk or containerized cargo. Planners must recognize potential risks associated with vessels and port facilities in their hazard assessment. Response to water-related incidents is coordinated through the U.S. Coast Guard and the California Department of Fish and Game. Regulations governing transportation of hazardous materials by vessel are found in 49 CFR Section 176.

Ground

Ground transportation provides the largest movement of hazardous materials and will generate the majority of incidents that will be confronted by local emergency response personnel. The three modes of ground transportation are rail, highway, and pipeline.

Rail is unique in both the quantity and types of hazardous materials that can be involved in one incident. Collisions, derailments, and mechanical failure, as well as loading and unloading, can all result in very serious hazardous materials incidents. A critical consideration for planners is a careful evaluation of the rail traffic in their jurisdiction. Rail companies as well as product manufacturers have emergency response teams available to assist local emergency responders. The United States Department of Transportation governs the transportation of hazardous materials by rail. The regulations are found in 49 CFR Section 174. Additional oversight is provided in California by the Public Utilities Commission.

Highway-related hazardous materials incidents account for the vast majority of situations faced by local responders. Highway incidents range from minor releases of diesel fuel, to multiple vehicle accidents involving large quantities of multiple types of hazardous materials. A concern for planners is the fact that these incidents can occur anyplace throughout the region. Multiple agency coordination is essential for successful control and mitigation of these incidents. Section 2454 of the California Vehicle Code confers authority for incident command at the scene of an on-highway hazardous substance incident to the appropriate law enforcement agency having primary traffic investigative authority on the highway where the incident occurs. The local governing body of the city may assign the authority to the local fire protection agency.

Pipeline incidents will typically involve compressed natural gas or petroleum products. An important aspect for planners to consider is that pipelines are frequently out of sight and out of mind. The Southern California region is honeycombed with underground pipelines ranging from a few inches to several feet in diameter. Pipelines transport products from as far away as Texas for use by local consumers. An important source of information on underground pipelines is Dig Alert. Regulation of pipeline activity is governed by the U.S. Department of Transportation and the California Public Utilities Commission.

Potential Effects of a Hazardous Materials Incident

As previously mentioned, highway accidents and incidents will constitute the majority of emergency response situations. There are two distinct facets that must be addressed in a local emergency action plan. Planners must consider the local community with fixed facilities and those individuals in transit. The following is illustrative of typical concerns that planners will encounter in addressing hazardous material occurrences.

Residential and Business Community

Chemical spills on streets and highways can affect the public in one or more of the following ways:

- Compelling shelter-in-place measures
- Evacuations
- Restriction or detour of local traffic
- Damage to homes and businesses
- Injury, illness, or death

Because of these potentially dangerous situations, it is necessary for emergency responders to be familiar with requirements for hazmat spill notification and to obtain and direct the resources necessary to protect public health and the environment. The following requirements address immediate spill notification:

- California Health and Safety Code Section 25507 2
- California Vehicle Code 2453 3
- California Government Code 8574.17 4. 42 U.S.C. 9602

In addition, provisions for response recovery are provided if the National Response Center is contacted (refer to 40 CFR Part 310). All agencies within LEPC Region I are encouraged to report all spills and releases to the Office of Emergency Services and the National Response Center when there is any significant or potential threat to the public. Additionally, public information through the news media to the public is a priority of the Cal OES and the Region I Local Emergency Planning Committee.

Commuter/Delivery Traffic

In addition to the surrounding locale, travelers going through or near transportation incidents may be affected in several ways:

- Exposure to harmful or flammable chemicals resulting in injury or illness
- Delayed travel
- Accidents
- Vehicle damage due to chemical contact

Agencies with on-highway responsibility in LEPC Region I should become familiar with shipping corridors and traffic patterns. Hazardous material transporters are also required to report incidents involving hazardous materials or wastes pursuant to the following regulations:

- Title 13 California Code of Regulations, Section 1166 2
- Title 49 Code of Federal Regulations, Part 17

Region I Transportation Needs

Research has indicated that the majority of hazardous materials incidents occur in the transportation arena. This fact strongly suggests that the region make the following recommendations for further transportation planning assessment:

- Identify various surface transporters within the region
- Determine the requisite level of training as it relates to transportation routes and notification requirements
- Evaluate emergency response resources for both public and private hazardous materials response teams

- Prioritize response resources in areas unable to respond to proportionally higher number of incidents
- Develop standard guidelines for evacuation of populations affected by transportation-related incidents
- Evaluate the need to perform transportation risk assessments for selected high-priority areas

Emergency planning principles and practices indicate that emergency plans include all the hazards existing within a jurisdiction. Cal OES has developed the *Emergency Planning Guidance for Local Government* to help local governments conduct emergency planning. Information on hazard analysis is also included in this guidance document.

Site-Specific Information

Information about specific sites involving hazardous materials business plans and inventories, waste generator permits, Cal ARP, spills, and site remediation may be requested in writing from the Los Angeles County Fire Department Web site:

(http://fire.lacounty.gov/HealthHazMat/HHMDRecordsRequest.asp).

Please include the complete address of the site in question, including the city and zip code and the requestor's name, address, telephone and fax numbers, and a self-addressed, stamped envelope.

Write to:

Public Health Investigation (PHI)
Custodian of Records
5555 Ferguson Drive, Suite 120-04
Commerce, CA 90022
Phone: (323) 890-7806 / Fax: (323)728-0217

The processing of a request will take approximately two weeks. In order to expedite the request, please indicate the section/unit (i.e., Site Mitigation Unit, Cal ARP Program) that handles the information being requested. (Los Angeles County Fire Department)

Site Mitigation Units

The Site Mitigation Unit's (SMU) goal is protection of public health and the environment while facilitating completion of site cleanup projects in an expeditious manner. SMU staff oversees the work of private environmental consultants to verify that contaminated sites are adequately characterized, appropriate remedial actions are implemented, and cleanup standards are met. Upon completion of site assessment and implementation of the required remedial action a closure letter/no further action (NFA) letter is issued to the responsible party. The NFA is recognized by financial institutions, insurance companies, and other regulatory agencies.



The Los Angeles County Certified Unified Program Agency (LACoCUPA) established its Site Mitigation Unit (SMU) in 1986. Since 1986 SMU has issued closure for over 750 sites. SMU's voluntary oversight program operates per Health and Safety Code §101480, which allows oversight of certain contaminated sites. In addition, in May 2008, the Department of Toxic Substances Control (DTSC) delegated corrective action oversight authority to LACoCUPA under chapter 6.5 of Division 20 of California Health and Safety code to implement corrective action under consent agreement at CUPA facilities within its jurisdiction. SMU voluntary oversight and corrective action oversight programs are options in addition to DTSC and Regional Water Quality Control Board (RWQCB) oversight programs for residents and businesses of Los Angeles County seeking oversight in a cost-effective and timely manner for cleanup of their contaminated properties.

At present, SMU oversight is limited to soil-only remediation. Verified groundwater contamination requires additional oversight by the RWQCB or DTSC. Oversight authority for underground storage tanks (USTs) is provided by RWQCB, local city fire departments, or the Los Angeles County Department of Public Works.

Oversight services are provided on a fee-for-service basis. Service is provided in all cities of Los Angeles County except El Segundo, Glendale, Long Beach, Santa Fe Springs, and Vernon. Please contact Shahin Nourishad, supervising hazardous materials specialist, at (323) 890-4106 for additional information.

Emergency Response

Los Angeles County Area Plan for Hazardous Materials

The *Los Angeles County Area Plan for Hazardous Materials* is established pursuant to Health and Safety Code Section 25503 and Title 19 of the California Code of Regulations, commencing with Section 2720. This plan was formulated to supplement the *Los Angeles County Operational Area Emergency Response Plan (LACOAERP)*. Addendums provide more specifics than are provided in the *Los Angeles County Operational Area Emergency Response Plan*. The plan is designed to incorporate information gathered from known handlers of hazardous materials prior to an emergency release, with a plan of action once a release occurs. The plan also allows for pre-emergency planning and training of response personnel, and for coordination of available resources.

The objectives of the plan are as follows:

- Provide procedures and protocols for emergency rescue personnel, including the safety and health of those personnel
- Pre-emergency planning
- Provide notification and coordination of on-site activities with state, local, and federal agencies, responsible parties, and special districts
- Training of appropriate personnel
- On-site public safety and information
- Required supplies and equipment
- Access to emergency response contractors and hazardous waste disposal sites
- Incident critique and follow-up

Containment and Cleanup

The incident commander at a hazardous material incident is responsible for ensuring that hazardous waste generated at the scene is properly disposed of. Proper cleanup of hazardous waste in accordance with state and federal law is often quite costly; therefore, both state and federal funds have been set aside to aid local jurisdictions in paying for cleanup of emergency releases. In all hazardous waste cleanup efforts, the party responsible for the release has primary financial responsibility for proper removal of the waste. The person, firm, or corporation responsible for an unauthorized discharge shall initiate and complete all actions necessary for cleanup. Costs associated with the cleanup shall be the responsibility of the person, firm, or corporation. If, however, the responsible party is unable to finance cleanup, or is an unknown party, then the following state or federal funds may be accessed—provided criteria specific to each fund are met. The Los Angeles County Fire Department Health Hazardous Materials Division has considerable experience and expertise in accessing these funds, and is most familiar with the necessary criteria for each fund. The Los Angeles County Fire Department, Health Hazardous Materials Division, is designated to provide liaison and technical expertise to the incident commander in accessing state and federal cleanup funds.

Funding Agencies

Local Government

In the event that state or federal funding criteria are not met at any given incident, local government should maintain a fund that is readily available for costs associated with emergency response and mitigation measures for hazardous materials incidents.

State Government

Caltrans

Caltrans administers a fund for cleanup on hazardous materials spills that affect state highways and right of way. This does not include cleanup of hazardous materials beyond the right of way, even if the incident originated on a state highway.

Fish and Game (Fish and Game Code Section 12017)

(Fish & Wildlife Pollution Cleanup and Abatement Account)

Cleanup and abatement actions of materials threatening to pollute, contaminate, or obstruct waters of the state to the detriment of fish, plant, bird, or animal life.

Funds in the Fish and Wildlife Pollution Clean-up and Abatement Account shall be expended only if both of the following conditions exist:

The Department has made a reasonable effort to have the responsible party remove in a timely manner, or reimburse the Department for the cost of the removal, the substance causing the prohibited condition, pursuant to Section 12015.

Funds are not available for disbursement from the Emergency Reserve Account of the Hazardous Substance Account in the General Fund pursuant to Section 25351 or 25354 of the Health and Safety Code.

California Environmental Protection Agency (Health & Safety Code Section 25354)

(Toxic Substances Control Account for Hazardous Materials Incidents)

Administered by the Toxics Substances Control Program. Funds may be used for payment of all costs of removal or remedial action by the state or by a local agency, with the approval of the director.

To request funding, ask the OES warning control officer to contact the on-call duty officer of the California Environmental Protection Agency Department of Toxics Substance Control Division, and to inform the duty officer that EPA funding is requested. Give the name and telephone number of the local contact representative. The duty officer will contact the local government representative as soon as he/she is notified. If the incident is eligible, one of the following may occur:

Federal Government

U.S. Coast Guard

Clean Water Act Federal Pollution Fund (311k)

Primary for oil spills that affect navigable waterways

Environmental Protection Agency

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) Hazardous Substance Response Trust Fund

Primarily for hazardous materials spills (not oil)

Radiological Incidents/Accidents

There are two operating nuclear power plants (NPP) in California: the Diablo Canyon Power Plant in San Luis Obispo County, and the San Onofre Nuclear Generating Station in San Diego County. Two other nuclear power plants, Humboldt Bay and Rancho Seco, are not operational, but have spent fuel stored on-site.

State and local governments having jurisdiction within 10 miles of an operating nuclear power plant must plan, train, and conduct emergency exercises annually in accordance with federal regulations. Detailed emergency plans are maintained by each affected agency.

Four emergency classification levels (ECLs) have been established in federal regulations to characterize the severity of the emergency and the response actions required. The ECLs must be used as the foundation for emergency response planning, training, and exercises. ECLs are described in the table below.

As part of the planning basis, affected agencies must establish emergency planning zones (EPZs), which is an approximate 10-mile radius drawn around each plant site. The exact EPZ size is established to provide for substantial reduction in early severe health effects in the event of a worst-case core melt accident.

To date, there have been no deaths or injuries resulting from a nuclear emergency event at a California nuclear power plant. For this reason they are classified as a less significant hazard.

Emergency Classification Levels	ECL Description and Purpose	Populations Effected	Occurrences
Notification of Unusual Event	Issued when events have occurred that potentially could degrade the level of plant safety. No radioactive releases requiring emergency response are expected.	On-site only	Average 1–2 per year.
Alert	Issued when events have occurred that involve a substantial degradation of plant safety. Any radioactive releases are expected to be a fraction of federal exposure guidelines requiring protective actions.	On-site only	1 (SONGS, March 1999)
Site Area Emergency	Issued when events have occurred that involve the failure of major plant functions needed to protect the public. Radioactive releases are not expected to exceed federal exposure guidelines at the site boundary.	Site area, schools, beaches, & transient populations within the EPZ.	0
General Emergency	Issued when events have occurred that involve substantial core degradation or loss of containment integrity. Radioactive releases are expected to exceed federal exposure guidelines.	Designated areas within the (EPZ)	0

The Nuclear Regulatory Commission (NRC) regulates the operation of nuclear power plants in the Unites States. The NRC is responsible for ensuring that the NPPs in California are safe from hazards such as earthquakes and fires, as well as hazards from hostile sources such as terrorism. FEMA evaluates the ability of local and state governments to protect the public in the event of a nuclear power plant emergency.

Due to strict regulation of nuclear power plants in the United States, significant nuclear power incidents that can cause harm to the public have low probability of occurrence, and none have occurred in California.

Japan

The Fukushima Daiichi nuclear disaster (Fukushima Dai-ichigenshiryoku hatsudensho jiko) was a series of equipment failures, nuclear meltdowns, and releases of radioactive materials at the Fukushima I Nuclear Power Plant, following the Tōhoku earthquake and tsunami on 11 March 2011. The plant comprises six separate boiling water reactors designed and built by GE, and maintained by the Tokyo Electric Power Company (TEPCO). The Fukushima disaster is the largest of the 2011 Japanese nuclear accidents, and is the largest nuclear accident since the 1986 Chernobyl disaster, but it is more complex as multiple reactors and spent fuel pools are involved.

Explosion

An explosion is a rapid release of stored energy characterized by a bright flash and an audible blast. Part of the energy is released as thermal radiation (flash); and part is coupled into the air as air blast and into the soil (ground) as ground shock, both as radially expanding shock waves.

To be explosive, the material

1. Must contain a substance or mixture of substances that remains unchanged under ordinary conditions, but undergoes a fast chemical change upon stimulation.

2. This reaction must yield gases whose volume—under normal pressure, but at the high temperature resulting from an explosion—is much greater than that of the original substance.

3. The change must be exothermic in order to heat the products of the reaction and thus to increase their pressure.

Common types of explosions include construction blasting to break up rock or to demolish buildings and their foundations, and accidental explosions resulting from natural gas leaks or other chemical/explosive materials.

The rapid expansion of hot gases resulting from the detonation of an explosive charge gives rise to a compression wave called a **shock wave,** which propagates through the air.

The front of the shock wave can be considered infinitely steep, for all practical purposes. That is, the time required for compression of the undisturbed air just ahead of the wave to full pressure just behind the wave is essentially zero.

If the explosive source is spherical, the resulting shock wave will be spherical. Since its surface is continually increasing, the energy per unit area continually decreases. Consequently, as the shock wave travels outward from the charge, the pressure in the front of the wave, called the **peak pressure**, steadily decreases. At great distances from the charge, the peak pressure is infinitesimal, and the wave can be treated as a sound wave.

Behind the shock wave front, the pressure in the wave decreases from its initial peak value. At some distance from the charge, the pressure behind the shock front falls to a value below that of the atmosphere and then rises again to a steady value equal to that of the atmosphere. The part of the shock wave in which the pressure is greater than that of the atmosphere is called the **positive phase**, and, immediately following it, the part in which the pressure is less than that of the atmosphere is called the **negative or suction phase**.

Conventional structures, in particular those above grade, are susceptible to damage from explosions, because the magnitudes of design loads are significantly lower than those produced by most explosions.

The peak pressure in the blast pulse produced by 10 lb of TNT at a range of about 50 feet is approximately 2.4 psi (which is 348 psf!) with a duration of the positive phase of 7.7 ms. Conventional structures are not normally designed to resist blast loads.

Recent terrorist attacks demonstrate the types of damage that can be produced. The 1993 terrorist attack on the World Trade Center in New York City removed several thousand square feet of concrete floor slabs in the general area of the explosion, and severely damaged several buildings' communication,

transportation, and utility systems. Due to the inherent redundancy of the steel frames, the structures did not collapse.

The 1995 attack on the Alfred P. Murrah Federal Building in Oklahoma City revealed the vulnerability of conventional structural designs when subjected to blast loads. When a source is located at street level, the blast shock wave acts up against the underside of the floor slabs at upper stories. Floor slabs are not designed for this magnitude and direction of load - for this direction of load, the reinforcement is in the wrong place.

Explosion Hazards

There are many potential explosion hazards in Los Angeles County. Catastrophic explosions could be caused by the following:

- Exotic chemicals and substances
- Natural gas and propane
- Methane gas
- Gasoline and other liquid fuels
- Manufactured and military explosives

The origin of a catastrophic explosion may be any of the following:

- Stationary pressure vessels and tanks
- Rail tank cars
- Truck tanks
- Pipelines
- Cargo ships carrying explosive materials

Explosions can be triggered by the following:

- Manual or accidental detonation of explosives
- Fire/open flame
- Electrical discharge
- Chemical interaction
- Radiological reaction
- Faulty containment
- Equipment malfunctions

Explosion Consequences

A catastrophic explosion could challenge responders to deal with the following:

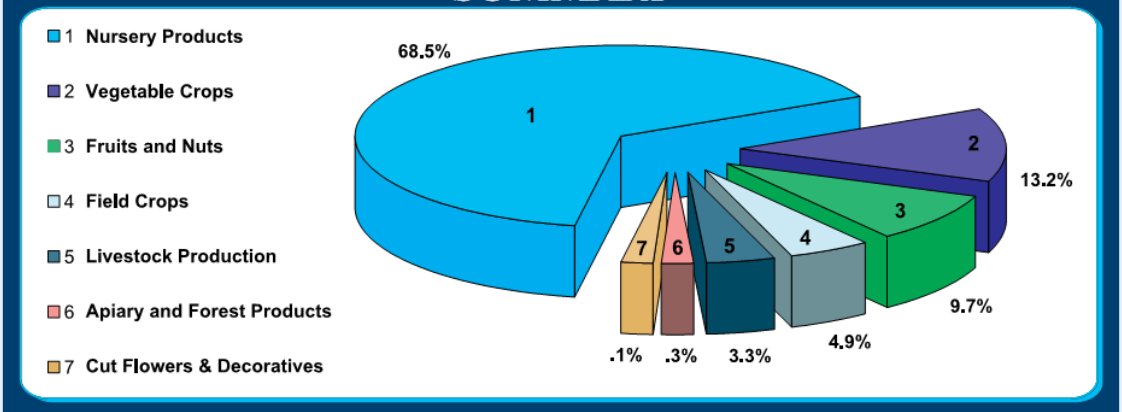
- Mass casualties
- Fires
- Building and property destruction
- Infrastructure failure (telecommunications, transportation, etc.)
- Lifeline interruption
- Chemical or radiation contamination
- Debris removal
- Agricultural loss (see table below)

Agricultural Loss

Million Dollar Commodities

1.	Ornamental Trees and Shrubs	$104,681,000	8.	Indoor Plants, Foliage	$4,284,000
2.	Bedding Plants	$43,144,000	9.	Grapes	$4,136,000
3.	Root Vegetables	$27,707,000	10.	Strawberries	$3,008,000
4.	Orchard Fruit	$16,475,000	11.	Ground Covers	$2,877,000
5.	Alfalfa Hay	$9,286,000	12.	Vine Crops	$2,359,000
6.	Dairy & Livestock	$8,513,000	13.	Grain Hay	$1,768,000
7.	Indoor Plants, Flowering	$4,425,000			

SUMMARY



Commodity	2006	2007
Nursery Products	$191,879,000	$173,580,000
Cut Flowers & Decoratives	$581,000	$734,000
Fruits and Nuts	$26,674,000	$24,469,000
Vegetable Crops	$33,146,000	$33,523,000
Field Crops	$11,176,000	$12,327,000
Livestock Production	$6,228,000	$8,513,000
Apiary	$1,211,000	$207,000
Forest Products	$20,000	$15,000
TOTAL	$270,915,000	$253,368,000

(Source: Los Angeles County Crop and Livestock Report)

Nursery Products

Item	Year	Green House Square Feet	Field Acres	Total Value	
Ornamental Trees	**2007**	**3,378,000**	**1,447**	**$104,681,000**	▼
	2006	4,172,000	1,507	$119,147,000	
Bedding Plants	**2007**	**1,636,000**	**159**	**$43,144,000**	▲
	2006	1,617,000	152	$37,041,000	
Indoor Plants, Flowering	**2007**	**534,000**	**2**	**$4,425,000**	▲
	2006	552,000	2	$3,947,000	
Indoor Plants, Foliage	**2007**	**408,000**	**7**	**$4,284,000**	▼
	2006	435,000	57	$6,302,000	
Ground Covers	**2007**	**167,000**	**26**	**$2,877,000**	▲
	2006	289,000	42	$2,539,000	
Miscellaneous *	**2007**	**203,000**	**967**	**$14,169,000**	▼
	2006	279,000	1,736	$22,903,000	
* Includes perennials, vegetable plants, bonsai plants, orchids, sod, palm trees, and cacti.					
TOTAL	**2007**	**6,326,000**	**2,608**	**$173,580,000**	▼
	2006	7,344,000	3,496	$191,879,000	

(Source: Los Angeles County Crop and Livestock Report)

Item	Year	Acreage	Production Per Acre	Production Total	Unit	Value Per Unit	Total Value	
Strawberries	2007	112	10.2	1,139	Ton	$2,641	$3,008,000	▼
	2006	106	17.3	1,830		$2,711	$4,961,000	
Avocados	2007	53	1.2	64	Ton	$1,450	$93,000	▲
	2006	60	1.7	100		$658	$66,000	
Cherries	2007	155	0.2	28	Ton	$3,986	$112,000	▼
	2006	155	0.9	138		$4,500	$621,000	
Apples	2007	130	3.0	390	Ton	$1,500	$585,000	▼
	2006	145	5.0	725		$1,500	$1,087,000	
Grapes	2007	329	3.9	1,273	Ton	$3,249	$4,136,000	▲
	2006	341	3.4	1,149		$1,224	$1,407,000	
Orchard Fruit	2007	1,080	Includes nectarines, peaches, pears, plums, oranges, tangerines, apricots, lemons, and grapefruits.				$16,475,000	▼
	2006	1,088					$18,474,000	
Miscellaneous	2007	47	Includes figs, pistachios, raspberries, other miscellaneous fruit, and nut crops.				$60,000	▲
	2006	28					$58,000	
TOTAL	2007	1,906					$24,469,000	▼
	2005	1,923					$26,674,000	

Fruit & Nut Crops



Item	Year	Acreage	Production Per Acre	Production Total	Unit	Value Per Unit	Total Value	
Root Vegetables	2007	5,703	Includes dry onions, carrots, potatoes, radishes, beets, turnips, and other root vegetables.				$27,707,000	▼
	2006	5,629					$29,446,000	
Herbs	2007	26	Includes cilantro, parsley, chives, mint, thyme, and other herb vegetables.				$486,000	▼
	2006	40					$1,143,000	
Table Greens	2007	25	Includes spinach, kale, oriental specialties, and lettuce.				$963,000	▲
	2006	19					$221,000	
Vine Crops	2007	147	Includes cucumbers, green beans, melons, pumpkins, squash, tomatoes, watermelons, and zucchini.				$2,359,000	▲
	2006	103					$1,392,000	
Miscellaneous	2007	680	Includes bell peppers, cacti, celery, chard, sweet corn, green onions, Mexican onions, and other miscellaneous.				$2,008,000	▲
	2005	168					$944,000	
TOTAL	2007	6,581					$33,523,000	▲
	2006	5,959					$33,146,000	

Vegetable Crops

(Source: Los Angeles County Crop and Livestock Report)

Field Crops

Item	Year	Acreage	Production Per Acre	Production Total	Unit	Value Per Unit	Total Value	
Alfalfa Hay	**2007**	**5,804**	**8.6**	**49,735**	**Ton**	**$187**	**$9,286,000**	▲
	2006	5,455	8.5	46,355		$180	$8,350,000	
Grain Hay	**2007**	**3,002**	**3.8**	**11,406**	**Ton**	**$155**	**$1,768,000**	▲
	2006	3,500	3.2	11,200		$140	$1,570,000	
Rangeland	**2007**	**42,200**					**$480,000**	▼
	2006	45,000					$585,000	
Miscellaneous	**2007**	**1,395 ***					**** $793,000**	▲
	2006	1,680 *					** $671,000	
TOTAL	**2007**	**10,201 *****					**$12,327,000**	▲
	2006	10,635 ***					$11,176,000	

* Acreage excludes stubble.
** Value includes irrigated pasture, sudan hay, oat hay, and grazing privileges on stubble.
*** Excluding rangeland and stubble.

Dairy & Livestock

Item	Year		Total Value	
	2007	Includes dairy cattle, beef cattle, hogs, goats, chickens, milk, goat milk, eggs, etc.	**$8,513,000**	▲
	2006		$6,228,000	

(Source: Los Angeles County Crop and Livestock Report)

Fire Ants



Fire ants are among the worst insect pests ever to invade the United States. Originally from South America, they are from 0.04" to 0.2" long, and have a severe sting that burns like fire. These ants are aggressive, and when disturbed are quick to attack people and animals. They also cause damage to homes, buildings, air-conditioning units, and other electrical equipment. They have flourished in the United States because they have no natural enemies there. Native ants are being replaced by the imported red fire ants.

Fire ants interfere with hay harvesting, maintenance of pastures, and some crops, but present the greatest problem around human dwellings. The greatest danger arises from multiple stings, often experienced by young children.

The two most common forms of imported fire ants are the red imported fire ant and the black imported fire ant. The black fire ant was introduced into Alabama from South America in 1918 and remained confined to the immediate area for about 10 years. The red imported fire ant was introduced into Alabama about 1930 and has since spread to the outer limits of the present imported fire ant range. There has been much controversy over the taxonomic status and interrelationship of the light and dark forms or species.

Bird Flu

Bird flu (or “avian influenza”) is a disease that is fatal to many birds but rarely affects people. Bird flu is not the same as pandemic flu in humans. Outbreaks of bird flu typically present very little threat to humans. Some people around the world have contracted bird flu after being in close contact with diseased birds, or bird droppings. To date, the number of such cases is very, very small, and most people never contract flu from birds.

Flu viruses can change (mutate) over time. If bird flu virus should ever change into a strain of flu that is very contagious for humans, and a large number of humans becomes infected, that is called pandemic flu. But currently, the bird flu virus has not changed. There is no evidence any bird flu strain anywhere in the world has changed to make it dangerous to people.

In a normal year, there are many flu (influenza) strains moving around in our world. Some exist in birds only, some exist in pigs only, and others affect only people. The strain of bird flu that recently has infected many birds, including chickens and ducks, is called H5N1.

Scientists are concerned that someday the bird flu could change into a strain of flu that is highly contagious for humans, and since we do not have a natural immunity to bird flu; it could cause severe illness and death in many people. Many health officials hold the view that there is a good chance bird flu could someday change into a strain of flu that would be dangerous to humans.

(Source: California Department of Public Health,
http://www.cdph.ca.gov/programs/immunize/Pages/BirdFlu(AvianInfluenza).aspx)

Distribution

The red imported fire ant is more widespread and is now in much of the Southeast, from the Carolinas to Texas. The imported red fire ant has invaded over 275 million acres.

All counties in Alabama, Florida, and Louisiana are infested. Counties in Arkansas, Georgia, Mississippi, Oklahoma, North Carolina, South Carolina, Tennessee, and Texas—plus Puerto Rico—have been invaded. Isolated colonies have been found as far west as California, and as far north as Kansas City, Missouri. One factor accounting for the rapid spread of fire ants in a region is the transport of queens and colonies by movement of nursery stock.

Stings

Their sting is characterized by an intense burning sensation. A pustule (not seen in the sting of other species) forms at the sting site in a day or so, and may become infected. Sensitive individuals may swell up as a result of stings, and occasionally even die. The venom of fire ants, containing alkaloids with relatively little protein, is unique among stinging insects, which usually employ a venom rich in protein. The venom is used to kill prey for food. It is an effective agent in killing insects, bacteria, and fungi.

Feeding Habits

Food is collected by workers who often leave the mound through tunnels which extend 15–25 m from the mound, 6–12 m underground. When food is found, the forager returns to the nest, leaving a pheromone trail for others to follow to the food source.

Their primary food is insects such as spiders, earthworms, fly larvae in animal wastes, leaf-eating caterpillars, and other ground-crawling insects. They attack newly hatched poultry and the young of ground-nesting wild birds. Helpless newborn animals, domestic and wild, have been killed by swarms of the worker ants.

Insects, spiders, myriopods, earthworms, and other small invertebrates make up the usual diet of the fire ants. They are attracted to sugar and honeydew and are known to feed on carrion.

Colonies

A colony is usually started by a single queen, but some beginning colonies are known to contain up to five queens. Fire ants infest lawns, school yards, athletic fields, and parks. They invade household kitchens and pantries. Mature multi-queen colonies are generally the case. After the nuptial flight, the queen lays eggs in the burrow she has created in 24–48 hours; the first workers appear 20–30 days later. Reproductive forms are produced in 5–12 months. A colony may contain 240,000 workers after three years. Each colony of fire ants is composed of a queen, winged males and females, and three kinds of workers. A single nest averages approximately 25,000 workers, but far larger populations are common.

The semi-permanent nests are large, unsightly mounds of excavated soil with openings for ventilation. Imported red fire ant mounds are generally dome-shaped, in contrast to those of other fire ant species. The hardened mounds interfere with the mechanical cultivation of fields and the ants' painful stings interfere with livestock grazing and the harvesting of crops by farm workers. The ants nest in the soil of open areas, pastures, and agronomic fields, and are occasionally found in wooded areas.

Regulation

In 1958, a federal quarantine was enacted to try to prevent the fire ant's spread. The quarantine restricts the movement of soils, sod, hay, potted plants, plants with soil attached, and used soil-moving equipment to non-infested areas. These pests are regulated in several states, including Alabama, Florida, and Louisiana, and parts of Arkansas, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

Control

The problem of effectively eradicating fire ants has baffled scientists and the government for decades. Control tactics include the judicious use of pesticides and other management options.

Biological control has become an area of interest within the community of fire ant researchers. There are parasitic flies, ants, and other organisms that are currently being evaluated for use in fire ant–infested areas of the United States.

One solution under investigation is infesting fire ants with the microorganism T. solenopsae. In 1973 it was discovered in Brazil, and is the most common pathogen found in fire ants in South America. The pathogen T. solenopsae infects ant colonies and chronically weakens them. he microorganism does not harm plants or native ant species. Workers transmit the pathogen to the queen through food exchange. The disease slowly reduces her weight. She lays fewer and fewer eggs, all infected with the pathogen, further weakening the colony. Colony elimination can take from 9 to 18 months.

Fire ants infected with a microorganism were released in Arkansas and Oklahoma to reduce the numbers of the imported ants. Scientists from the U.S. Department of Agriculture's Agricultural Research Service think that, over time, T. solenopsae can reduce fire ant populations.

Community Involvement Needed for Successful Abatement

Community involvement is important for effective control of the red imported fire ant. Several communities throughout the United States have developed abatement programs to minimize the impact of this insect. There are several types of abatement programs that a community can develop. Some communities have area-wide treatment periods during which the homeowner elects to purchase the appropriate pesticide and apply it within a specified period. Other communities involve individuals who apply the pesticides at the appropriate period, and the community pays him/her a fee for services.

In 1997, to stimulate the public and press to become aware of the threat of imported red fire ants, Texas offered a $1,000 reward for the discovery of the largest fire ant mound. The contest was divided into two categories: the largest city mound and the largest country mound. The largest mound found was 40 inches at the base and 18 inches tall. According to Texas surveys, fire ants are considered the second most important urban pest, behind cockroaches. Besides stinging people and animals, fire ants can damage air conditioners, outside lighting, sprinkler systems, computers, and other electronic equipment.

Creutzfeldt-Jakob Disease (Mad Cow Disease)

Since 1996, evidence has been increasing for a causal relationship between ongoing outbreaks in Europe of a disease in cattle, called bovine spongiform encephalopathy (BSE, or "mad cow disease"), and a disease in humans, called variant Creutzfeldt-Jakob disease (vCJD). Both disorders are invariably fatal brain diseases with unusually long incubation periods (measured in years), and are caused by an unconventional transmissible agent.

On December 23, 2003, the U.S. Department of Agriculture (USDA) announced a presumptive diagnosis of bovine spongiform encephalopathy (BSE, or "mad cow" disease) in an adult Holstein cow from Washington State. The diagnosis was confirmed by an international reference laboratory in Weybridge, England, on December 25. Preliminary trace-back based on an ear-tag identification number suggests that the BSE-infected cow was imported into the United States from Canada in August 2001.

Description

Although there is very strong evidence that the agent responsible for the human disease (vCJD) is the same agent responsible for the BSE outbreaks in cattle, the specific foods that might be associated with the transmission of this agent from cattle to humans are unknown. However, bioassays have identified the presence of the BSE agent in the brain, spinal cord, retina, dorsal root ganglia (nervous tissue located near the backbone), distal ileum, and the bone marrow of cattle experimentally infected with this agent by the oral route.

In addition to cattle, sheep are susceptible to experimental infection with the BSE agent by the oral route. Thus, in countries where flocks of sheep and goats may have been exposed to the BSE agent through contaminated feed, a theoretical risk exists that these animals might have developed infections caused by the BSE agent and that these infections are being maintained in the flocks, even in the absence of continued exposure to contaminated feed (for example, through maternal transmission). Regardless, as of July 2002, cattle remain the only known food animal species with disease caused by the BSE agent.

Preventive Measures

Public health control measures, such as enhanced BSE surveillance, the culling of sick animals, and bans of specified risk materials (SRM), have been instituted in countries of Europe to prevent potentially BSE-infected tissues from entering the human food chain. The most stringent of these control measures, including an "Over Thirty Months Scheme" that excludes all animals older than 30 months from the human food and animal feed chains, have been applied in the United Kingdom, and appear to be highly effective. In June 2000, the European Union Commission on Food Safety and Animal Welfare strengthened the European Union's set of control measures in relation to BSE by adopting a decision requiring all member states to remove SRMs from the animal feed and human food chains as of October 1, 2000; such bans had already been instituted in most member states. Also noteworthy among the European Union's set of control measures are the banning of the use of mechanically recovered meat from the vertebral column of cattle, sheep, and goats for human food, and the BSE testing of all cattle aged over 30 months destined for human consumption.

New variant CJD (vCJD) is a rare, degenerative, fatal brain disorder in humans. Although experience with this new disease is limited, evidence to date indicates that there has never been a case of vCJD transmitted through direct contact of one person with another. However, a case of probable transmission of vCJD through transfusion of blood components from an asymptomatic donor who subsequently developed the disease has been reported.

Section 10:

Mitigation Strategies

Table of Contents

Section 10: Mitigation Strategies 1

Overview of Mitigation Strategy 1

Planning Approach 1

Goals 2

FEMA Mitigation Measure Categories 3

County of Los Angeles General Plan 3

How Are the Mitigation Action Items Organized? 14

Organization of Action Items 14

Funding Source 14

Coordinating Organization 14

Plan Goals Addressed 14

Timeline 14

Ranking 15

Comments 16

Mitigation Actions Matrix 16

Section 10: Mitigation Strategies

Overview of Mitigation Strategy

As the cost of damage from natural disasters continues to increase nationwide, the County of Los Angeles recognizes the importance of identifying effective ways to reduce vulnerability to disasters. Hazard mitigation plans assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the County.

The plan provides a set of action items to reduce risk from natural, technological, and human-caused hazards through education and outreach programs, and to foster the development of partnerships. Further, the plan provides for the implementation of preventive activities, including programs that restrict and control development in areas subject to damage from hazards.

The resources and information within the Mitigation Plan achieve the following:

1. Establish a basis for coordination and collaboration among agencies and the public in the County of Los Angeles

2. Identify and prioritize future mitigation projects

3. Assist in meeting the requirements of federal assistance programs

The Mitigation Plan is integrated with other County plans, including the County of Los Angeles General Plan and Floodplain Management Plan, as well as department-specific standard operating procedures.

Planning Approach

The four-step planning approach outlined in the FEMA publication *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* (FEMA 386-3) was used to develop this plan:

- Develop mitigation goals and objectives: The risk assessment (hazard characteristics, inventory, and findings), along with municipal policy documents, was utilized to develop mitigation goals and objectives.

- Identify and prioritize mitigation actions: Based on the risk assessment, goals, and objectives; existing literature/resources; and input from participating entities, mitigation activities were identified for each hazard. Activities were (1) qualitatively evaluated against the goals and objectives, and other criteria; (2) identified as high, medium, or low priority; and (3) presented in a series of hazard-specific tables.

- Prepare implementation strategy: High-priority activities are recommended for implementation first. However, based on community needs and goals, project costs, and available funding, some medium- or low-priority activities may be implemented before some high-priority items.

- Document mitigation planning process: The mitigation planning update process is documented throughout this plan.

Goals

ELEMENT C. MITIGATION STRATEGY | C3
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

The Hazard Mitigation Planning Advisory Committee reviewed the goals identified in the 2005 All-Hazard Mitigation Plan and decided to amend the goals to make them less specific and more general in nature. It was agreed that more generalized goals would be easier to work with, and ultimately easier to implement. The resulting mitigation goals avoid or reduce long-term vulnerabilities to all hazards.

The goals are also based on the risk assessment, representing a long-term vision for hazard reduction or enhanced mitigation capabilities. The goals are compatible with community needs and goals expressed in other planning documents prepared by the County. The five mitigation goals and descriptions are listed below.

Protect Life and Property

Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural, human-caused, and technological hazards.

Improve hazard assessment information to make recommendations for avoiding new development in high-hazard areas and encouraging preventive measures for existing development in areas vulnerable to natural, human-caused, and technological hazards.

Enhance Public Awareness

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural, human-caused, and technological hazards.

Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Preserve Natural Systems

Support management and land use planning practices with hazard mitigation to protect life.

Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.

Encourage Partnerships and Implementation

Strengthen communication and coordinate participation with public agencies, citizens, nonprofit organizations, business, and industry to support implementation.

Encourage leadership within the County and public organizations to prioritize and implement local and regional hazard mitigation activities.

Strengthen Emergency Services

Establish policy to ensure mitigation projects are considered for critical facilities, services, and infrastructure.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, nonprofit organizations, business, and industry.

Coordinate and integrate hazard mitigation activities (where appropriate) with emergency operations plans and procedures.

FEMA Mitigation Measure Categories

Based on the goals, the Hazard Mitigation Planning Advisory Committee identified loss reduction or mitigation activities for each hazard. The activities include a range of options consistent with the six broad categories of mitigation actions outlined in FEMA Publication 386-3 *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*.

- **Prevention**: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

- **Property Protection**: Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

- **Public Education and Awareness**: Actions to inform and educate citizens, property owners, and elected officials about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- **Natural Resource Protection**: Actions that, in addition to minimizing hazard losses, preserve, or restore the functions of natural systems. Examples include 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 following a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

- **Structural Projects**: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, retaining walls, and safe rooms.

County of Los Angeles General Plan

The Hazard Mitigation Planning Advisory Committee went to great lengths to examine the various regulatory documents influencing the County's ability to mitigate against the hazards identified as posing a significant risk. Perhaps the most important of those documents was the County's General Plan, last updated in 2014. It is the intention of the Hazard Mitigation Planning Advisory Committee to link the Mitigation Plan actions items as closely as possible to the County's General Plan. The purpose of this association is that many development projects require a determination of "General Plan conformity" prior to approval. If the Mitigation Plan and General Plan are aligned, this will better ensure both the sustainability and implementation of the Mitigation Plan. Since the establishment of the DMA 2000 regulations, FEMA and other regulators have been frustrated by the ineffectiveness of mitigation plan implementation - in other words, the failure of plans to actually affect the built environment and cause a reduction in risk.

The Hazard Mitigation Planning Advisory Committee believes that changing the circle of build-damage-rebuild can most effectively be broken by linking the Mitigation Plan to the regulations and policy guidelines that allow for construction and land use.

The Los Angeles County General Plan is the guide for growth and development for the unincorporated areas of Los Angeles County. The General Plan guides the long-term physical development and conservation of the County's land and environment through a framework of goals, policies, and implementation programs. The California Government Code requires that each city and county adopt a general plan "for the physical development of the county or city, and any land outside its boundaries which bears relation to its planning." Long-range planning provides the opportunity to responsibly manage and direct future development, conserve natural areas, support economic development objectives, and improve mobility in the region.

The Government Code requires that all general plans contain elements that address the following: land use, circulation, housing, conservation, open space, noise, and safety. The Government Code also provides flexibility to local jurisdictions to address additional issues that are of local importance. The County's General Plan addresses all of these requirements through the following elements:

- Land Use Element
- Mobility Element
- Air Quality Element
- Housing Element (adopted and certified in 2008)
- Conservation and Open Space Element
- Parks and Recreation Element
- Noise Element
- Safety Element
- Public Services and Facilities Element
- Economic Development Element

ELEMENT A: PLANNING PROCESS | A4

A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

Highlighted (**bold**) in the table below are the General Plan policies that provide the greatest opportunity for integrating natural hazards. In addition to the specific mitigation strategies listed in the action plan, the County of Los Angeles will actively pursue multi-objective projects that include natural hazard mitigation in implementing the General Plan.

Table 10-1: General Plan Policies
(Source: Los Angeles County General Plan 2014)

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
Conservation and Open Space Element					
Biological Resources					
Goal C/OS 3: Biologically diverse ecological systems, including riparian resources, wildlife corridors, and woodlands, preserved in perpetuity. • Policy C/OS 3.5: Restore degraded streams, rivers, wetlands, and other significant riparian resources to maintain ecological function. • Policy C/OS 3.8: Maintain watercourses, riparian habitats, and wetlands, including blue line streams, vernal pools and other drainages, in a natural state, unaltered by grading, fill, or diversion activities. • Policy C/OS 3.9: Preserve and sustainably manage the County's forests and woodlands. • Policy C/OS 3.10: Discourage new development in the wildland-urban interface.	X	X	X	X	X
Water Resources					
Goal C/OS 4: A protected and clean supply of water resources. • Policy C/OS 4.1: Require compliance with adopted Municipal Separate Storm Sewer System, General Construction, and point source NPDES (National Pollutant Discharge Elimination System) permits. • Policy C/OS 4.2: Require compliance with NPDES storm water permit requirements. • Policy C/OS 4.3: Require compliance with all approved TMDL (total	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
maximum daily load) implementation and compliance plans for impaired water bodies. • Policy C/OS 4.4: Manage the use of septic systems adjacent to aqueducts, reservoirs, and other sources of water to limit impacts to water bodies. • Policy C/OS 4.5: Manage and prevent future hydromodification in County water sources. • Policy C/OS 4.6: Improve the health of rivers, streams, and minor tributaries to enhance overall water resources and groundwater recharge. • Policy C/OS 4.7: Eliminate point and non-point source water pollution.					
Goal C/OS 5: Effectively manage water resources to reduce groundwater depletion. • Policy C/OS 5.1: Require low-impact development features to reduce downstream storm water impacts. • Policy C/OS 5.2: Protect natural groundwater recharge areas and artificial spreading grounds. • Policy C/OS 5.3: Participate in the creation and implementation of programs and policies to conserve groundwater resources. • Policy C/OS 5.4: Promote the development of multi-use facilities for storm water quality improvement, groundwater recharge, flood management, and other compatible uses.	X	X	X	X	X
Goal C/OS 6: Watersheds that are healthy and protected from harmful impacts. • Policy C/OS 6.1: Ensure healthy and productive watersheds for future generations. • Policy C/OS 6.2: Support the preservation, restoration, and strategic acquisition of open space to preserve natural streams, drainage channels, wetlands, and rivers that are necessary for the healthy function of watersheds. • Policy C/OS 6.3: Support the preparation and implementation of watershed and river master plans. • Policy C/OS 6.4: Consider specific issues affecting water bodies within each watershed, including pollutants of concern, TMDLs, natural ecology, and potential for hydromodification in water management planning.	X	X	X	X	X
Agricultural Resources					

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
Goal C/OS 7: Productive farmland that is protected for local food production, open space, public health, and the local economy. • Policy C/OS 7.1: Protect agricultural resource areas—and other land identified as prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance by the Department of Conservation—from encroaching development, and discourage incompatible adjacent land uses. • Policy C/OS 7.2: Limit non-agricultural uses in agricultural resource areas, other land identified as prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance by the Department of Conservation. • Policy C/OS 7.3: Encourage agricultural activities within the Agricultural Resource Area Overlay. *Goal C/OS 8: Sustainable agricultural practices.* • Policy C/OS 8.1: Support agricultural practices that minimize and reduce soil loss, minimize pesticide use, and prevent water runoff from affecting water, soil, and air quality. • Policy C/OS 8.2: Support innovative agricultural practices that conserve resources and promote sustainability, such as drip irrigation, hydroponics, and organic farming. • Policy C/OS 8.3: Support farmer's markets throughout the county. • Policy C/OS 8.4: Support countywide community garden and urban farming programs.	X	X	X	X	X
Mineral and Energy Resources					
Goal C/OS 9: Locally available mineral resources to meet the needs of construction, transportation, and industry. • Policy C/OS 9.1: Protect MRZs and access to MRZs from urban development, and discourage incompatible adjacent land uses. *Goal C/OS 10: Mineral extraction activities that are conducted in a manner that minimizes impacts to the environment.* • Policy C/OS 10.3: Require appropriate levels of remediation for all oil and natural gas production sites based on possible future uses. • Policy C/OS 10.4: Restrict and regulate the installation, operation, and decommissioning of oil derricks to protect natural resources and prevent excessive grading in hillside areas.	X	X	X	X	X
Goal C/OS 11: Sustainable management of renewable and non-renewable energy resources. • Policy C/OS 11.1: Expand the production and use of renewable energy	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
resources. • Policy C/OS 11.2: Encourage the effective management of nonrenewable resources, such as ensuring adequate reserves to meet peak demands. • Policy C/OS 11.3: Encourage new development to employ sustainable energy practices, such as utilizing passive solar techniques and/or active solar technologies. • Policy C/OS 11.4: Require maximum amounts of energy conservation in new development and municipal operations.					
Goal C/OS 12: Energy efficiency and conservation through development and design techniques. • Policy C/OS 12.1: Support the design of developments that provide substantial tree canopy cover and utilize light-colored paving materials and reflective roofing to reduce the urban heat island effect. • Policy C/OS 12.2: Require green building policies, low-impact development, and drought-tolerant landscaping in all development activities. • Policy C/OS 12.3: Encourage development to optimize the solar orientation of buildings to maximize passive and active solar design techniques.	X	X	X	X	X
Scenic Resources					
Goal C/OS 13: Protected visual and scenic resources. • Policy C/OS 13.1: Protect the County's scenic resources through land use regulations that mitigate development impacts. • Policy C/OS 13.2: Manage development in hillside management areas (25 percent slope or greater) to protect their natural and scenic character and minimize risks from natural hazards, such as fire, flood, erosion, and landslides. • Policy C/OS 13.3: Consider the following in the design of a project that is located within an HMA, to the greatest extent feasible: • Public safety and the preservation of hillside resources through the application of safety and conservation design standards, and • Maintenance of large contiguous open areas that limit landslide, liquefaction, and fire hazards and protect natural features, such as significant ridgelines, watercourses, and SEAs. • Policy C/OS 13.4: Protect the County's ridgelines from incompatible	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
development that diminishes their scenic value. • Policy C/OS 13.5: Reduce light trespass, light pollution, and other threats to scenic resources. • Policy C/OS 13.6: Require development to be designed to create a consistent visual relationship with the natural terrain and vegetation. • Policy C/OS 13.7: Require grading to conform to the existing terrain. • Policy C/OS 13.8: Prohibit outdoor advertising and billboards along scenic routes, corridors, and other scenic areas. • Policy C/OS 13.9: Incorporate roadside rest stops, vista points, and interpretive displays into projects in scenic areas.					
Safety Element					
Seismic and Geologic Hazards					
Goal S 1: An effective regulatory system that prevents or minimizes personal injury, loss of life, and property damage due to seismic and geological hazards. • Policy S 1.1: Discourage development in seismic and geologic hazard zones. • Policy S 1.2: Prohibit new developments within fault traces until a comprehensive geological study has been completed, as defined by the Alquist-Priolo Act. • Policy S 1.3: Require developments to mitigate geologic hazards, such as soil instability and landslides, in hillside management areas through siting and development standards. • Policy S 1.4: Support the retrofitting of unreinforced masonry structures to help reduce the risk of structural and human loss due to seismic or geological hazards.	X	X	X	X	X
Flood Hazards					
Goal S 2: An effective regulatory system that prevents or minimizes personal injury, loss of life, and property damage due to flood and inundation hazards. • Policy S 2.1: Discourage development in the County's flood hazard zones. • Policy S 2.2: Discourage development from locating in dam and reservoir inundation routes. • Policy S 2.3: Discourage development from locating assets downslope from aqueducts. • Policy S 2.4: Consider climate change adaptation strategies in flood and inundation hazard planning.	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
• Policy S 2.5: Ensure that developments located within the County's flood hazard zones are sited and designed to avoid isolation from essential services and facilities in the event of flooding. • Policy S 2.6: Ensure that the mitigation of flood-related property damage and loss limits impacts to biological and other resources. • Policy S 2.7: Establish cooperative working relationships among public agencies with responsibility for flood protection. • Policy S 2.8: Locate essential public facilities, such as hospitals and fire stations, outside of flood hazard zones (where feasible).					
Fire Hazards					
Goal S 3: An effective regulatory system that prevents or minimizes personal injury, loss of life, and property damage due to fire hazards. • Policy S 3.1: Discourage development in very high fire hazard severity zones, particularly in areas with significant biological resources. • Policy S 3.2: Consider climate change adaptation strategies in planning for very high fire hazard severity zones. • Policy S 3.3: Ensure that the mitigation of fire-related property damage and loss in very high fire hazard severity zones limits impacts to biological and other resources. • Policy S 3.4: Reduce the risk of wildland fire hazards through the use of regulations and performance standards, such as fire-resistant building materials and vegetation. • Policy S 3.5: Encourage the use of fire-resistant vegetation that is compatible with the area's natural vegetative habitats in fuel modification activities. • Policy S 3.6: Reduce the risk of urban fire hazards through the implementation of regulations and performance standards. • Policy S 3.7: Ensure adequate infrastructure, including ingress, egress, and peak load water supply availability for all projects located in very high fire hazard severity zones. • Policy S 3.8: Consider siting and design for developments located within very high fire hazard severity zones, particularly in areas located near ridgelines and on hilltops, to reduce the wildfire risk. • Policy S 3.9: Support the retrofitting of existing structures in very high fire hazard severity zones to help reduce the risk of structural and human loss due to wildfire.	X	X	X	X	X
Emergency Response					

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
Goal S 4: Effective County emergency response management capabilities. • Policy S 4.1: Ensure that County residents are protected from the public health consequences of natural or man-made disasters through increased readiness and response capabilities, risk communication, and the dissemination of public information. • Policy S 4.2: Support County emergency providers in reaching their response-time goals. • Policy S 4.3: Coordinate with other County and public agencies (such as transportation agencies and health care providers) on emergency planning and response activities, and evacuation planning. • Policy S 4.4: Encourage the improvement of hazard prediction and early warning capabilities. • Policy S 4.5: Ensure that there are adequate resources, such as sheriff and fire services, for emergency response. • Policy S 4.6: Support increased efforts to implement coordinated regional evacuation plans and disseminate public information about disaster response.	X	X	X	X	X
Public Services and Facilities Element					
Effective Services and Facilities					
Goal PS/F 1: A coordinated, reliable, and equitable network of public facilities that preserves resources, ensures public health and safety, and keeps pace with planned development. • Policy PS/F 1.1: Discourage development in areas without existing adequate public services and facilities. • Policy PS/F 1.2: Ensure that adequate services and facilities are provided in conjunction with a development project through phasing or other mechanisms. • Policy PS/F 1.3: Ensure coordinated service provision through collaboration between County departments and service providers. • Policy PS/F 1.4: Focus infrastructure investment, maintenance, and expansion efforts where the General Plan encourages growth, such as in transit-oriented districts. • Policy PS/F 1.5: Support multifaceted public facility expansion efforts, such as substations, mobile units, and satellite offices.	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
Water					
Goal PS/F 2: Increased water conservation efforts. • Policy PS/F 2.1: Implement water conservation measures, such as drought-tolerant landscaping and restrictions on water used for landscaping. • Policy PS/F 2.2: Support educational outreach efforts that discourage wasteful water usage.	X	X	X	X	X
Goal PS/F 3: Increased local water supplies through the use of new technologies. • Policy PS/F 3.1: Increase the supply of water though the development of new sources, such as recycled water. • Policy PS/F 3.2: Support the increased production, distribution, and use of recycled water to provide for groundwater recharge, seawater intrusion barrier injection, irrigation, industrial processes, and other beneficial uses.	X	X	X	X	X
Wastewater and Sewer					
Goal PS/F 4: A reliable network of wastewater systems in the County. • Policy PS/F 4.1: Encourage the planning and continued development of efficient countywide wastewater systems. • Policy PS/F 4.2: Support capital improvement plans to improve aging and deficient wastewater systems, particularly in areas where the General Plan encourages development (such as TODs). • Policy PS/F 4.3: Ensure the proper design of sewage treatment and disposal facilities, especially in landslide, hillside, and other hazard areas.	X	X	X	X	X
Solid Waste					
Goal PS/F 5: Adequate disposal capacity and minimal waste and pollution in the County. • Policy PS/F 5.1: Maintain an efficient, safe and responsive waste management system that reduces waste while protecting the health and safety of the public. • Policy PS/F 5.2: Encourage solid waste management facilities that utilize conversion and other alternative technologies (such as waste-to-energy facilities). • Policy PS/F 5.3: Reduce the County's waste stream by minimizing waste generation and enhancing diversion. • Policy PS/F 5.4: Encourage the use and procurement of recyclable and biodegradable materials throughout the county.	X	X	X	X	X

GENERAL PLAN POLICIES	MITIGATION PLAN GOALS				
	Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
• Policy PS/F 5.5: Encourage the recycling of construction and demolition debris generated by public and private projects. • Policy PS/F 5.6: Ensure adequate and regular waste and recycling collection services. • Policy PS/F 5.7: Ensure adequate disposal capacity by providing for environmentally sound and technically feasible development of solid waste management facilities, such as landfills and transfer/processing facilities. • Policy PS/F 5.8: Discourage incompatible land uses near or adjacent to solid waste disposal facilities identified in the *Countywide Integrated Waste Management Plan*. • Policy PS/F 5.9: Encourage the availability of trash and recyclables containers in new developments, public streets, and large venues.					
Solid Waste					
Goal PS/F 6: A County with adequate public utilities. • Policy PS/F 6.1: Ensure efficient and cost-effective utilities that serve existing and future needs. • Policy PS/F 6.2: Improve existing wired and wireless telecommunications infrastructure. • Policy PS/F 6.3: Expand access to wireless technology networks, while minimizing visual impacts through co-location and design. • Policy PS/F 6.4: Protect utility facilities to ensure the continued provision of utility services in the county. • Policy PS/F 6.5: Encourage the use of renewable energy sources in utility and telecommunications networks. • Policy PS/F 6.6: Encourage the construction of utilities underground, where feasible. • Policy PS/F 6.7: Encourage projects that incorporate on-site renewable energy systems, such as wind turbines, solar panels, or fuel cells.	X	X	X	X	X
Education					
Goal PS/F 7: A County with adequate educational facilities. • Policy PS/F 7.2: Proactively work with school facilities and education providers to coordinate land use and facilities planning.	X	X	X	X	X

How Are the Mitigation Action Items Organized?

The Hazard Mitigation Planning Advisory Committee also developed hazard-specific mitigation goals, which appear in Section 10: Mitigation Strategies. The action items are organized within the following mitigation actions matrix, which lists all of the multi-hazard (actions that reduce risks for more than one specific hazard) and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation resulted in the development of these action items (Section 2: Planning Process). The matrix includes the following information for each action item:

Organization of Action Items

The action items are organized within the following matrix, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan.

Funding Source

The action items can be funded through a variety of sources, possibly including the operating budget/general fund, development fees, the Community Development Block Grant (CDBG), Hazard Mitigation Grant Program (HMGP), other grants, private funding, the Capital Improvement Plan (CIP), and other funding opportunities.

Coordinating Organization

The mitigation actions matrix assigns primary responsibility for each of the action items. The hierarchies of the assignments vary—some are positions, others are departments, and others are committees. The primary responsibility for implementing the action items falls to the entity shown as the "Coordinating Organization." The coordinating organization is the agency with regulatory responsibility to address hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Plan Goals Addressed

The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins. The goals are defined in Section 10: Mitigation Strategies.

The plan goals are organized into the following five areas:

1. Protect Life and Property
2. Enhance Public Awareness
3. Preserve Natural Systems
4. Encourage Partnerships and Implementation
5. Strengthen Emergency Services

Timeline

Action items include an estimate of the timeline for implementation, ranging from one to five years.

Ranking

ELEMENT C. MITIGATION STRATEGY | C5
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

To assist with implementing the All-Hazard Mitigation Plan, the Hazard Mitigation Planning Advisory Committee adopted the following process for ranking mitigation action items (refer to attachment 2-1: Prioritizing Mitigation Action Items). Designations of "High," "Medium," and "Low" priority have been assigned to each action item using the following criteria (a positive response = one point):

Does the action

- ✓ solve the problem?
- ✓ address vulnerability assessment?
- ✓ reduce the exposure or vulnerability to the highest priority hazard?
- ✓ address multiple hazards?
- ✓ offer benefits that equal or exceed costs?
- ✓ implement a goal, policy, or project identified in the General Plan or Capital Improvement Plan?

Can the action

- ✓ be implemented with existing funds?
- ✓ be implemented by existing state or federal grant programs?
- ✓ be completed within the five-year life cycle of the LHMP?
- ✓ be implemented with currently available technologies?

Will the action

- ✓ be accepted by the community?
- ✓ be supported by community leaders?
- ✓ adversely affect segments of the population or neighborhoods?
- ✓ require a change in local ordinances or zoning laws?
- ✓ result in positive or neutral impact on the environment?
- ✓ comply with all local, state, and federal environmental laws and regulations?

Is there

- ✓ sufficient staffing to undertake the project?
- ✓ existing authority to undertake the project?

During the prioritization meeting of the Hazard Mitigation Planning Advisory Committee, department representatives were provided worksheets for each of their assigned action items. Answers to the criteria above determined the priority according to the following scale:

- ✓ 1–6 = Low priority
- ✓ 7–12 = Medium priority
- ✓ 13–18 = High priority

Comments

Department representatives provided status updates on each of the mitigation action items identified in the 2005 Plan. The status was indicated in the "comments" column using the following categories: new, revised, completed, deleted, and deferred.

Mitigation Actions Matrix

The following is the Mitigation Actions Matrix which identifies the existing and future mitigation activities developed by the Committee.

ELEMENT C. MITIGATION STRATEGY | C4
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
ELEMENT C. MITIGATION STRATEGY | C5
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
ELEMENT D. MITIGATION STRATEGY | D2
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))
ELEMENT D. MITIGATION STRATEGY | D3
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3)

Organizational Acronyms used in the Mitigation Actions Matrix

CEO	Chief Executive Office
DHS	Department of Health Services
DMH	Department of Mental Health
DPH	Department of Public Health
DPSS	Department of Public Social Services
DPW	Department of Public Works
DRP	Department of Regional Planning
ESP	Emergency Survival Program
FOS	Facilities Operations Services
ISD	Internal Services Department
ITS	Internal Services Department - Information Technology Services
LACOE	Los Angeles County Office of Education
LACoFD	Los Angeles County Fire Department
LASD	Los Angeles Sheriff's Department
OAAC	Office of Affirmative Action Compliance
OEM	Chief Executive Office - Office of Emergency Management

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
All-Hazard							
AH-1	OEM	Survey the systems available with the goal of installing a biochemical and radiation warning system for the County Office of Emergency Management (OEM) Emergency Operations Center (EOC). This strategy would include the installation of biochemical and radiation warning and detection equipment. System would be deployed both internally and externally of the EOC.	2012-2015	G, GF	$125,000 (2005)	H	Deferred due to lack of funding.
AH-2	OEM	Design, engineer, and replace the HVAC system for the building that houses the Emergency Operations Center. Ventilation system to be self-contained and closed to outside and inside contamination. System would require an air purification system, specialized air intake components, and a dedicated power source.	2012-2015	G, GF	$75,000 (2005)	H	Deferred, Revised

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-3	OEM	Conduct a study for the design and implementation of a fire suppression system that will not pose a risk to the computer, telephone, and ham radio rooms and systems. The current fire suppression system would damage the internal electronic systems of the EOC. A component of this strategy would be to write a systems continuity plan to protect the environment, telecommunications, and data systems for the EOC. Look into new methods for fire suppression.	2012-2017	G, GF	$75,000 (2005)	H	Deferred
AH-4	OEM	Replaced EMIS system in the EOC with OARRS – Operational Area Response and Recovery System. Still need a satellite communication system. This system is currently under study and this strategy needs further development based on that survey.	2012-2015	GF	u/k	H	Revised action item, Completed OARRS June 30, 2011. Funding still needed for satellite system.

Table 10-2: Mitigation Actions Matrix							
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AH-5	OEM	As part of the County's Enterprise GIS strategy, the Chief Information Office is developing a single countywide database of landmark and critical infrastructure point locations. A basic set of information about each location will be stored and maintained in the database. The CIO has developed a Web-based application for updating the locations, known as the Location Management System. The CIO has proposed a strategy of having each location maintained by the responsible jurisdiction, such as city, department, or agency, where possible.	Annually	G, GF	$400,000 (2005)	H	Deferred, Revised

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-6	OEM - GIS, LA County Assessor	The County is currently working with the University of Southern California to utilize HAZUS MH *Risk Assessment Report*. This report is very useful to the County in analyzing loss data. However, the default national data does not accurately reflect asset and property values in Los Angeles County. An example of this would be the default amount of $500,000 for a school building. The average school building in California costs in excess of $5 million, and generally a great deal more. It is estimated it would take the Office of Emergency Management GIS department approximately one year to upgrade the HAZUS MH program data to correctly reflect losses in Los Angeles County.	2012-2015	GF	$135,000 (2005)	H	Deferred – Will continue as funding becomes available, Revised action item.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-7	ISD	The Internal Services Division Headquarters at 9230 E. Imperial Hwy, Downey, CA, does not have an electrical standby system in place. The project is to install an auto transfer switch and generator for power projection in the event of a disaster.	2012-2017	G	$25,000 (2005)	H	Deferred – Lack of funding Revised – Funding source
AH-8	ISD - FOS	The project would identify the need for asbestos abatement in the listed buildings. Asbestos is exposed and released into the air during disaster incidents, causing a risk to life and property. 1100 North Eastern Ave. ISD Administration Building - 80,000 sq. ft., $11,200.00 1102 North Eastern Ave. – ISD Shops Bldg. B - 68,000 sq. ft., $23,602.00 1104 North Eastern Ave. – ISD Automotive Bldg. C/D - 230,031 sq. ft., $32,205.00	2012-2017	GF	$67,000 (2005)	H	Completed - Inventory in 2007. Revised action item. Actual improvements remain to be funded and completed.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-9	ISD - FOS	This project would remove asbestos from the buildings, rendering them safe in both day-to-day operations and disaster incidents. Asbestos is exposed and released into the air during disaster incidents, causing a risk to life and property. Remove asbestos and replace with acceptable fireproofing materials. Sites: 1100 North Eastern Ave. ISD Administration Building - 80,000 sq. ft., $11,200.00 1102 North Eastern Ave. – ISD shops Bldg. B - 68,000 sq. ft., $23,602.00 1104 North Eastern Ave. – ISD Automotive Bldg. C/D - 230,031 sq. ft., $32,205.00	2012-2017	u/k	See status	H	As of 2012: 1100 building - 90% completed, 10% remaining at cost of $60,000 (2012) As of 2012: 1102 building – estimation $6.6 million to complete (2012) As of 2012: 1104 building – 30% completed with $5,510,000 estimation to complete (2012)

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-10	CEO, DPW	The Downey Data Center is operationally managed by the Internal Service Department and is essential for the data services operation of the County. The data center is currently housed in an unsafe facility. It is the intent of the County to replace this center to ensure that essential County systems are available for normal operations, during emergencies, and when a disaster occurs.	2012-2017	GF, CIP	$60 million (2005)	H	Deferred
AH-11	ISD	It is the intent of the Internal Services Division that a Disaster Recovery Data Center be established to sustain critical applications in the event of a sustained outage at the prime data center.					Completed in 2007

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-12	ISD	Microwave Tower Infrastructure Upgrades: Upgrade the power, air-conditioning, access roads for mountain sites, and buildings housing the County's many microwave sites. Individual sites are confidential information.	Ongoing	G, GF	$3 million per site (2012)	H	Revised – updated the estimated cost. The project continues to be in progress. Expected to take approximately 50 years to complete.
AH-13	DPH, DPSS, LACoFD, LASD, City of Los Angeles Fire	Establish a process for screening potentially contaminated victims of a public health disaster as a pre-admission requirement prior to being allowed into a Red Cross shelter. Victims of an incident that involves any level of contamination (biological, radiological, or chemical) and thus a public health threat will be assessed and triaged at the secured incident site (red zone).	2012-2017	u/k	u/k	H	Deferred, Revised – Action item description and timeline

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-14	ISD	Assess technological advancements to improve the County's internal ability to communicate during a major disaster (at both executive and staff levels). Focus on distributed communications, multiple systems, duplicate systems, backup EOCs, etc. (LACOA Emergency Management Strategic Plan Goal 1, strategy 3) A needs assessment was completed during 2004, and ISD is currently working on multiple projects to increase County communication capacity in a major disaster. One project is the Los Angeles County Regional Communications Systems and the other is a project to enhance CWIRS radio area (frequency) coverage. Written plans and proposals for both projects have been completed. ISD is currently working with the Los Angeles Tactical Communications System Executive Committee to obtain grant monies to complete the projects.	Ongoing	G, GF	u/k	H	Revised – Changed timeline and lead agency to ISD

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-15	OEM	Develop plans to conduct regular emergency management seminars for executive managers in government, business, and nonprofits, ensuring that the issues presented, the mode of presentation, and speakers are appropriate to the audience. Objectives of these seminars should be to encourage greater financial and policy support for emergency planning and mitigation, including greater support for emergency services coordinators.					Completed in 2007

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-16	OEM	Develop a special program to enhance the awareness of school boards and superintendents to the vulnerability of schools and issues of child safety. OEM staff completed a summary report describing the programs that COE developed to enhance school preparedness. On August 25, 2004, the Emergency Management Council (EMC) formally designated the County Office of Education as the operational area coordinator for schools. OEM will work with COE administration on a process to notify superintendents of local districts of the responsibilities of COE in this new role, and the responsibilities of local districts. OEM will recommend that the notification include a discussion of the role of the school boards and recommend that the superintendents brief their boards on these responsibilities.					Revised action item. Completed in 2007

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-17	COE, OAAC, OEM	Ensure that County building evacuation plans address the needs of people with disabilities, including visitors to County facilities, and that evacuation drills test these plans. The plan includes an annual training program to reinforce County policies, supported by a videotape for key County staff. OEM has worked with the Office of Affirmative Action Compliance (OAAC) to complete a set of building emergency procedures for the disabled in August 2003. The ADA/BEC procedures will be the basis for the information that will be provided in the video and disk. OEM met with the County Office of Education (COE) to discuss the possibility of using their video production facilities for the making of the ADA/BEC training video.	2012-2017	u/k	u/k	H	Deferred due to lack of funding. Revised action item

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-18	OEM	Develop plans in concert with OES, INFO LINE, and other stakeholder agencies for post-disaster public information and recovery centers (similar to FEMA's disaster application centers) and to evaluate the participation of County departments.					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-19	OEM	Los Angeles County manages a highly effective program to educate the public on home preparedness for disasters, including terrorism. This program is called the Emergency Survival Program (ESP), and the advisory board includes emergency management professionals from state and local governments throughout Southern California and other states, as well as a Red Cross representative. This is an ongoing program that reaches over 50,000 people with hard copies of materials, and an unknown number through the program Web site at www.espinfo.org. The ESP campaign for 2005 will focus on terrorism. The ESP program coordinator is working with a private contractor and the Commissions on Aging and Disabilities to develop focused outreach materials to meet the unique preparedness needs for the aged and people with disabilities.	2012-2017	G	u/k	H	Deferred – no funding, Revised timeline

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-20	OEM	The Board of Supervisors has ordered OEM to develop a public Web site to ensure that communities have access to the latest emergency information and alerts following a major disaster. After major wildfires in 2002 and 2003, OEM developed a public Web site with recovery information, including information on federal public assistance programs. This Web site is being expanded to include emergency alerts and other information regarding an emergency.					Completed - Implemented in 2007 and revised in November 2010, with plans remaining on website.
AH-21	OEM	The mission of the Los Angeles County Operational Area Citizen Corps program is to engage in collaborative efforts aimed at helping cities and communities become safer, stronger, and better prepared for preventing and handling terrorism, crime, and disasters.	Ongoing	G	$400,000 (annual)	H	

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-22	OEM	A cluster of servers identical to our production servers has been configured. Data is replicated to these servers so that they may be used for disaster recovery or to serve as the primary servers if necessary. The remote location will be the City of Denver, Colorado. The design for an alternate EOC vehicle/trailer is in process. It will contain all the hardware that we would need to set up a temporary EOC at one of the pre-determined locations.	2012-2017	G, GF	$500,000 (2005)	H	Deferred due to lack of funding
AH-23	OEM	Install a secure satellite communications virtual private network (VPN) throughout the County. The satellite VPN has been purchased and is in the initial implementation process.					Completed in 2005

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-24	Los Angeles County Department of Coroner	Review the existing program to train employees of large companies to deal with mass-fatality incidents (wrap, tag, and hold). This review will include listing organizations that have participated, developing criteria for organizations that should participate, and discussion of the role of funeral directors in mass-fatality incidents.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding.
AH-25	Los Angeles County Department of Coroner	Purchase equipment to set up an off-site mobile morgue. This equipment would be incorporated into the business continuity plan in case the main facility is unusable, and would help to avoid unnecessary exposure of employees or the public to biological, radiological, or chemical agents.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-26	CEO	This mitigation strategy is to take the list of facilities and develop a geographical matrix that would delineate the risks each facility is vulnerable to and, if possible, better estimate potential damages. Every facility in Los Angeles County is vulnerable to damage from earthquakes, and the plan makes that fact quite clear; however, predicting more accurate future losses from floods, wildfires, and other natural hazards requires further study and development.					Completed during 2012 Mitigation Plan update.
AH-27	CEO	Develop a specific plan, based on engineering studies, for demolition and replacement of County buildings determined to be unsafe or not economically feasible for refurbishment.	2012-2017	G, GF	$150,000 (2005)	H	Revised

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
AH-28	DPH	Conduct a comprehensive review and gap analysis of current local and regional efforts to provide disaster preparedness training to the public, the effectiveness of these efforts, and how they can be improved to create a more disaster-resilient community.	2012-2014	G	$300,000 (2012)	H	New
AH-29	DPH	Hire a new staff member for the position of community resilience coordinator. This position would be responsible for coordinating disaster public education for DPH, acting as DPH liaison to the private sector and nonprofit organizations, and representing DPH in regional disaster public education efforts.	2012-2015	G	$100,000 per year (salary + benefits 2012)	H	New
AH-30	DPH	Continue to create and distribute disaster educational materials for the public, in particular for underserved populations and those with access and functional needs.	Ongoing	G	$200,000 per year (2012)	M	New

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AH-31	DPH	Continue to work with UCLA and RAND to conduct disaster preparedness workshops for the general public.	2012-2015	G	$500,000	H	New
AH-32	DPH	Continue to work with UCLA and City and County Departments of Aging to produce materials and conduct workshops to better prepare elderly residents for disasters.	2012-2015	G	$200,000 (2012)	H	New
AH-33	DPH	Continue to conduct periodic widespread disaster preparedness surveys to gauge current preparedness levels among the general public in Los Angeles County.	2012-2014	G	$200,000 (2012)	H	New
AH-34	DPH	Participate as a partner agency in OEM's Emergency Survival Guide program, and assist with additional funding as well as health expertise.	2012-2015	G	$50,000 per year (2012)	H	New
AH-35	OEM, ESP Chair, LACOE, CAPSO	Work with LACOE/CAPSO and the safe school center to develop an all-hazard plan for schools and a school campus.	Ongoing	GF	n/k	H	New

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AH-36	OEM, ESP Chair	ESP Web site – updates on new mitigation	Ongoing	GF	n/k	M	New
AH-37	ISD	Administration Building, 1100 Eastern Avenue Fire, Life, Safety: 1) Replace dry standpipe fire water line; 2) Upgrade public address system; 3) Upgrade evacuation signing. Security: 1) Upgrade card reader access control system coverage; 2) Install exterior entry camera monitoring system	2012-2017	G, GF	n/k	H	New

Table 10-2: Mitigation Actions Matrix							
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AH-38	ISD	Human Resources Annex, 1100 Eastern Avenue Fire, Life Safety: 1) Digital fire alarms tied to central complex enunciation panel; 2) Public Address speakers tied to central complex system. Security: 1) Card reader access control tied to central complex system; 2) Exterior entry camera monitoring. Department Operations Center, 1100 Eastern Avenue Fire, Life Safety: 1) Digital fire alarms tied to central complex enunciation panel; 2) Public Address speakers tied to central complex system. Security: 1) Card reader access control tied to central complex system; 2) Exterior entry camera monitoring.	2012-2017	G,GF,CIP	u/k	M	New

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AH-39	ISD	Crafts Building, 1102 Eastern Avenue Fire, Life, Safety: 1) Replace detector check valves; 2) Tie public address speakers to central complex system; 3) Upgrade evacuation signing. Security: 1) Tie card reader access control to central complex system; 2) Install exterior entry camera monitoring system.	2012-2017	G,GF,CIP	u/k	M	New

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AH-40	ISD	Fleet Building, 1104 Eastern Avenue Fire, Life, Safety: 1) Replace detector check valves; 2) Tie public address speakers to central complex system; 3) Upgrade evacuation signing. Security: 1) Camera monitoring at fuel station; 2) Card reader access control tied to central complex system; 3) Exterior entry camera monitoring.	2012-2017	G,GF,CIP	u/k	M	New

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AH-41	ISD	Ceremonies Building, 1106 Eastern Avenue Fire, Life Safety: 1) Digital fire alarms tied to central complex enunciation panel; 2) Public Address speakers tied to central complex system. Security: 1) Install exterior building camera monitoring; 2) Install automated entry gate and controls; 3) Tie card reader access control to central complex system; 4) Extend central card access system to entry gate for after-hours access; 5) Install camera monitoring at gate; 6) Install exterior building entry camera monitoring.	2012-2017	G,GF,CIP	u/k	M	New

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AH-42	ISD	Communications Building, 1110 Eastern Avenue Fire, Life Safety: 1) Tie public address speakers to central complex system; 2) Upgrade evacuation signing. Security: 1) Exterior building camera monitoring; 2) Automated entry gate and controls; 3) Card reader access control tied to central complex system; 4) Extended central card access system to entry gate for after-hours access; 5) Camera monitoring at entry gate; 6) Exterior building entry camera monitoring.	2012-2017	G,GF,CIP	u/k	M	New

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AH-43	ISD	Communications Engineering, 1112 Eastern Avenue Fire, Life Safety: 1) Digital fire alarms tied to central complex enunciation panel; 2) Public Address speakers tied to central complex system. Security: 1) Card reader access control tied to central complex system; 2) Exterior entry camera monitoring.	2012-2017	G,GF,CIP	u/k	M	New

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AH-44	ISD	Eastern Avenue Complex Security: 1) Install lower level, gate1, gate 2, and gate 3 automated entry gates and controls; 2) Extend central card access system to entry gates for after-hours access; 3) Install camera monitoring at lower level, gate1, gate 2, and gate 3 entry gates.	2012-2017	G,GF,CIP	u/k	M	New

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AH-45	ISD	ITS Offices And Data Center, 9150 Imperial Hwy, Downey Fire, Life Safety: 1) Upgrade evacuation signing; 2) Upgrade public address system; 3) Ensure elevator compliance with current guidelines; 4) Conduct fire separation safety review and modifications; 5) Conduct fire corridor safety review and modifications. Security: 1) Install emergency power for site entry gates and turnstiles; 2) Install emergency power for card access control system; 3) Install camera monitoring at gates; 4) Install camera monitoring at building entrances.	2012-2017	G,GF,CIP	u/k	M	New

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AH-46	ISD	District 2 Maintenance and Operations Offices, San Fernando Fire, Life Safety: 1) Upgrade fire alarms; 2) Upgrade evacuation signing; 3) Upgrade public address system.	2012-2017	G,GF,CIP	u/k	M	New
AH-47	ISD	District 3 Maintenance and Operations Offices, Culver City Fire, Life Safety: 1) Upgrade fire alarms; 2) Upgrade evacuation signing.	2012-2017	G,GF,CIP	u/k	M	New
AH-48	ISD	District 4 Maintenance and Operations Offices, Downey Fire, Life Safety: 1) Upgrade fire alarms; 2) Upgrade evacuation signing.	2012-2017	G,GF,CIP	u/k	M	New

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AH-49	ISD	ITS Offices and Data Center, 9150 Imperial Hwy., Downey All Hazard: Construct and occupy new state-of–the-art data center and general offices in Rancho Los Amigos Development, Downey, CA;	2012-2017	G,GF,CIP	u/k	M	New
AH-50	ISD	Install emergency generator at 9230 E. Imperial Hwy., Downey, ISD FOS Dist. 4 Headquarters.	2012-2017	u/k	$31,000 (2005)	H	Deferred due to lack of funding. Revised to “All Hazard” category
AH-51	ISD	New state- of-the-art data center	2012-2017	CIP	$150 million	H	New
AH-52	ISD	An electrical engineering study should be performed in the data center to identify areas in need of upgrade. The IBM room H79 is running out of breaker space in the remote distribution cabinets (RDC), and power is up to 69% inverter load on the UPSA and UPSB units that also support this area.	2012-2014	GF	u/k	M	New

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AH-53	ISD	Upgrade the Downey building's data center security badge access control system.	0–1 years	u/k	u/k	H	New
AH-54	ISD	Replace eight aging (30+ yrs.) air handlers that supply HVAC to the Downey Data Center; they are contaminated with asbestos.	2012-2015	CIP	u/k	M	New
AH-55	ISD	Replace two aging (30+ yrs.) boilers that control humidity in the Downey Data Center. Due to their age, damage repairs will be costly and parts will be difficult to locate.	2012-2015	CIP	u/k	M	New
AH-56	ISD	Replace the aging Halon fire suppression system in the Downey Data Center. The system is 30+ yrs. old and parts are no longer available. The use of Halon chemicals in data centers has run its course.	2012-2015	CIP	u/k	M	New
AH-57	ISD	Purchase portable air conditioning units to provide emergency backup cooling for the Downey Data Center.	2012-2013	GF	$100,000 (2012)	H	New

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AH-58	ISD	Replace five aging generators (30+ yrs. old) that supply backup electrical power to the Downey Data Center.	2012-2014	CIP	u/k	M	New
AH-59	ISD	Install ISO-BASE seismic platforms under all Downey and LRC Data Center equipment to minimize damage during an earthquake.	2014	GF	$200,000 (2012)	H	New
AH-60	ISD	Special Services Building, 1106 Eastern Avenue: Add fire alarms, seismic engineering, and building shell reinforcement.	2013	u/k	$850,000 (2012)	M	New
AH-61	ISD, LASD, LACoFD	ISD Eastern Avenue Complex: Dual-feed power and switch repairs.	2013	u/k	$425,000 (2012)	H	New

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AH-62	ISD – ITS	Compile list of telecommunications services priority (TSP) telephone lines and data circuits for County departments. A telecomm service assigned TSP status is assured priority attention, via an FCC mandate, during emergency situations. TSP lines and data circuits are identified as services critical to national security and emergency preparedness. A service request for TSP status must be submitted for authorization to FEMA and the service vendor, such as AT&T, for each line and circuit identified. There is a one-time charge of $345 per line/circuit to activate TSP, and a monthly charge of $5 per line/circuit. There is a potential for hundreds of lines and circuits to be identified Countywide.	2012-2017	u/k	$120,000 (2012)	H	New

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AH-63	ISD – ITS	Develop a priority list of GETS and WPS users for ISD and County departments. GETS (Government Emergency Telephone Service) provides emergency access and priority processing of telephone calls during emergency or crisis situations when the public switched network is congested. WPS (wireless priority service) is an enhancement to basic cellular service that allows national security and emergency preparedness cellular calls a priority status during emergency situations. GETS is implemented with a toll-free access number and PIN. GETS calls are billed at a rate of 10 cents or 7.5 cents per minute. WPS costs are a $10 one-time activation fee, a $4.50 per month service fee, and 75 cents per minute for WPS calls.	2012-2017	u/k	u/k	H	New

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AH-64	ISD – ITS	Evaluate various audio, video, and Internet conferencing services/systems currently available that provide emergency backup services that would remain operational and functional during emergency preparedness and disaster recovery efforts.	2012-2014	u/k	u/k	H	New
AH-65	ISD	Special Services Building, 1106 Eastern Avenue: Add fire alarms, seismic engineering, and building shell reinforcement.	2013	u/k	$850,000 (2012)	M	New
AH-66	ISD, LASD, LACoFD	ISD Eastern Avenue Complex: Dual-feed power and switch repairs.	2013	u/k	$425,000 (2012)	H	New
AH-67	ISD	Special Services Building, 1106 Eastern Avenue: Add fire alarms, seismic engineering, and building shell reinforcement.	2013	u/k	$850,000 (2012)	M	New
AH-68	ISD, LASD, LACoFD	ISD Eastern Avenue Complex: Dual-feed power and switch repairs.	2013	u/k	$425,000 (2012)	H	New
AH-69	ISD	Generator for power source. ISD 1104 Eastern Ave., L.A.	2013	u/k	$25,000 (2012)	H	New

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AH-70	ISD	Generator for power source. ISD 1055 N. Alameda St., L.A.	2013	u/k	$25,000 (2012)	H	New
AH-71	ISD	Generator for power source. ISD 140 N. Grand Ave., L.A.	2013	u/k	$25,000 (2012)	H	New
AH-72	ISD	Spare parts for fuel site. ISD 1104 Eastern Ave., L.A.	2013	u/k	$2,000 (2012)	H	New
AH-73	ISD	Spare parts for fuel site. ISD 1055 N. Alameda St., L.A.	1 year	u/k	$2,000 (2012)	H	New
AH-74	ISD	Spare parts for fuel site. ISD 140 N. Grand Ave., L.A.	1 year	u/k	$2,000 (2012)	H	New
AH-75	OEM	Coordinate the development of a Multi-Hazard DMA 2000 plan. Coordinating Individual/ Organization: Office of Emergency Services (OEM) will work together with the members of the Los Angeles County Multi-Hazard Mitigation Plan Advisory Committee.		G, GF			Completed

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AH-76	OEM	Review and update plans that would include coordination with cities, special districts, and county departments.	Ongoing	G, GF	u/k	H	New
AH-77	OEM, County of LA Hazard Mitigation Planning Advisory Committee	Publicize and encourage the adoption of appropriate hazard mitigation actions.	2012-2017	G, GF	u/k	H	New
AH-78	DRP	Update building codes to reflect current earthquake standards.	2012-2017	G, GF	u/k	H	New
AH-79	DPW	Review and compare existing flood control standards, zoning and building requirements.	2012-2015	G, GF	u/k	H	New
AH-80	OEM	Implement a County Business Continuity Program (BCP) for County of LA as approved by the Emergency Management Council and County Chief Executive Officer. .					Completed in 2011
AH-81	OEM, LACoFD, DPW	Develop partnerships for a countywide vegetation management program.	2012-2015	G, GF	u/k	H	New

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AH-82	OEM, Media & Public Relations/IT	Encourage the public to prepare and maintain a 3-day preparedness kit for home and work.	2012-2015	G, GF	u/k	H	New
AH-83	OEM, LASD	Alert L.A.					Completed
AH-84	LASD	Emergency Alert System					Completed
AH-85	DPSS	Multi-language data and phone bank – County 211	Ongoing	G, GF	u/k	H	New
AH-86	ESP	Develop ESP bulletin for home and business mitigation	Ongoing	G, GF	u/k	H	New
AH-87	DMH	Develop, test, and train DMH surge capacity plan to receive and respond to mental health requests at all DMH service delivery points to include but not limited to clinics, field responses, and the ACCESS Center during a regional major disaster event.	2012-2015	G	u/k	H	New

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AH-88	DMH	Develop a program to teach DMH staff about hazards in the community and what they can do to mitigate, prevent, and prepare themselves and their families for these hazard events.	2012-2014	G	u/k	H	New
AH-89	DHS	Evaluate what medical appliances, such as automatic defibrillators, should be placed in County facilities. As part of the evaluation, review the implementation of defibrillators and other medical appliances in airlines and other industries					Completed
Earthquake Hazards							
EQ-1	ISD	The Internal Services Division Headquarters at 9230 E. Imperial Hwy. Downey, CA, has a need to seismically brace a number of the buildings' light fixtures. The project is to seismically secure the identified fixtures.	2012-2017	GF	$6,000 (2005)	H	Deferred due to lack of funding. Revised timeline.

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EQ-2	ISD	Perform feasibility and cost study for seismic bracing for the interior lighting and T-bar ceilings in the ISD FOS District Headquarters at 11236 Playa Court.	2012-2017	GF	$3,000 (2012)	H	New
EQ-3	LACoFD - Technical Services	Develop, equip, and deploy a surge capacity staffing plan for one urban search and rescue (USAR) vehicle.	2012-2014	G	u/k	H	Deferred due to lack of funding. Revised timeline.
EQ-4	ISD	Repair masonry block perimeter walls surrounding District Manager's Headquarters: 11236 Playa Ct., Culver City, ISD FOS District 3 Headquarters.	2012-2017	u/k	u/k	H	New
EQ-5	OEM	Evaluate and develop plans to address the mitigation of non-structural hazards in County facilities. This is a complex and expensive project, since there are over 2,500 occupied buildings within Los Angeles County.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
EQ-6	DPW - Design Division	Strengthen bridge structures to withstand the maximum credible earthquakes.	2012-2017	G	$77 million (2005)	H	As of 2012: 70% completed

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EQ-7	DPW - Environmental Programs Division	Recognizing that DPW must coordinate the management of debris following a disaster, the department is preparing for this responsibility by revising/updating the MDR Plan (1996), establishing partnerships, and providing public awareness and staff education/training consistent with FEMA, state, and local guidelines. Immediately following a major disaster within the County of Los Angeles, Public Works will be prepared to effectively take emergency action and implement a plan for the removal of disaster-generated debris.	Ongoing	GF, G	u/k	H	
EQ-8	DPW - Environmental Programs Division	Inspections are conducted on sites that have underground storage tanks. Inspections are conducted to enforce federal, state, and local regulations. Inspections of tank removals are done to verify compliance and to check for soil contamination. On an annual basis, approximately 2,500 inspections are conducted.	Ongoing	G	u/k	H	

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EQ-9	DPW - Environmental Programs Division	Inspections are conducted on commercial and industrial sites to verify compliance with local, state, and federal regulations on disposal of industrial waste. Inspections are conducted to enforce proper collection, storage, treatment, and disposal of industrial waste or hazardous materials—either to the sewer system for compliance with local limits, or for off-site disposal. On an annual basis, approximately 7,500 inspections are conducted.	Ongoing	G	u/k	H	

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EQ-10	DPW - Waterworks Division	Install approximately 9,000 linear feet of 12-inch-diameter steel water main to introduce a new water source into Waterworks District No. 29 and provide system redundancy through an interconnection with Las Virgenes Municipal Water District along Encinal Canyon Road. This project would provide emergency water supplies in the event the primary source of water, a feeder along Pacific Coast Highway, was interrupted due to earthquake, land movement, or a terrorist act.	2012-2017	G	$3 million (2005)	H	Deferred due to lack of funding. Revised timeline and coordinating organization
EQ-11	DPW - Waterworks Division	Design and construct a 380,000-gallon steel tank to replace an existing, aging 300,000-gallon cylindrical concrete tank that has not been seismically retrofitted. The tank is located at 5731 Busch Drive, Malibu.	2012–2014	CIP	$1,46 million (2005)	H	Deferred due to lack of funding. Revised, about to start tank design

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EQ-12	DPW - Waterworks Division	Equip two water wells suitable for drinking (4-69 and 4-72) located in the Antelope Valley. These wells are to be used as a secondary source of water supply and also are an important alternative source in case of any damage to the AVEK Aqueduct—Antelope Valley's primary source of water supply.					Completed in 2005
EQ-13	Los Angeles County Department of Coroner	As detailed in a facility audit of March 2002, upgrade the Forensic Science Center buildings to improve fire/life safety and earthquake resistance. Provide a backup power source sufficient for the facility to operate during power outages.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline
EQ-14	OEM, ESP Chair	Work with Cal OES and ShakeOut to do a retrofit earthquake public awareness campaign.	Ongoing	GF	u/k	H	New

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Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-15	ISD	Administration Building, 1100 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, partitions.	2012-2017	G	u/k	H	New
EQ-16	ISD	Human Resources Annex, 1100 Eastern Avenue Earthquake: Seismic engineering and reinforcement of modular building.	2012-2017	G	u/k	H	New
EQ-17	ISD	Department Operations Center, 1100 Eastern Avenue Earthquake: Seismic engineering and reinforcement of modular building.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-18	ISD	Crafts Building, 1102 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New
EQ-19	ISD	Fleet Building, 1104 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, partitions.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-20	ISD	Ceremonies Building, 1106 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New
EQ-21	ISD	Communications Building, 1110 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-22	ISD	Communications Engineering, 1112 Eastern Avenue Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-23	ISD	ITS Offices and Data Center, 9150 Imperial Hwy., Downey Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions; 3) Seismic engineering and reinforcement of cooling tower platforms; 4) Seismic engineering and reinforcement of primary chilled water piping.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-24	ISD	District 2 Maintenance and Operations Offices, San Fernando Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New
EQ-25	ISD	District 3 Maintenance and Operations Offices, Culver City Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-26	ISD	District 4 Maintenance and Operations Offices, Downey Earthquake: 1) Seismic engineering and reinforcement of building shell; 2) Seismic engineering and reinforcement of tenant improvements, including ducting, piping, lighting, ceilings, and partitions.	2012-2017	G	u/k	H	New
EQ-27	Energy Management	Seismic Bracing for Co-Generation Plants: Civic Center Cogen 301 N. Broadway, Los Angeles, CA 90012 Pitchess Cogen 29300 The Old Road, Saugus, CA 91350	2012-2017	u/k	$12 million (2012)	H	New
EQ-28	Energy Management	Cooling tower facade reinforcement	2012-2013	u/k	$3,000,000	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
EQ-29	DMH	Retrofit any critical existing or future DMH facility within strong shaking areas that do not meet the IBC requirements for seismic safety.	2012-2017	*, G	u/k	H	New
EQ-30	OEM	Update the current HAZUS study information to reflect accurate, up-to-date replacement cost values.	Ongoing	G, GF	u/k	H	Revised action item to exclude working with other jurisdictions. Conduct every 5 years during the update to the Hazard Mitigation Plan.
Wildfire							
WF-1	LACoFD - Prevention Bureau	Develop a policy that will address issues related to limited construction under transmission lines.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
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WF-2	DPW	Road maintenance projects for fire access: The following road maintenance projects are designed to enhance the ability to access areas prone to fire (note all cost estimates are in 2005 dollars): 553 Placerita Cyn. Rd. @ M.M. 2.57 Install trash/debris rack $8,724 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 2.67 Install 36" CMP stand pipe & trash rack $10,971 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 2.77 Install 36" CMP stand pipe $10,971 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 2.94	2012-2017	u/k	$342,320 (2005)	H	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Install 36" CMP stand pipe & trash rack $10,971 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.04 Install 36" CMP stand pipe $10,971 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.10 Clear pipe $19,990 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.15 Install 36" CMP stand pipe $10,971 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.21 Install trash/ debris rack & clear pipe $10,971 Protective measures as result of the Foothill					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Fire 553 Placerita Cyn. Rd. @ M.M. 3.23 Install trash/ debris rack & clear pipe $8,724 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.57 Clear pipe $11,000 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.35 Remove 60 CY sediment and debris from inlet area; remove and replace existing inlet standpipe with 60" CMP; install CMP elbow and downpipe on outlet to direct flows; install rip rap at outlet. $19,561 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.42 Remove 500 CY sediment from inlet					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		area; upgrade existing standpipe to 60"; install vertical beam trash rack. $19,972 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 3.82 Remove 400 CY sediment and debris from inlet area; clear and re-stabilize existing standpipe; upgrade existing standpipe to 60" if necessary. $17,653 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.18 Remove fallen oak tree on access road; install 60" CMP standpipe over existing inlet; install vertical beam trash rack. $13,912 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.30 Remove 400 CY of alluvial material at					

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Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		toe of slope; place k-rail along shoulder as necessary. $16,440 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.33 Remove 800 CY sediment and debris from inlet area; remove and replace existing 36" culvert with 48" CMP; construct inlet and outlet headwalls; fill and compact outlet area with material removed from inlet area; install 100 tons of 2-ton rip rap at outlet. $19,184 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.35 Remove 400 CY of alluvial material at toe of slope; place k-rail along shoulder as necessary. $14,980 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.64					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Install 60" CMP standpipe over existing inlet; remove interfering burned trees from work area if necessary; install 48" CMP bypass culvert with downpipe to toe of slope. $19,933 Protective measures as result of the Foothill Fire 553 Placerita Cyn. Rd. @ M.M. 4.97 Remove 100 CY sediment and debris from inlet area; install 60" CMP standpipe over existing inlet; remove interfering burned trees from work area if necessary; install 48" CMP bypass culvert; fill and compact outlet area with material removed from inlet area. $19,914 Protective measures as result of the Foothill Fire 557 Mt. Emma Road @ M.M. 0.11 Install vertical beam trash rack. $18,800					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 0.33 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 1.03 Install 12'x5' vertical beam trash rack. $5,143 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 1.44 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 1.78 Install 12'x5' vertical beam trash rack. $3,100					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 1.84 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 1.86 Install 12'x5' vertical beam trash rack. $2,305 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 2.19 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 2.27 Install 12'x5' vertical beam trash rack. $3,100					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 2.34 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 2.48 Install 12'x5' vertical beam trash rack. $5,143 Protective measures as result of the Crown Fire 557 Mt. Emma Road @ M.M. 3.56 Install 12'x5' vertical beam trash rack. $3,100 Protective measures as result of the Crown Fire 557 Aliso Canyon Road @ M.M. 2.28 Install 12'x5' vertical beam trash rack. $2,579					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Protective measures as result of the Crown Fire 557 Aliso Canyon Road @ M.M. 2.32 Install 12'x5' vertical beam trash rack. $2,579 Protective measures as result of the Crown Fire 557 Aliso Canyon Road @ M.M. 3.15 Install 12'x5' vertical beam trash rack. $2,579 Protective measures as result of the Crown Fire 557 Aliso Canyon Road @ M.M. 3.52 Install 12'x5' vertical beam trash rack. $2,579 Protective measures as result of the Crown Fire Total $342,320					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
WF-3	DPW - Waterworks Division	Constructing additional water reservoir throughout the district for firefighting.	2012-2017	G, Special Funding	$30 million (2005)	H	Deferred due to lack of funding. Revised timeline.
WF-4	DPW - Waterworks Division	Replace deteriorated and undersized water system to meet the customers' need for a safe, reliable water supply, and provide the minimum flow required by the fire department for residential fire protection. Upgrading the system will reduce the leaks and potential flooding of the homes in the Kagel Canyon community. The upgrades also include interconnection with the DWP water system to provide for an alternative secondary source of water supply in case of damage to the existing water system in the area.	2012-2017	CIP	$5,000,000	H	Deferred due to lack of funding. Revised timeline.
WF-5	DPW - Waterworks Division	Clear the brush around all Waterworks facilities to reduce the fire hazard.	Ongoing	GF	$100,000 (annual 2005)	H	Annual program.
WF-6	DRP	Update the County fire code every three years.	2012-2015	G, GF	u/k	M	New

Table 10-2: Mitigation Actions Matrix							
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WF-7	OEM, LACoFD, DPW - Watershed Management	Promote cooperative vegetation management programs that incorporate hazard mitigation.	2012-2015	G, GF	u/k	M	New
WF-8	LACoFD, DPW - Watershed Management	La Canada Flintridge Project: This project is located in the center of the County and included treatment of 900 acres using manual (crews), biological (goats), mechanical (brush crusher), and prescribed fire measures. The project provides protection to the City of La Cañada Flintridge, La Crescenta, and Pasadena. The project started in 2001, with a total of 183 acres having been burned. The biological treatment continued in 2004, with 30 additional acres burned in 2004 and 2005.					New. Completed in 2005.

Table 10-2: Mitigation Actions Matrix							
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WF-9	LACoFD, DPW - Watershed Management	Pitchess Detention Center: This project is located in the Santa Clarita area, and consisted of the treatment of 1,045 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the Los Angeles County Sheriff's Department. This project provided fire protection to the Pitchess Ranch Detention Center. A secondary benefit to the project is the annual training of firefighters on firing operations and grass firefighting.					New. Completed
WF-10	LACoFD, DPW - Watershed Management	Poppy Park Reserve: This project is located in northern Los Angeles County, and consisted of the treatment of 200 acres using prescribed fire to enhance the growth of California poppies and eliminating non-native vegetation. The project also provided fire protection to the Poppy Park Reserve Visitor Center and the community of Lake Hughes.					Completed

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WF-11	LACoFD, DPW - Watershed Management	Malibu Creek State Park: This project was located in the Santa Monica Mountains, and consisted of the treatment of 450 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the California State Parks. This project provided fire protection to the Malibu Creek State Park and the City of Malibu, including enhancing the growth of native vegetation and eliminating non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of grasses and thistle.					Completed

Table 10-2: Mitigation Actions Matrix							
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WF-12	LACoFD, DPW - Watershed Management	Cheeseboro: This project was located in the Santa Monica Mountains, and consisted of the treatment of 100 acres using manual (crews) and prescribed fire measures. This was a coordinated resource project undertaken in tandem with the National Park Service. This project provided fire protection to Cheeseboro Park and the City of Agoura Hills, and includes enhancing the growth of native vegetation by eliminating non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of grasses and thistle.					Completed

Table 10-2: Mitigation Actions Matrix							
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WF-13	LACoFD, DPW - Watershed Management	Kenneth Hahn State Recreational Area: This project was located in the Kenneth Hahn State Recreational Area, and consisted of the treatment of 60 acres using prescribed fire to enhance the growth of native species, and eliminating non-native vegetation. The project also provided fire protection to the park's visitor center; to the cities of Los Angeles, Culver City and Inglewood; and to the unincorporated community of Baldwin Hills.					Completed
WF-14	LACoFD, DPW - Watershed Management	Hathaway: The Hathaway Project was a 6,226-acre area located northwest of the City of Santa Clarita. The County of Los Angeles Fire Department has determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities in Hasley and Oak Canyons, and the communities of Castaic, Piru, Del Valle, and Valverde. The county and the property owners recognize the					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		potential threat of catastrophic wildfires burning in the ranch property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Hathaway property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires.					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.					
WF-15	LACoFD, DPW - Watershed Management	Descanso: The Descanso Project encompasses a 138-acre area located in the City of La Cañada Flintridge. The County of Los Angeles Fire Department, the City of La Cañada Flintridge, and the Descanso Gardens board have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of La Cañada, Montrose, Glendale, and the historical Descanso Gardens. The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Gardens property and surrounding lands. This plan addresses the potential wildfire problem					Completed

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		through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Descanso Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing,					

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		thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.					
WF-16	LACoFD, DPW - Watershed Management	Glendora: The Glendora Project area is a 184-acre area located in the San Gabriel Mountains Conservancy land north of the City of Glendora. The County of Los Angeles Fire Department, the City of Glendora, and the San Gabriel Mountains Conservancy have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the cities of Glendora, San Dimas, and Azusa. The enhancement entails the growth of native vegetation that requires fire for propagation; eliminating non-native vegetation is also a primary goal of this project. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Glendora Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
WF-17	LACoFD, DPW - Watershed Management	Stunt: The Stunt Project area is an 83-acre area located in the Santa Monica Mountains, 8 miles north of the City of Malibu. The County of Los Angeles Fire Department and the National Park Service have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of Monte Nido, El Nido, Calabasas, Agoura Hills, and the City of Malibu. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Stunt Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); equipment (brush crusher); and prescribed fire.					
WF-18	OEM, LACoFD, DPW - Watershed Management	Colby Ranch: The Colby Ranch Project area is a 332-acre area nestled in Angeles National Forest north of the City of La Cañada Flintridge. The County of Los Angeles Fire Department, the U.S. Forest Service, and the Colby Ranch have determined the need for a					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the ranch, the Angeles National Forest, and surrounding cities and communities. The county and the property owner recognize the potential threat of catastrophic wildfires burning in the Angeles National Forest and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located					

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		throughout Southern California. Fuel reduction zones in open-space areas within the Colby Ranch Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling) and manual (clearing, mowing, thinning, and multi-cutting).					
WF-19	LACoFD, DPW - Watershed Management	Horizon Hills: The Horizon Hills Project is a California Fire Safe Council–sponsored vegetation management project. The project area consists of 57 acres located in the City of Malibu. The County of Los Angeles Fire Department, the Horizon Hills Homeowners Association, and the California Fire Safe Council have determined the need for a					Completed

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the communities of Horizon Hills and the City of Malibu. The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Horizon Hills property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve the fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		within the Horizon Hills Project will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); and manual (clearing, mowing, thinning, and multi-cutting).					
WF-20	LACoFD, DPW - Watershed Management	Lakeside Firewise II: The Lakeside Firewise II Project is a California Fire Safe Council–sponsored vegetation management project. The project area encompasses 86 acres located in the community of Malibu Lake. The County of Los Angeles Fire Department, the Malibu Lakeside Homeowners Association, and the California Fire Safe Council have determined the need for a vegetation management plan to provide a long-term mitigation for the hazardous wildfire problem					Completed

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		affecting the community of Malibu Lake and the cities of Agoura Hills and Malibu. The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Malibu Lake property and surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Law and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Lakeside Firewise II Project will substantially reduce the potential hazard					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing) and manual (clearing, mowing, thinning, multi-cutting).					
WF-21	LACoFD, DPW - Watershed Management	Whittier Hills: The Whittier Hills Project involves a 1,396-acre area located north of the City of Whittier. The County of Los Angeles Fire Department and the Whittier City Council have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the City of Whittier and the community of Hacienda Heights. The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Wilderness Park property and					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		surrounding lands. This plan addresses the potential wildfire problem through the use of current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Whittier Hill Wilderness Park property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); and prescribed fire.					
WF-22	LACoFD, DPW - Watershed Management	City of Industry/Tonner Canyon: The Tonner Canyon Project encompasses a 3,200-acre area located south of the City of Diamond Bar. The County of Los Angeles Fire Department and the cities of Industry and Diamond Bar have determined the need for a vegetation management plan to provide long-term mitigation for the hazardous wildfire problem affecting the City of Diamond Bar, Chino Hills, Brea, La Habra, La Habra Heights, and Industry. The county and the property owners recognize the potential threat of catastrophic wildfires burning in the Tonner Canyon property and surrounding lands. This plan addresses the potential wildfire problem through the use of					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		current technologies, scientific studies, and related fire behavior computer programs. Laws and regulations that could affect fire hazard reduction activities have also been considered. This plan is being developed to improve fire safety for residents and firefighters without compromising environmental concerns, and to manage the fire/flood cycle that characterizes most urban/wildland interface areas located throughout Southern California. Fuel reduction zones in open-space areas within the Tonner Canyon property will substantially reduce the potential hazard posed by airborne embers. Embers have been documented to cause 40% to 60% of structure losses in catastrophic wildfires. The following treatment methods will be used throughout this project: biological (strategic recycling, grazing); manual (clearing, mowing,					

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		thinning, multi-cutting); mechanical (brush crusher); and prescribed fire.					
WF-23	LACoFD, DPW - Watershed Management	Oak Woodland Restoration: This project is a parcel dedicated as open space, and located in the City of Santa Clarita. The project consists of the treatment of 150 acres using biological (goats), manual (crews) and prescribed fire methods. This project provided fire protection to the West Ridge Development and the City of Santa Clarita. Additional goals are the enhancement of native vegetation growth by eliminating non-native vegetation, and the annual training of firefighters on fire control of non-native vegetation to facilitate the establishment of native species.					Completed
WF-24	LACoFD, DPW - Watershed Management	Stevenson Ranch: This project was located in the City of Santa Clarita, adjacent to the Oak Woodland Restoration Project, and consisted of the treatment of 1,501 acres using biological					Completed

Table 10-2: Mitigation Actions Matrix							
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		(strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); mechanical (brush crusher); and prescribed fire methods. This project provided fire protection to the cities of Santa Clarita and Valencia, and to the community of Stevenson Ranch. An added goal of the project is the annual training of firefighters on fire control of non-native vegetation to facilitate the establishment of native species.					
WF-25	LACoFD, DPW - Watershed Management	Placerita Canyon State Park: This project was located in the Santa Susana Mountains, and consisted of the treatment of 200 acres using biological (strategic recycling, grazing); manual (clearing, mowing, thinning, and multi-cutting); mechanical (brush crusher); and prescribed fire methods. This was a coordinated resource project with the California State Parks. This project provided fire protection to the Placerita Canyon State					Completed

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
		Park, the City of Santa Clarita, and the Angeles National Forest. An additional benefit will be the enhancement of native vegetation growth, and reduction of non-native vegetation. A secondary benefit to the project is the annual training of firefighters on fire control of brush fires.					
WF-26	DMH	Install "green belts" utilizing grass seed mixture recommended by fire specialist in order to help maintain defensible space around the built environment.	1-5 years	*, G	TBD	H	New
WF-27	DMH	Create fuel breaks to separate DMH facilities encroachment from brush fields and forests.	1-5 years	*, G	TBD	H	New
WF-28	LACoFD – Prevention Bureau	Develop a comprehensive response plan and protocols to define philosophy, resources, guidelines and contacts for large-scale events such as terrorism or disasters.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
WF-29	LACoFD – North Operations Bureau	Develop a helispot directory to include helispots, snorkel sites, and portable tank sites to enhance our ability to safely deploy our helicopter fleet and double the number of available water access sites at wildland fire incidents.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-30	LACoFD	Ensure the completion of the specific assigned portion of the Emergency Operations Directory including resource information and guidelines for incident management.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-31	LACoFD – Support Services Bureau, Maintenance & Construction Division	Develop and implement a plan for the physical plant including headquarters (RFP and funding) and heliport.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-32	LACoFD – Forestry Division	Complete the implementation of the Infrared Command Unit.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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WF-33	LACoFD – Forestry Division	Expand customer/stakeholder outreach through the reassessment and development of recommendations for the existing Very High Fire Hazard Severity Zone in the unincorporated area of Los Angeles County.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-34	LACoFD – Air & Wildland Division	Identify and correct delay points in the procurement process for Aircraft on Ground (AOG) resulting in a 25% reduction in turnaround time.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-35	LACoFD – Air & Wildland Division	Develop and recommend a proposal for implementing a third 24-hour air squad in the Antelope Valley.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-36	LACoFD – North Operations Bureau	Lead and direct all aspects of the acquisition of a Sirkorsky Firehawk helicopter, including funding, specifications and leasing, and operational use.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.
WF-37	LACoFD – Forestry Division	Install two additional Remote Automated Weather Stations to provide more cost effective augmented staffing.	2012-2017	G, GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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Weapons of Mass Destruction/Terrorism							
WT-1	LASD	Develop an effective information-gathering analysis and sharing capability to enhance event and incident management. Enhance threat assessment sharing and evaluation efforts to deter, prevent, and respond to terrorism events. Evaluate program with training and exercise needs.	2012-2017	G, GF	$5.2 million (2005)	H	Deferred due to lack of funding. Revised the Coordinating. Organization
WT-2	LASD	Provide public information educational materials on terrorism dangers and actions the public can take to protect themselves. Enhance public outreach, education, and community training to address terrorism events. Support the capabilities developed through Citizen Corps and other community-based organizations. Provide resident and family preparedness plans and programs.	Ongoing	G, GF	$52,600 annual (2005)	H	

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WT-3	DPH, OEM, Emergency Medical Community	Development of federally approved training programs and courses to coordinate WMD response activities with emergency medical and the public health discipline. These courses would include training exercise programs and scenarios.	2012-2017	G, GF	$823,658 (2005)	H	Deferred due to lack of funding. Revised – Public Health changed to lead agency
WT-4	DHS	The Department of Health Services, Emergency Medical Services Agency has established six local pharmaceutical caches that are maintained by the EMS Agency staff. Additionally, 11 private hospitals have established pharmaceutical caches that are maintained at that facility. These caches are available for use throughout the County at the direction of the EMS Agency. These pharmaceuticals would be used initially in the response to a terrorism event until additional supplies could be obtained through the Strategic National Stockpile Program.					Completed

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WT-5	DHS	The Strategic National Stockpile (SNS) prepares the County for requesting, receiving, storing, staging, distributing, dispensing, and recovering SNS material. SNS material consists of pharmaceuticals, vaccines, and related equipment LAC OA may need to respond to a large-scale chemical or biological attack that would require this material in greater quantities than locally available on short notice. The initial shipment of SNS material will be received in LAC within 12 hours after it is released by the federal government. The SNS plan for the LAC OA is a regularly updated, operational working document in which the preparedness phase—including planning, training, exercising, and evaluating—is currently being implemented, and the response phase would be implemented in the event of an emergency requiring the use of SNS material.					Completed

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WT-6	DPW - Waterworks Division	Install security upgrade measures for sites that were assigned a rating of H (high) for risk. The project includes the following upgrades: site hardening, physical security upgrades, access control systems, and electronic monitoring devices such as digital video cameras, motion sensors, microwave and infrared detectors, and intrusion detection equipment on doors, hatches, and vault lids.					Completed in 2008
WT-7	DPW - Waterworks Division	Install security upgrade measures for nine sites that were assigned a rating of H (high) for risk. The project includes the following upgrades: site hardening, physical security upgrades, access control systems, electronic monitoring devices such as digital video cameras, motion sensors, microwave and infrared detectors, and intrusion detection equipment on doors, hatches, and vault lids.					Completed in 2008

Table 10-2: Mitigation Actions Matrix							
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WT-8	DPW - Water Resources Division	Install security enhancements at the high-hazard dams, per recommendations from the threat assessments.	2012-2017	u/k	$300,000 (2005)	H	Deferred due to lack of funding
Utility Loss							
UL-1	ISD	Install emergency generator: 11236 Playa Ct., Culver City, ISD FOS Dist. 3 Headquarters.	2012-2017	u/k	u/k	H	Deferred due to lack of funding
UL-2	ISD	Eastern Avenue Complex Emergency Operations: Dual-feed power and switch repairs	2012-2017	u/k	u/k	H	New
UL-3	ISD	ITS Offices and Data Center, 9150 Imperial Hwy., Downey Emergency Operations: 1) Additional emergency power generation redundancy; 2) Additional air conditioning water redundancy; 3) Additional cooling tower redundancy; 4) Additional fire water redundancy.	2012-2017	u/k	u/k	H	New

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UL-4	ISD	District 2 Maintenance and Operations Offices, San Fernando Emergency Operations: Emergency power generator	2012-2017	u/k	u/k	H	New
UL-5	ISD	District 3 Maintenance and Operations Offices, Culver City Emergency Operations: Emergency power generator	2012-2017	u/k	u/k	H	New
UL-6	ISD	District 4 Maintenance and Operations Offices, Downey Emergency Operations: Emergency power generator	2012-2017	u/k	u/k	H	New
Flood							
FL-1	DPW - Water Resources Division	Enforce the National Flood Insurance Program (NFIP) cumulative impact analysis requirements: Work with NFIP to develop criteria for the enforcement of existing requirements for the cumulative impacts of further development.	2012-2015	G, GF	$20,000 (2012)	H	Deferred due to lack of funding. Revised action item.

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FL-2	DPW - Water Resources Division	Consider tightening regulations so that new structures are at least 1 foot higher than the current regulations require.	2012-2015	G, GF	$20,000 (2012)	H	New – separated off from original language of FL-1.
FL-3	DPW	Initiate studies of areas where landslides threaten or are already damaging existing development, and prepare plans for controlling the hazard. Once plans are developed, encourage the formation of geologic hazard abatement districts through the state to provide funding for mitigation measures to stabilize the areas.	Ongoing	G	u/k	H	
FL-4	DPW - Building & Safety Division	Building & Code Restrictions in Flood Hazard Zones. (See supporting documentation for project specifics.) 11236 Playa Ct., Culver City, ISD FOS Dist. 3 Headquarters.	Ongoing	GF	Varies	H	Note: High Priority

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FL-5	DPW - Environmental Programs Division	Inspections are conducted of commercial and industrial sites for compliance with state and local regulations on storm water issues. During the inspections, handouts are given to the public on best management practices. Approximately 1,500 inspections are conducted during the permit period.	Ongoing	G	u/k	H	
FL-6	DPW - Flood Maintenance Division	Emergency Flood Control - this program is used for activities related to the inspection of flood control facilities where storm-related problems are likely to occur. Support services are also provided.	Ongoing	Flood Fund	$618,400 (2005)	H	

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FL-7	DPW - Flood Maintenance Division	O&M of Channel Improvements - this program is used to operate and maintain open channel and underground storm drains that involve activities of routine nature. Work performed under this program includes contract administration, inspection of maintenance contracts, services, geotechnical investigations, material testing and analysis, various mapping and property management services, survey services, and electrical and craft services. Environmental documents and mitigation measures necessitated by the O&M activities are also under this program. Expenditures by both field and office personnel are included, as well as contract payments for ordinary maintenance work (catch basin cleaning, trash and debris removal, right-of-way clearing, etc.).	Ongoing	Flood Fund	$23.3 million (2005)	H	

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FL-8	DPW - Flood Maintenance Division	O&M of Runoff Regulation Facilities - this program is used for activities related to the operation and maintenance of flood control facilities (dams and retention/detention facilities) and their appurtenances. Work performed under this program includes maintenance service contract administration, material testing and analysis, geotechnical investigations, various mapping and property management functions, electrical and craft services, and surveying. Other work performed under this program includes collecting, processing, and maintaining hydrologic data; preparing operation plans; maintaining related instruments; conducting surveillance activities at dams; repair of telemetry and alarm systems; developing reservoir management plans; implementing sediment removal projects; preparing hydrologic analysis; preparing environmental documents; and	Ongoing	Flood Fund	$10.5 million (2005)	H	

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		conducting reservoir routing studies and dam break analyses. Work also includes drainage and removing debris from reservoirs.					
FL-9	DPW - Flood Maintenance Division	O&M of Pumping Plants - this program is used for activities related to the operations and maintenance of pumping plants designed to pump storm runoff. Activities performed under this program include maintaining and repairing instruments, equipment, and craft services. Environmental documents and mitigation measures necessitated by the O&M activities are also under this program.	Ongoing	Flood Fund	$2,315,700	H	
FL-10	DPW - Flood Maintenance Division	Hazardous Material Cleanup - this program is used for all costs and activities associated with the unplanned cleanup of hazardous materials discharged into Flood Control District facilities and/or from site assessment.	Ongoing	Flood Fund	$815,200 (2005)	H	

Table 10-2: Mitigation Actions Matrix							
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FL-11	DPW - Flood Maintenance Division	O&M of Debris Control Facilities - this program is used for activities related to the operation and maintenance of debris basins and sediment placement sites, drainage and removal of vegetation, and removal of debris from debris basins. Work performed under this program includes geotechnical (geology and soils) investigations, material testing and analysis, various mapping and property management functions, craft and electrical services, preparation of environmental documents and ensuring compliance with regulatory requirements, sediment removal, and surveying. Other work performed under this program includes monitoring debris inflow and preparing recommendations on cleanouts, developing sediment placement site re-vegetation plans for cleanout activities, coordinating the acquisition of permits, and conducting safety surveillance at debris basins.	Ongoing	Flood Fund	$6.2 million (2005)	H	

Table 10-2: Mitigation Actions Matrix							
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FL-12	DPW - Flood Maintenance Division	O&M of Storm Drain Improvements - this program is used to operate and maintain underground storm drains, which includes all catch basins. Work performed under this program includes contract administration, work and services performed under a maintenance contract, geotechnical investigations, material testing and analysis, various mapping and property management services, and survey services. Expenditures by both field and office personnel are included, as well as contract payments for ordinary maintenance work.	Ongoing	Flood Fund	$3 million (2005)	H	

Table 10-2: Mitigation Actions Matrix							
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FL-13	DPW - Waterworks Division	Design and construct water diverting systems to retrofit 16 tank sites in Malibu and Antelope Valley to prevent flooding of the homes and businesses surrounding the tank sites in case of a tank rupture due to a significant seismic occurrence or other disaster. The diverting systems would include the construction of retaining walls, flood gates, drainage systems and drainage courses, weep holes, etc., to control the flow of water and divert water safely away from homes and businesses surrounding the tank sites.	Ongoing	CIP	$1.3 million (2005)	H	
FL-14	DPW - Water Resources Division	Aliso Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
FL-15	DPW - Water Resources Division	Big Briar Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-16	DPW - Water Resources Division	Dry Canyon South Fork Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-17	DPW - Water Resources Division	Emerald East Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-18	DPW - Water Resources Division	Englewild Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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FL-19	DPW - Water Resources Division	Goss Debris Basin Project: Construct new debris basin to replace existing storm drain inlet.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-20	DPW - Water Resources Division	Hog Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-21	DPW - Water Resources Division	Linda Vista Debris Basin Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-22	DPW - Water Resources Division	Mull Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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FL-23	DPW - Water Resources Division	Pickens Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-24	DPW - Water Resources Division	Sombrero Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-25	DPW - Water Resources Division	Starfall Debris Basin Enlargement Project: modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.
FL-26	DPW - Water Resources Division	Sullivan Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	u/k	H	Deferred due to lack of funding. Revised timeline.

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FL-27	DPW - Water Resources Division	Sunnyside Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	n/k	H	Deferred due to lack of funding. Revised timeline.
FL-28	DPW - Water Resources Division	Verdugo Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	n/k	H	Deferred due to lack of funding. Revised timeline.
FL-29	DPW - Water Resources Division	William S. Hart Park Debris Basin Enlargement Project: Modification to the facility by raising the spillway elevation and over-excavating to increase sediment storage capacity to meet the design debris requirement.	2012-2017	GF	n/k	H	Deferred due to lack of funding. Revised timeline.

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FL-30	DPW - Water Resources Division	Mudflow Protection Advice: evaluate potential mudflow hazard to occupied properties within/below burned areas, and provide mudflow protective advice to property owners potentially affected by mudflow and flooding. Determine the phase potential of an impending storm and issue debris and mudflow potential forecasts to emergency response agencies and affected divisions.	Ongoing	GF	$50,000/yr (2005)	H	Deferred due to lack of funding. Revised timeline.
FL-31	DPW - Road Maintenance Division – Maintenance District 1	Upgrade the four culverts on Mt. Baldy Rd. at MMs 1.34, 1.65, 1.96, and 8.85 to provide adequate and higher protection than the <1 year flow burned and bulked flood rates. The above-mentioned culverts failed during the big storm events of December 2003 subsequent to the wildfire, causing 50 feet or road lane and 100 feet of shoulders to be washed.	2012-2017	u/k	$1.2 million (2005)	H	Deferred due to lack of funding. Revised timeline.

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FL-32	DPW	Develop and implement plan to enhance monitoring of the levees that can no longer contain the FEMA 100-year flood for anticipated overtopping of the levees to provide more timely flood warnings and evacuations.	Ongoing	Flood Fund	$20,000 (2012)	H	New

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FL-33	DPW	Update the County floodway maps to more accurately reflect the current existing conditions.	Ongoing	Flood Fund	$300,000 (2012)	H	New. Typically the floodway maps are revised due to projects. This is to restudy areas using improved contours, modeling methods, rainfall and runoff data, and changes in the creeks (vegetation, sediment), not necessarily where there have been recent revisions.

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FL-34	DPW	Conduct outreach that includes recommendations for flood mitigation measures for repetitive loss properties in the County unincorporated areas.	Ongoing	G	$100,000 (2012)	H	New.
FL-35	DPW	For all properties in the floodplain having a structure, conduct outreach regarding flood preparation and how to protect the property from flood damages.	Ongoing	G	$100,000 (2012)	H	New
FL-36	DPW	Construct the Quartz Hill storm drain along 50th Street West in the unincorporated area of Quartz Hill. The storm drain will relieve the drainage and flooding hazards in the Quartz Hill community.	2012-2015	Utility funds transferred to the Road Fund.	$12 million (2012)	H	New
FL-37	DPW	Develop a specific plan, based on engineering studies, to mitigate flood hazards along Dominguez Channel and Compton Creek.	2012-2017	Flood Fund	$2.01 million (2012)	H	New

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FL-38	DPW	Develop a plan for the maintenance of major flood control channels to mitigate the flood hazards identified by regulatory agencies mandating maintenance protocols through permits.	2015-2017	Flood Fund	$3 million (2012)	H	New
FL-39	DPW	Los Angeles County Regional Deficiency Identification: Plan to create a GIS database of all the LACFCD facilities with capacity, hydrology, and other information to assist the LACFCD in future project planning for flood hazard mitigation.	2015-2017	Flood Fund	u/k	H	New
FL-40	DPW	Mitigate flood hazards in the Hancock Park sub-watershed by upgrading the deficient storm drain system.	2015-2017	Flood Fund, G	u/k	H	New

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FL-41	ISD	Eastern Avenue Complex Flooding: 1) Repair crushed corrugated steel storm water piping from settlement below SE Edison tower; 2) Install protective liner in main storm water corrugated steel piping to prevent further deterioration from rust; 3) Install UG storm water drains for south hillside west of Humphrey's Cul-de-sac; 4) Install storm water diversion wall along south hillside property line east of Humphrey's Cul-de-sac; 5) Grade and repair east hillside storm water v-ditches damaged by landfill settlement; 6) Replace east hillside v-ditch UG storm water transfer drains.	2012-2017	u/k	u/k	H	New

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FL-42	DPW	Carry out flood and storm water management projects that would reduce damage to existing and future buildings due to flooding. These projects may include, but are not limited to, modify or replace existing culverts, upgrade capacity of storm drains, build flood walls to block or redirect flood waters, and create floodwater retention basins in small watersheds.	2015-2017	u/k, G	u/k	H	New
Biological Hazard							
BH-1	ECC, DHS, Mobile Doc	A command post trailer was purchased to be used as the Mobile Incident Command Post.					Completed in 2006.
BH-2	DPH	New radios (120) were purchased to replace the first model, MP-A Scan radios, which are no longer manufactured.					Completed in 2007.

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BH-3	DPH	Design and renovate a permanent location for the Department Operations Center Emergency Control Center (ECC).Currently two conference rooms—one at Public Health Headquarters and one at a clinic adjacent to headquarters—are "wired" to become an ECC location if needed. Issues of security, continuity of emergency coordination work (monitoring activities and amenities for around-the-clock work shifts), accommodation for emergency command staff, and accessibility underscored the need for a permanent location. Funds for this location are lacking.	2012-2017	u/k	u/k	H	Revised – Description of action item.

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BH-4	DPH	Implementation of the Web-secured system Visual Confidential Morbidity Report (VCMR), which allows real-time electronic disease reporting, tracking, and investigation, and employs multiple channels for routine communications by automatically alerting key staff via phone, pager, and/or e-mail.	2012-2017	G	$1.5 million (2005)	H	Deferred due to lack of funding. Revised timeline.
BH-5	DPH	Vaccinated Public Health Response and Healthcare Response Team staff for smallpox, and trained staff on mass vaccination.	Ongoing	u/k	u/k	H	
BH-6	DPH	Renovation of a new Public Health laboratory facility in order to meet the standards for advanced biological (level C) and chemical (level 2) testing.					Completed in 2008; laboratory has been moved to a new location in Downey.

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BH-7	DPH	Construction of a secure communication platform and portal for health care professionals and emergency response partners. This communication channel provides the capability for rapid distribution of critical health alerts and broadcasted advisories through a variety of mechanisms such as blast fax, mobile devices, and two-way pagers. The system is a portion of the Los Angeles County help alert network.	2012-2017	GF	$2 million (2005)	H	Completed in 2008. Revised – Description of action item and timeline.
BH-8	DPH	This system will be able to register, track, and administer training to Public Health professionals and emergency response partners via the Web.					Completed in 2008

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BH-9	DPH	Enhancing the Los Angeles Immunization Network (LINK) registry to support data management needs of mass vaccinations/prophylaxis situations. Additional modules to support the receipt, storage, and staging of the Strategic National Stockpile inventory management system and other medical assets within the jurisdictions.					Revised action item. Completed in 2010
BH-10	DPH	Conduct a scientific study to provide data on optimal placement of next-generation Biowatch sensors, including studies of climate, topography, wind patterns, and GIS analysis to determine site placement that provides the best chance of detecting a biological attack.	2013-2015	G	$250,000	H	New

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Water/Wastewater Hazards							
WW-1	DPW - Waterworks Division	Equip three drinking wells (4-61, 4-63, and 4-64) located in the Antelope Valley area. These wells are to be used as a secondary source of water supply and they are also an important alternative source in case of any damage to the AVEK Aqueduct—Antelope Valley's primary source of water supply.					Completed in 2005
WW-2	DPW - Waterworks Division	Design, construction, and equipping of drinking well 27-7 located in the Antelope Valley. This well is to be used as a secondary source of water supply, and is also an important alternative source in case of any damage to the AVEK Aqueduct - Antelope Valley's primary source of water supply.					Completed in 2008

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WW-3	DPW - Waterworks Division	Design and replace the aging, leaking, deteriorating, and undersized existing cross-country lines with steel water mains in the City of Malibu and Topanga Community. Upgrading the system will provide Waterwork's customers with a better and more reliable water supply system, and provide the adequate flow required by the Fire Department for residential fire suppression.	Ongoing	CIP	$2 million (2005)	H	
WW-4	DPW - Waterworks Division	Equip four drinking water wells (4-62, 4-65, 4-67 and 4-68) located in the Antelope Valley. These well are to be used as a secondary source of water supply; they are also an important alternative source in case of any damage to the AVEK Aqueduct, Antelope valley's primary source of water supply.					Completed in 2005

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WW-5	DPW - Waterworks Division	To construct and operate injection/extraction facilities for an aquifer storage and recovery (ASR) project within the Lancaster Sub-basin in Antelope Valley. The project would require drilling and construction of 11 wells, as well as installation of pump stations, pipelines, and related facilities. The primary objective is to halt the long-term decline of groundwater level and associated land subsidence while meeting the growing demand for potable water. The project integrates management of local groundwater basins with use of imported supplies of surface water. This project will also provide a secondary and an important alternative source of water supply in case of any damage to the AVEK Aqueduct, Antelope valley's primary source of water supply.					Completed in 2010

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WW-6	DPW - Waterworks Division	Install 1,000 feet of 30-inch pipeline to serve as an alternate connection in the event that the primary source of water for Waterworks District No. 29, the Malibu and Marina del Rey water system is interrupted.	Ongoing	CIP	$3 million (2005)	H	
WW-7	DPW - Waterworks Division	Install 24,000 feet of 16-inch pipeline to serve as an alternate connection in the event that the primary source of water for Topanga Canyon and Malibu residents is interrupted.	Ongoing	CIP	$12 million (2005)	H	
WW-8	DPW - Waterworks Division	Install a new connection with the Antelope Valley-East Kern Water Agency to increase the reliability and redundancy of water supplies into the Rancho Vista community in West Palmdale.					Completed in 2005
WW-9	DPW - Waterworks Division	Chlorination Facility Safety Enhancement - the project involves improving and/or upgrading existing chlorination facilities in the Los Angeles County Waterworks Districts.					Completed in 2008

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Data/Telecommunication Loss							
DT-1	County of LA Registrar	The Los Angeles County Registrar's office 4 handles almost all of the County's vital statistics and records, from marriage licenses to property transactions. At this time the office does not have a backup system for their data management system.	2012-2014	GF	u/k	H	Deferred, Revised
DT-2	ISD	Administration Building, 1100 Eastern Avenue Communications: Provide 24/7 generator back-up air conditioning in main telephone/ server room (formerly compass room).	2012-2017	u/k	u/k	M	New
Large Venue Structure Fire							
LF-1	LACoFD - Prevention Bureau	Evaluate non-sprinkled high-rise structures to develop code enforcement/changes to improve fire and life safety. Recommend an approach for revising the code to require sprinklers in high-rise buildings.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline

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LF-2	LACoFD - Prevention Bureau	Identify and gain representation on appropriate NFPA technical committees regarding the adoption of the NFPA fire code.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline
LF-3	LACoFD - Special Operations Bureau	Develop a departmental program for Homeland Security, to include staffing, training, equipment, and funding sources to enhance public safety and to ensure first responder readiness.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline
LF-4	ISD - FOS	Asbestos and Lead Abatement in County-Owned Building: 1100 North Eastern Avenue, ISD Administration Building A – 80,000 sq. ft. (abatement fire proofing – 4,000 sq. ft.; abatement pipe insulation – 50 linear feet).	2012-2017	G	$201,350 (2005)	M	Deferred due to lack of funding. Revised timeline
Hazardous Materials							
HM-1	CEO	Asbestos and Lead Abatement following Phase 1 Survey in County-Owned Building: Various buildings.	2012-2017	G	u/k	M	Revised – Coordinating Organization

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HM-2	CEO	Asbestos and Lead-Based Paint Survey of County-Owned Facilities built prior to 1980.	2012-2017	G	$4.2 million (2005)	M	Revised – Coordinating Organization
HM-3	ISD	Administration Building, 1100 Eastern Avenue Hazardous Materials: Friable asbestos removal in lower level.	2012-2017	G	u/k	M	New
HM-4	ISD	Crafts Building, 1102 Eastern Avenue Hazardous Materials: 1) Complete current program to remove asbestos fire proofing and replace with non-hazardous fire proofing; 2) Remove, cap, and remediate (as required) in-ground hydraulic truck tailgate lifts; 3) Remove and remediate—or replace and relicense—the in-ground clarifier lines, structures, and safety components.	2012-2017	u/k	u/k	M	New

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HM-5	ISD	Fleet Building, 1104 Eastern Avenue Hazardous Materials: 1) Complete current program to remove asbestos fire proofing and replace with non-hazardous fire proofing; 2) Remove, cap, and remediate (as required) in-ground hydraulic vehicle and truck lifts; 3) Remove and remediate—or replace and relicense—the in-ground clarifier lines, structures, and safety components.	2012-2017	u/k	u/k	M	New
Radiological Accidents							
RA-1	DPH	These are monitors people would walk through to determine if they have radioactive materials on their persons, or, using the vehicle adapter, in their vehicles.	2012-2017	u/k	$36,000 (2005)	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
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RA-2	DPH	Procure 3 teletectors - instruments that measure extremely high radiation fields.	2012-2017	u/k	$13,725 (2005)	M	Deferred due to lack of funding. Revised timeline.
RA-3	DPH	Radiation Management now has a specialized gas proportional device to measure tritium. The instrument requires P-10 gas. We did not have the ability to detect tritium before.	2012-2017	u/k	$6,179 (2005)	M	Deferred due to lack of funding. Revised timeline.
RA-4	DPH	We have four additional multi-channel analyzers for nuclide identification.	2012-2017	u/k	$31,464	M	Deferred due to lack of funding. Revised timeline.
RA-5	Energy Management	Develop off-site building operations access for BEAS in the event of an after-hours biological event.	2012-2017	u/k	u/k	M	New
RA-6	Energy Management	In the event of a contaminant attack (such as with chemical or biological agents), remote sensors could be installed throughout our network, with alarming capabilities configured within the BEAS building network.	2012-2017	u/k	u/k	M	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
Dam Failure							
DF-1	DPW - Water Resources Division	Rehabilitate Big Dalton Debris Dam to mitigate concerns with seismic stability of the embankment, spillway walls, and outlet tower. The rehabilitation will conform to DSOD's design requirements.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
DF-2	DPW - Water Resources Division	Rehabilitate Big Tujunga Dam to mitigate concerns with seismic stability of the dam and spillway inadequacy for the PMP flow rate. The rehabilitation will conform to DSOD's requirements. We are currently in the design phase of this project.	2012-2017	State Proposition 13, FEMA (HMGP); FEMA (HMGP) transferred from Santa Anita Dam Project, General Fund	$31 million (2005)	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
DF-3	DPW - Water Resources Division	Installation of Dams Automated Data Acquisition Systems at Pacoima, Live Oak, and Big Dalton Dams to monitor for safety and dam operational, structural, geotechnical, and hydraulic conditions associated with flood and earthquake events.	2012-2017	GF	$373,000	M	Deferred due to lack of funding. Revised timeline.
DF-4	DPW - Water Resources Division	Outlet tower rehabilitation at Eaton Wash Dam to mitigate seismic deficiencies and ensure safe operation of the dam during major storms, and to safeguard the water conservation capabilities of the dam to ensure a reliable water supply is available after earthquake events.	2012-2017	GF	$700,000	M	Deferred due to lack of funding. Revised timeline.
DF-5	DPW - Water Resources Division	Rehabilitate Little Dalton Debris Dam to comply with DSOD's design requirements for seismic stability by strengthening the spillway walls and outlet tower, and converting the facility to a free-draining debris dam.	2012-2017	G (FEMA-HMGP), GF	$1.03 million (2005)	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
DF-6	DPW - Water Resources Division	Modification of intake and electrical system, and replacement of three regulating valves. This will improve the reservoir's flood control capability, increase the operational storage capacity by 34 percent, increase the operational storm water capture ability by 5,700 acre-feet, and provide $2.6 million annual water supply benefits to ensure a safe water supply is available after earthquake events.	2012-2017	GF	$14 million (2005)	M	Deferred due to lack of funding. Revised timeline.
DF-7	DPW - Water Resources Division	Replacement of 84-inch valve at the San Gabriel Dam to ensure safe operation of the dam during major storm events and to optimize the reservoir's water conservation capabilities to help drought-proof and ensure a safe water supply is available after earthquake events.	2012-2017	GF	$250,000	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
DF-8	DPW - Water Resources Division	Rehabilitate Santa Anita Dam to mitigate concerns with seismic stability and spillway inadequacy of the dam. The rehabilitation will comply with DSOD's design requirements. We are currently considering three concepts: 1) full rehabilitation; 2) partial rehabilitation (partial buttress); 3) free-draining (riser modification).	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
DF-9	DPW - Water Resources Division	Rehabilitate Santa Anita Debris Dam to mitigate concerns with seismic stability of the embankment, spillway walls, and outlet tower. The rehabilitation will conform to DSOD's design requirements, ensure safe operation of the dam during major storms, and safeguard the water conservation capabilities of the dam to ensure there is a reliable water supply after earthquake events.	2012-2017	u/k	$1 million – $7.5 million (2005)	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
DF-10	DPW - Water Resources Division	Rehabilitate Sawpit Debris Dam to mitigate concerns with seismic stability of the embankment, spillway walls, and outlet tower. The rehabilitation will conform to DSOD's design requirements.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
Landslide							
LS-1	DPW	Document landslide response and frequency from the 1998 winter storms and evaluate the effectiveness of current landslide and debris flow hazard maps in identifying slopes that failed.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-2	DPW	Digitize existing debris flow and landslide hazard maps.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-3	DPW	Develop a model for improved prediction of heavy rainfall over identified landslide and debris flow areas, and an associated emergency debris flow warning and response system.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
LS-4	DPW	Promote use of the newest monitoring technology and standardized techniques for evaluation of landslide movement.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-5	DPW, DRP	Revise the standards for development of the safety element contained in the General Plan Guidelines to better address geologic issues and hazards.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-6	DPW, ITD	Promote Internet accessibility of information on landslides, debris flows, coastal erosion, and other geologic hazards.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-7	DPW	Increase public awareness of hazards, and of the risks of living in hazardous areas.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.
LS-8	DPW	Develop an educational outreach program for local governments, which could also be used throughout communities. Development of a “partnership” should also include media industry partners and the cooperative production of videos and newsletters.	2012-2017	u/k	u/k	M	Deferred due to lack of funding. Revised timeline.

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
LS-9	DPW	Enhance program effectiveness for the citizens of Los Angeles County by using multilingual staff and materials.	2012-2017	u/k	u/k	M	Deferred due to lack of funds. Revised action item and timeline
LS-10	ISD	Eastern Avenue Complex 1) Remediation of land slide areas on south hillside; 2) Remediation of land slide area on east hillside; 3) Establish hillside ground planting for storm water erosion control	2012-2017	u/k	u/k	M	New

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
Severe Weather							
SW-1	DMH	Add to existing structures or include in new construction wind-resistant features to DMH properties in areas susceptible to high wind damage. These features may include concrete block construction, gable end bracing, a hip roof, the presence of single or double roof straps, wind-resistant roof covering, impact resistant glass, window shutters, the presence of a secondary water resistance barrier, and property topography.	2012-2017	G	u/k	H	New
Tsunami							
TS-1	OEM	Develop an LA County Operational Area Response Plan – Tsunami Annex					New. Completed 2006
TS-2	OEM	Develop and conduct tsunami response training program for emergency response personnel.	Ongoing	G, GF	u/k	H	New

Table 10-2: Mitigation Actions Matrix							
Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (u/k=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (u/k = unknown)	Ranking Future Actions (L=Low, M=Med., H=High, n/a=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
TS-3	OEM	Develop tsunami public education programs.	Ongoing	G, GF	u/k	H	New
TS-4	OEM	Satisfy requirements for NOAA TsunamiReady eligibility.	2012	G, GF	u/k	H	New
TS-5	OEM	Work with unincorporated communities and Cities in coastal areas to post tsunami warning signs in appropriate locations.	Ongoing	G, GF	u/k	H	New
TS-6	OEM	Develop and deliver Operational Area tsunami exercises for emergency response personnel.	Ongoing	G, GF	u/k	H	New

Section 11:

Plan Maintenance

Table of Contents

Section 11: Plan Maintenance 1

Plan Adoption 1

Method, Evaluating, and Updating 1

Monitoring, Evaluating, and Updating 1

Plan Evaluation 2

Coordinating Body 2

Plan Updates 4

Implementing through Existing Programs 4

Continued Public Involvement 5

Convener 5

Economic Analysis of Mitigation Projects 5

Section 11: Plan Maintenance

This section of the plan describes the formal process that will ensure that the plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually, and producing a plan revision every five years. This section describes how the County and cities will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how jurisdictions intend to incorporate the mitigation strategies outlined in this plan into existing planning mechanisms, such as the County's general plan, capital improvement plans, and building codes.

Plan Adoption

The Los Angeles County Board of Supervisors was responsible for adopting the 2005 All-Hazard Mitigation Plan since the Board is the governing body with authority to promote sound public policy regarding hazards. Once the 2005 Plan was adopted, the Los Angeles County Office of Emergency Management (OEM) became responsible for updating and submitting future plans to the State Hazard Mitigation Officer at the California Office of Emergency Services (Cal OES). Cal OES reviews then submits the updated plan to the Federal Emergency Management Agency (FEMA) for review and approval. This review process addresses the requirements set forth in 44 C.F.R. Section 201.6 (Local Mitigation Plans) and supplemental FEMA guidelines. Upon acceptance by FEMA, the County of Los Angeles will become eligible for Hazard Mitigation Grant Program funds.

Method and Scheduling of Plan Implementation

ELEMENT A: PLANNING PROCESS | A6
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

The Committee that was involved in research and writing of the Plan will also be responsible for implementation. The Committee will be led by a Program Manager from the Office of Emergency Management. Please refer to the Credits on page 2 of the Plan for a full list of Committee members.

	Year 1		Year 2		Year 3		Year 4		Year 5	
Monitoring	X	X	X	X	X	X	X	X	X	X
Evaluating									X	X
Updating									X	X

Monitoring, Evaluating, and Updating

The Hazard Mitigation Planning Advisory Committee participants will be responsible for monitoring the plan annually for updates to goals, objectives, and action items. If needed, these participants will coordinate through OEM to integrate these updates into the plan. OEM will be responsible for monitoring the overall plan for updates on an annual basis.

Plan Evaluation

1. The plan will be evaluated by OEM and by each participating department at least every quarter to determine the effectiveness of programs, to ensure the plan reflects changes in land development or programs that may affect mitigation priorities, and to update the "status" of the individual mitigation action items.

2. The plan will also be reevaluated by the Hazard Mitigation Planning Advisory Committee members (or their designated representatives) based on the initial rating criteria used to draft goals, objectives, and action items.

3. OEM representatives will also review the goals and action items to determine their relevance to changing situations in the County, as well as changes in state or federal regulations and policy.

4. OEM representatives will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data.

5. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, any difficulties encountered, the success of coordination efforts, and which strategies should be revised.

6. OEM will distribute quarterly reminders to the departments with assignments in the Mitigation Actions Matrix. Any updates or changes necessary will be forwarded to OEM for inclusion in further updates to the plan. It is envisioned that the Hazard Mitigation Planning Advisory Committee and each department's mitigation subcommittee will meet annually to discuss the status of the plan.

7. The plan will be updated every five years.

Coordinating Body

The Hazard Mitigation Planning Advisory Committee will be responsible for coordinating the implementation of plan action items and undertaking the formal review process. The Board of Supervisors, Chief Executive Officer, and department heads will assign representatives from departments, divisions, and agencies with responsibilities identified in the Mitigation Actions Matrix.

The following County staff will serve as representatives of the Hazard Mitigation Planning Advisory Committee:

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

Hazard Mitigation Planning Advisory Committee

NAME	AGENCY
Yvette Countee, County Project Manager	Office of Emergency Management
John Cvjetkovic	Department of Public Social Services
Cpt. D Chetwood	Fire Department
Connie Chung	Department of Regional Planning
Michael Contreras	Department of Public Health
Cpt. Angus Alexander	Fire Department/Lifeguard
Margaret Ayala	Department of Mental Health
Ana DeLaTorre	Department of Mental Health
Barbara Engleman	Department of Mental Health
Anush Gambaryan	Department of Parks and Recreation
Luis Gomez	Department of Health Services
Robert Held	Public Library
Sherryl Jones	Cal EMA
Ron Lacayo	Department of Public Works
Cpt. Daniel Martin	Fire Department
Linda Estrada	Internal Services Department
Enrique Orta	Department of Parks and Recreation
Edward Ramos	Public Library
Anne Russet	Department of Regional Planning
Susan Tae	Department of Regional Planning
Michael Takeshita	Fire Department/Forestry Division
Pablo Valadez	Fire Department
Martin Zimmerman	Chief Executive Office

Plan Updates

The Los Angeles County OEM is the responsible agency for updates to the plan. All Hazard Mitigation Planning Advisory Committee participants will be responsible for providing OEM with departmental-level updates to the plan when/if necessary, as described above. Every five years the updated plan will be submitted to Cal OES and FEMA for review.

Implementing through Existing Programs

ELEMENT A: PLANNING PROCESS | A4
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))
ELEMENT A: PLANNING PROCESS | A6
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))
ELEMENT C. MITIGATION STRATEGY | C6
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

The County will implement many of the recommended action items (Mitigation Actions Matrix) through existing County programs and procedures. As an example, several action items are identified for funding through the County's next Capital Improvement Program or General Fund. Upon approval and adoption of the 2013 Plan, the departments with responsibilities identified in the 2013 Mitigation Plan will schedule quarterly meetings with department representatives to ensure that the items within their charge are monitored, funded, and executed within the identified timeline. Each quarter, the various department subcommittees will come together to track the status of their mitigation action items. OEM will distribute department-specific copies of the Mitigation Actions Matrix to the individual departments. Those spreadsheets will serve as "tracking tools" for use by the departments.

Additionally, Section 3 – Community Profile includes a detailed Capabilities Assessment of county government. The Assessment identifies a wide range of plans, policies, ordinances, and other implementing regulations managed by the various departments included in the mitigation planning process.

Continued Public Involvement

ELEMENT A: PLANNING PROCESS | A5
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

The Los Angeles County OEM is dedicated to involving the public directly in review and updates of the plan. OEM and a representative from other participating organizations will be responsible for monitoring, evaluating, and updating the plan as described above. During all phases of plan maintenance, the public will have the opportunity to provide feedback.

A copy of the plan will be publicized and available for review on the OEM Web site. In addition, copies of the plan will be catalogued and kept at all of the appropriate agencies in the County. The existence and location of these copies will also be posted on the County Web site. The site will contain contact information for members of the Hazard Mitigation Advisory Committee to which people can direct their comments and concerns.

All public feedback will be forwarded to the Hazard Mitigation Advisory Committee for review and incorporation (if deemed appropriate). This information will also be forwarded to OEM personnel responsible for keeping track of public comments on the plan.

A press release requesting public comments will also be issued after each evaluation, or when deemed necessary by the Hazard Mitigation Advisory Committee. The press release will direct people to the Web site or to an appropriate local agency location where the public can review proposed updated versions of the plan. This will provide the public with an outlet through which they can express their concerns, opinions, or ideas about any updates/changes that are proposed to the plan. The OEM will be responsible for using County resources to publicize the press releases and maintain public involvement through public access channels, Web pages, and newspapers, as deemed appropriate.

Convener

The Board of Supervisors adopted the 2005 County of Los Angeles All-Hazard Mitigation Plan and assigned future updates to the Office of Emergency Management. The Hazard Mitigation Planning Advisory Committee will take responsibility for plan maintenance and implementation. The Program Manager in OEM will serve as a convener to facilitate the Hazard Mitigation Planning Advisory Committee meetings, and will assign tasks such as updating and presenting the plan to the members of the Hazard Mitigation Planning Advisory Committee. Plan implementation and evaluation will be a responsibility that is shared among all of the Hazard Mitigation Planning Advisory Committee members.

Economic Analysis of Mitigation Projects

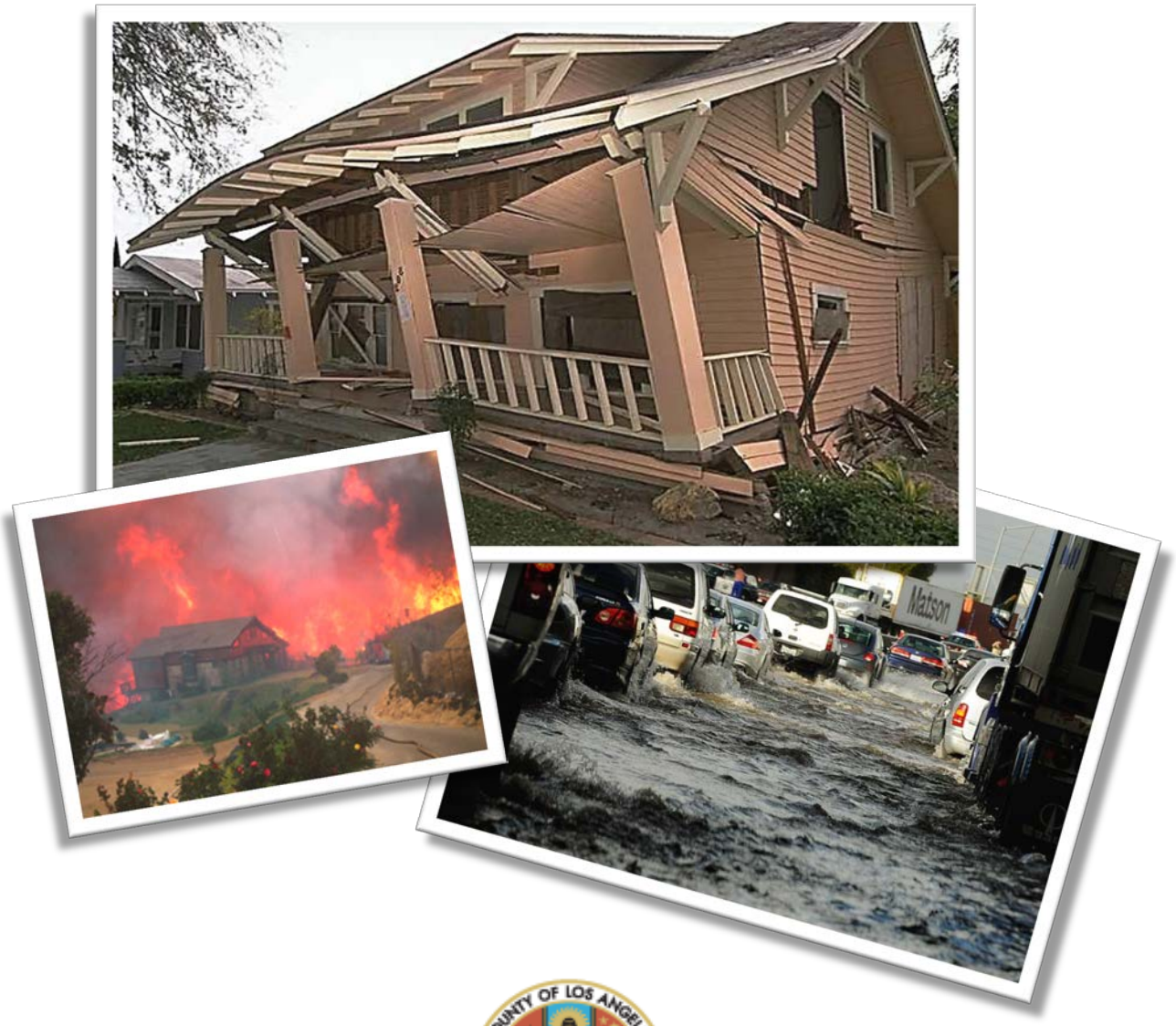
FEMA's approach to identifying the costs and benefits associated with hazard mitigation strategies, measures, or projects can be subdivided into two general categories: benefit/cost analysis and cost-effectiveness analysis.

Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now in order to avoid disaster-related damages later.

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating hazards can provide decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis for comparing alternative projects.

When federal funding is involved, the Hazard Mitigation Planning Advisory Committee will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. For other projects and funding sources, the Hazard Mitigation Planning Advisory Committee will use other appropriate approaches to understand the costs and benefits of each action item, and then develop a prioritized list.

APPENDIX A



Jurisdictional Guide to Updating Hazard Mitigation Plans

Table of Contents

Introduction 2

Potential Mitigation Action Items 4

Insights on Plan Approval 24

Master Map Resources Directory 53

Introduction

The purpose of this Guide is to assist Los Angeles County cities, special districts, and other "public entities" with the process of updating their existing Hazard Mitigation Plans. According to FEMA regulations, an approved plan must be updated every five (5) years.

The date of FEMA approval will appear on the FEMA cover letter that you received back when the plan was originally approved. Five years from the date on the cover letter is when your plan expires.

Most plans identify the City Council or Board of Directors as the entity responsible for re-adoption of the plan. In some circumstances, the original plan identified the City Manager or other organizational leader as having authority to approve updates and revisions to the plan. In both cases, once the re-adoption is completed, it is necessary to prepare a new FEMA Plan Review Tool and mail 1 hard copy and 2 electronic copies of updated Plan and completed Review Tool to Cal OES for review then forwarding to FEMA for approval. Your updated plan will not be official until it is approved by FEMA.

Updating Content, Maps, Facts, and Figures

In addition to addressing the mandated content identified in the FEMA Crosswalk, the plan update process also requires a review of other content including maps, tables, and other data. As example, your original plan identifies statistics about population, housing, and income. This data will need to be updated. Similarly, the maps in the plan may have been updated over the past 5 years either in the County's All-Hazard Mitigation Plan (2014), the State's Hazard Mitigation Plan (2010), the jurisdiction's General Plan, Capital Improvement Plan (city), or Facilities Maintenance Plan (special district). Also be sure to review maps from other sources (e.g. United States Geological Service), which are updated on a regular basis.

Be sure to look at the County of Los Angeles Mitigation Plan for web resources pertaining to maps, facts, and figures.

Organization of the Guideline

The Guideline is presented in three parts: Potential Mitigation Action Items, Insights on Plan Approval, and Master Map Resources Directory.

Part I is Potential Mitigation Action Items and is intended to assist you in capturing mitigation actions that already exist in your jurisdiction, along with developing new mitigation actions.
It's important to capture your existing commitment to mitigation by documenting the actions already in place.

The Potential Mitigation Action Items provides your planning team with a broad range of ideas that may or may not fit the needs of your jurisdiction. And remember, the goal is to develop action items that you feel are necessary and will be supported within your physical and political environment.

Part II is Insights on Plan Approval and includes the various FEMA Plan Review Tool citations, examples of how the requirement was satisfied in the County of Los Angeles update, and some insights on how to best address the various requirements.

Part III is a Master Map Resources Directory is a table of all of the District level maps pertaining to each City and Unincorporated area in the County.

Potential Mitigation Action Items

Hazard mitigation refers to any **sustained action** taken to reduce or eliminate the long-term risk to human life and property from hazardous conditions. The following list of possible hazard-specific mitigation action items were compiled from actual mitigation plans, as well as state and federal resources. Special thanks to FEMA Region V for their publication Mitigation Ideas.

	Mitigation Action Items
Hazard	
MULTI-HAZARD - Some mitigation ideas fit easily into many or all hazard types. These also tend to fall under a type of planning generally referred to as "preparedness." A selection of mitigation/preparedness ideas is included here at the beginning; these ideas can be considered relevant to all sections of the mitigation ideas list.	
Public Education	State and local governments can provide information describing all types of hazards, methods for preventing damages resulting from hazardous conditions, and how to respond when a hazard threatens. Either directly or by lobbying elected officials, citizens can also get involved in comprehensive planning activities that identify and alleviate their communities' hazards.
NOAA Weather Radio	Communities can encourage the use of National Oceanic and Atmospheric Administration (NOAA) weather radios among their residents. At least one set of counties surrounding a chemical stockpile has provided NOAA weather radios to all homes and businesses within the area. NOAA Weather Radio continuously broadcasts National Weather Service forecasts, warnings and other crucial weather information. NOAA Weather Radio also provides direct warnings to the public for natural, man-made, or technological hazards, and it is the primary trigger for activating our country's Emergency Alert System (EAS) on commercial radio, television, and cable systems.
Continuity of Operations Planning	The goal of Continuity of Operations (COOP) planning is to ensure that the essential functions of an organization, including government, can continue to operate during and after an emergency incident which may prevent access to normally operating systems, such as physical plant, data or communication networks, or transportation. Communities can encourage businesses, other organizations, and families to prepare themselves by regularly backing up computer drives, copying essential files and/or important family information, and storing these items in a separate location. A larger organization may coordinate with another office from the organization in a different part of the country to take over operations when necessary.
Land Use Planning	Once a community is familiar with the location of its hazardous areas; it may adopt a land use plan, or modify an existing land use plan to: ✓ Guide development away from hazardous areas; ✓ Reduce density in the hazardous areas; or ✓ Encourage greater development restrictions on the property.
Site Emergency Plans	Communities can encourage development and testing of internal emergency plans and procedures, including COOP planning, by businesses and other organizations. Communities should develop and test site emergency plans for schools, factories, office buildings, shopping

	malls, hospitals, correctional facilities, stadiums, recreation areas, and other similar facilities.
Emergency Response Personnel Training & Exercises	Emergency response personnel need to be trained and plan for various contingencies and response activities, such as evacuation, traffic control, search, and rescue.
Emergency Response Plans	Preparation of organizational emergency response plans can ensure an efficient and effective response to a major emergency or disaster.
Community Emergency Response Teams	A community may consider sponsoring a Community Emergency Response Team (CERT). A CERT is a volunteer group of citizens who are trained and equipped to respond if emergency services are unable to meet all of the immediate needs of the community following a major disaster, especially if there is no warning as in an earthquake.
Insurance	Insurance should not be considered an alternative to reducing damages for any type of hazard, but it does have the value of protecting oneself from financial devastation if damage were to occur.
Real Estate Disclosure	Real estate disclosure laws are important because they force a seller to advise a potential buyer about pre-existing conditions. This allows buyers to make more informed decisions about the potential risks involved in owning property, such as whether a property is located in a floodplain or if it had been previously damaged from flood water or any other type of hazard condition.
Personal Preparedness	Encouraging residents to prepare themselves by understanding their local hazards, stocking up with necessary items, and planning for how family members should respond if any of a number of possible emergency or disaster events strike.
FLOOD - Ninety percent of federal disaster declarations are for flood events. Response and recovery costs can be extremely high, so where risks are apparent it makes sense to take actions that prevent damage from occurring. If flood damage cannot be fully prevented, there may be mitigation techniques that lessen the damage. Flooding addressed in this section can be from high ground water, overland flooding from rivers or streams, or from a dam failure.	
Acquisition	Land with structures may be purchased by and titled in the name of a local governing body that can remove structures and enforce permanent restrictions on development.
Relocation	A structure may be moved to a less hazardous location.
Elevation	A structure may be mechanically lifted so that the lowest floor, including the basement, is raised above the base flood elevation. Utilities or other mechanical devices should also be raised above expected flood levels.
Floodplain/Coastal Zone Management	Determining and enforcing acceptable land uses through planning and regulation may not prevent inevitable flooding in flood-prone areas, but planning and regulation can alleviate the risk of damage by limiting exposure in such hazard areas. Floodplain and coastal zone management can be included in comprehensive planning.
Capital Improvement Plans	Infrastructure planning decisions can affect flood hazard mitigation. For example, decisions to extend roads or utilities to an area may increase exposure. Some communities may consider structural flood protection such as levees or floodwalls.
Zoning Ordinance	Examples of zoning methods that affect flood hazard mitigation include: 1) adopting ordinances that limit development in the floodplain; 2) limiting the density of developments in the floodplain; and 3) requiring that floodplains be kept as open space.
Subdivision Ordinance	Subdivision design standards can require elevation data collection during

	the platting process. Lots may be required to have buildable space above the base flood elevation.
Building Code	Requirements for building design standards and enforcement include the following possibilities: 1) that a residential structure be elevated; and 2) that a nonresidential structure be elevated or floodproofed.
Transfer of Development Rights	In return for keeping floodplain areas in open space, a community may agree to allow a developer to increase densities on another parcel that is not at risk. This allows a developer to recoup potential losses from non-use of a floodplain site with gains from development of a non-floodplain site.
Purchase of Easement/Development Rights	Compensating an owner for partial rights, such as easement or development rights, can prevent a property from being developed contrary to a community's plan to maintain open space. This may apply to undeveloped land generally or to farmland in particular.
Stormwater Management Ordinance	Stormwater ordinances may regulate development in upland areas in order to reduce stormwater run-off. Examples of erosion control techniques that may be employed within a watershed area include proper bank stabilization with sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.
Post-Disaster Recovery Ordinance	A post-disaster recovery ordinance regulates repair activity, generally depending on property location. It prepares a community to respond to a disaster event in an orderly fashion by requiring citizens to: 1) obtain permits for repairs, 2) refrain from making repairs, or 3) make repairs using standard methods.
Flood Insurance	Purchasing flood insurance does not prevent a flood from occurring, but it does mitigate a property owner's financial exposure to loss from flood damage. National Flood Insurance Program (NFIP) policies are only available in communities that participate in the program, which is administered by FEMA.
Floodplain Ordinances	Communities that choose to participate in the NFIP must adopt ordinances that meet minimum federal and state requirements. Communities may pass more stringent ordinances to reduce risk even further.
Community Rating System	Also administered by FEMA, the Community Rating System (CRS) is a companion program to the NFIP. It rewards a community for taking actions over and above minimum NFIP requirements with the goal of further reducing flood damages in the community. The more actions a community takes, the lower the premiums for flood insurance within that community.
Storm Drainage Systems	Flood mitigation can involve installing, re-routing, or increasing the capacity of a storm drainage system that may involve detention and retention ponds, drainage easements, or creeks and streams. It can include separation of storm and sanitary sewerage systems as well as higher engineering standards for drain and sewer capacity.
Drainage Easements	Communities may consider obtaining easements for planned and regulated public use of privately owned land for temporary water retention and drainage.
Wetland Protection	With special soils and hydrology, wetlands serve as natural collection basins for floodwaters. Acting like sponges, wetlands collect water, filter it, and release it slowly into rivers and streams. Protecting and preserving wetlands can go a long way toward preventing flooding in other areas.
Roads	Roads are needed to get people and goods from place to place. In addition to planning for traffic control during floods, there are various construction and placement factors to consider when building roads. To maintain dry

	access, roads should be elevated above the base flood elevation. However, if a road creates a barrier it can cause water to pond. Where ponding is problematic, drainage and flow may be addressed by making changes to culvert size and placement. In situations where flood waters tend to wash roads out, construction, reconstruction, or repair can include not only attention to drainage but also stabilization or armoring of vulnerable shoulders or embankments.
Structural Flood Control Measures	Structural flood control measures (e.g., levees, dams, or floodwalls) channel water away from people and property. Structural measures may also increase drainage or absorption capacities (e.g., detention and retention basins, relief drains, spillways, drain widening/dredging or rerouting, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, or channel redirection). However, structural measures may cause an increase in the base flood elevation. History has shown that structures that channel water may create a false sense of security and result in greater damage to nearby properties if the structures fail.
Dam and Levee Maintenance	Although dams and levees may have been constructed properly, failure to maintain them can lead to significant loss of life and property if they are stressed and broken or breached during a flood event. An inspection, maintenance and enforcement program helps to ensure continued structural integrity. Dams or levees need to be kept in good repair. Unnecessary or old and structurally unsound dams should be removed. Planning for dam breaks can include constructing emergency access roads as well as automating pump and flood gate operation. And it never hurts to regulate development in a dam's hydraulic shadow, where flooding would occur if there were a severe dam failure.
Community Outreach and Education	Communities may use outreach programs to: 1) advise homeowners of risks to life, health and safety; 2) facilitate technical assistance programs that address measures that citizens can take; or 3) facilitate funding for mitigation measures. Driver safety strategies for flooded areas can be addressed through driver safety/education classes and by the media. Local officials can be trained on flood fighting, floodplain management, flood proofing, traffic control during flooding, and other measures.
Debris Control	Community members can participate in debris control by securing debris, yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if floodwaters would pick them up and carry them away. Additionally, a community can pass and enforce an ordinance that regulates dumping.
Hazardous and Buoyant Material Protection	Containers of hazardous materials such as petroleum or chemicals should not be located in a flood hazard area. If such a location is necessary, hazardous material containers need to be anchored, because the contents can contaminate water and multiply the damaging effects of flooding by causing fires or explosions, or by otherwise making structures unusable. Also, buoyant materials should be anchored, because if they float downstream, they may cause additional damage to buildings or bridges or may plug a stream resulting in higher flood heights.
Manufactured Homes	Manufactured or mobile homes should be elevated above the base flood elevation and anchored, or more preferably, kept out of the floodplain.
Flood Warning	In addition to a communication strategy, a flood warning system may consist of people or machines monitoring water level with stream gauges. Although a flood warning system generally does not provide long-term damage reduction, it can alleviate health and safety risk by providing

	citizens time to escape and possibly remove belongings that could be damaged. NOAA weather radio and EAS broadcasts can be incorporated into a community's flood warning system.
Backup Generators	A community may consider back-up generators for pumping and lift stations in sanitary sewer systems, along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades).
Basement Backflow Prevention	Depending on its infrastructure capabilities, a community may encourage the use of check valves, sump pumps, and backflow prevention devices in homes and buildings.
Landslide and Debris Flow - Landslides or debris flow can be caused by the same high water levels or rain that results in flooding. Landslides can also be caused by earthquakes. Although many mitigation measures resemble those for flooding, landslides pose unique considerations.	
Mapping	Local governments, developers, and residents can make better decisions using maps. Soil types, slope percentage, drainage, or other critical factors are used to identify landslide prone areas.
Building Codes	Building codes can set construction standards, including minimum foundation requirements, in landslide-prone areas.
Zoning Ordinances	Zoning ordinances may be used to create buffers between structures and high-risk areas.
Slide-Prone Area Ordinance	A special purpose ordinance for slide-prone areas may be used to limit fill or dumping, as well as address drainage and other landslide related problems.
Code Enforcement	A strong community commitment to code enforcement is necessary to ensure compliance with building codes and zoning ordinances.
Drainage Control Regulations	Drainage regulations are similar to storm water management regulations. By controlling drainage, a community can reduce the risk of landslides resulting from saturated soils.
Grading Ordinances	Grading ordinances require developers and landowners to obtain permits prior to filling or regrading. Such ordinances may also provide specific design standards.
Hillside Development Ordinances	Hillside development ordinances are special purpose ordinances that set specific standards for construction on hillsides.
Subdivision Ordinances	Subdivision ordinances set guidelines on how land will be divided, the placement and size of roads, and the location of infrastructure. Such ordinances can also be used to regulate open space and buildable areas.
Sanitary System Codes	Sanitary system codes can reduce the effect of drainage on landslides by limiting the type and location of sanitary systems.
Geological Hazard Overlay Zones	A geological hazard overlay zone requires a detailed geotechnical analysis prior to any construction activity. Used in association with building codes, this may reduce damage potential by providing clear information about risk.
Open Space Designations	Open space designations keep landslide prone areas undeveloped.
Relocation	Structures may be moved to less hazardous locations.
Acquisition	Land and structures may be purchased by and titled in the name of a local governing body that can remove structures and enforce permanent restrictions on development.
Restraining Structures	Restraining structures may be designed and used to hold soil in place.
Debris-Flow Measures	Debris-flow measures may include stabilization, energy dissipation, and flow control measures, all of which may reduce damage in sloping areas.
Grading	Grading can be used to increase slope stability, depending on types of soils, height of fill or cut, and compaction.

Vegetation Placement and Management Plans	Various types of vegetation increase soil stability through root length and strength and by absorbing precipitation. Management plans are aimed at ensuring long-term maintenance of vegetation appropriate for an area.
Utility Location	Placing utilities outside of landslide areas decreases the risk of service disruption.
Abatement Districts	A special taxing district, such as an abatement district, can be used to pool resources to mitigate common hazards.
Restrictive Covenants	A legally binding agreement in a private development can be used to impose restrictions on land use.
Thunderstorms and Lightning - Damage from thunderstorms and lightning is often underestimated. Everyone should have an appreciation for the dangers of lightning. Although not entirely preventable, damage and life safety risk from these events can be minimized.	
Community Outreach and Education	Communities may use outreach programs to promote awareness of thunderstorm dangers. Driver safety strategies for severe weather events can be addressed by driver safety/education classes and by the media.
Early Warning Systems	Local and state governments can invest in public early warning systems/networks, as well as train people to serve as weather spotters.
Building Construction	Public and private buildings can be designed with structural bracing, shutters, laminated glass in window panes, and hail-resistant roof shingles or flashing to minimize damage.
Surge Protectors and Lightning Protection	Surge protection can be installed on critical electronic equipment. Lightning protection devices and methods, such as lightning rods and grounding, can be installed on a community's communications infrastructure and other critical facilities.
Burying Power Lines	Buried power lines offer the security of uninterrupted power during and after storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes more readily.
Tornado - Tornadoes can strike anywhere and cause extensive damage. Damage and life safety risk may not be entirely preventable, but it can be minimized.	
Construction Standards and Techniques	To strengthen public and private structures against severe wind damage, communities can require or encourage wind engineering measures and construction techniques that may include structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles. Also, architectural design can make roofs less susceptible to uplift.
Safe Rooms	Risk to lives can be improved through construction and use of concrete safe rooms in homes and shelter areas of mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas.
Manufactured Homes	Damage and injury can be prevented by anchoring manufactured homes and exterior attachments such as carports and porches.
Loose Items	Loose items like yard and patio furniture should be secured.
Temporary Debris Disposal	Temporary debris disposal sites can be protected by fencing and/or located away from populated areas.
Severe Wind - Severe wind can be as destructive as tornadoes. Damage and life safety risk may not be entirely preventable, but it can be minimized.	
Roofing Shingles	Requiring the use of special roofing shingles designed to interlock and resist uplift forces in extreme wind conditions can reduce damage to a roof or to other structures.
Building Construction	Engineered construction can accommodate foundation design, braced

	elevated platforms, and the ability of a structure to withstand the lateral forces of winds and waves.
Manufactured Home Tie-Downs	The risk of manufactured home damage can be reduced by using tie-downs with anchors and ground anchors appropriate for the soil type.
Burying Power Lines	Buried power lines offer the security of uninterrupted power after severe winds, but consideration needs to be made for maintenance and repair.
Designed-Failure Mode	Designed-failure mode refers to power line design that allows for lines to fall or fail in small sections rather than as a complete system, so restoration can be done more quickly.
Backup Power	Backup power resources can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods.
Tree Management	Tree pruning near power lines can reduce the potential for trees falling on and breaking power lines.
Extreme Temperature - When temperatures reach levels that are extremely high or extremely low, they pose dangers that can be alleviated by planning for how to handle such situations.	
Outreach/Public Awareness	A local government can organize outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.
Heating Requirements	Housing/landlord codes can require minimum temperatures.
Heating Bills	If not already required by state law, communities can encourage utility companies to offer special arrangements for paying heating bills.
Heating and Cooling Centers	A community can establish heating and/or cooling centers for vulnerable populations. Center operations should be linked to outreach projects that encourage at-risk populations to use the centers.
Winter Weather and Snowstorms - Proper preparation can decrease the risks of injury that can occur during cold weather and snowstorms in particular.	
Family and Traveler Emergency Preparedness	A local or state government can produce and distribute family and traveler emergency preparedness information relating to severe winter weather hazards.
Driver Safety	Safety strategies for severe weather events can be included in driver education classes and materials.
Power Lines	Burying or otherwise protecting electric and other utility lines can prevent utility disruption by protecting lines from ice, wind or snow damage. Nevertheless, lines buried in frozen soil may be difficult to reach if repair is necessary.
Code Enforcement and Building Maintenance	Local governments can impact building/site design through building code enforcement of snow-related ordinances such as snow loads, roof slope, snow removal, and storage. Communities can also monitor snow amounts to provide site-specific snow load data. Home and public building maintenance should be encouraged in order to prevent roof and wall damage from “ice dams,” particularly resulting from ice and sleet storms.
Shelters	A community can establish heating centers or shelters for vulnerable populations, not only for residents, but also for stranded motorists and travelers.
Outreach	A community can plan to systematically contact isolated, vulnerable, or special-needs populations.
Animal Protection	Farmers and other animal custodians should plan for addressing livestock or other animal needs.
Roads	Local governments need to always plan for and maintain adequate road

	and debris clearing capabilities.
Snow Fences	Using snow fences or "living snow fences" (rows of trees or other vegetation) can limit blowing and drifting of snow over critical roadway segments.
Snow Load - Buildings can only hold so much snow before they collapse. Paying attention to snow load weight capacities can prevent damage and injury.	
Snow Load Design Standards	A single snow load weight capacity standard may not be adequate for all areas within a community. Local building departments should determine the snow load limits for their communities based on local data. A community's building code can include snow load limits or weight capacity standards in an appendix.
Snow Weight Data Collection	Establishing a program of systematic snow weight data collection will enable a community's building department to better establish realistic snow load design standards.
Maintenance	Building owners should be educated and encouraged to inspect older buildings for deterioration and make subsequent repairs.
Modifications	As buildings are modified, new technology may be used to create or increase structural stability.
Analysis and Repair or Replacement of Structural Systems	Existing support systems may be vulnerable to load stress. A community may wish to set up an inspection system and recommend repairs to building owners.
Subsidence - Some areas of land are susceptible to collapse. Risks of collapse can be determined and managed.	
Community Awareness	Local and state governments can promote community awareness of subsidence risks and effects.
Mapping	Old mining areas or geologically unstable terrain should be identified and mapped so that development can be prevented or limited.
Open Space	Areas susceptible to collapse can be maintained as public open space.
Acquisition	Land or structures may be purchased by and titled in the name of a local governing body that can enforce permanent restrictions on development.
Filling or Buttressing	Filling or buttressing subterranean open spaces, as with abandoned mines, can prevent or alleviate collapse.
Relocation	A structure may be moved to a less hazardous location.
Hydrological Monitoring	Groundwater levels can be monitored in subsidence-prone areas.
Earthquake - Some regions are particularly susceptible to earthquake damage. Risks of injury and damage from earthquake events can be determined and managed.	
Seismic Hazard Mapping	Information gained from seismic hazard mapping can be used to assess risk. The first step is collection of geologic information on seismic sources, soil conditions, and related potential hazards. The second step is to prepare a map showing the approximate locations of various hazards.
Related Hazard Mapping	Other earthquake related hazards include liquefaction and landslides. Maps of these related hazards may be used for vulnerability analysis and risk assessment.
Map Education	Map users should be educated in the appropriate uses and limitations of maps.
Rapid Visual Screening	Rapid visual screening is a technique used to quickly inspect a building and identify disaster damage or potential seismic structural and non-structural weaknesses. This method may be used to screen and prioritize retrofitting efforts, or inventory high-risk structures and critical facilities. In a post

	disaster setting, rapid visual screening can be used to assess risk during response and recovery efforts and determine if buildings are safe to re-occupy.
Loss Estimation Studies	After seismic hazards have been identified, planners can create an earthquake scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community. Scenarios can be particularly useful in predicting lifeline performance, i.e., the sustainability of critical public services or systems such as electricity, water, or roadways. This knowledge can be used to develop earthquake mitigation priorities.
HAZUS	FEMA's HAZUS is a computer-based tool that can be used to quantitatively estimate losses from an earthquake.
Seismic Safety Committees	Duties of a local or state seismic safety committee can include providing policy recommendations, evaluating and recommending changes in state and local seismic safety standards, and an annual assessment of local and statewide implementation of seismic safety improvements.
School Survey Procedures	Schools are critical facilities not only because of the special population they accommodate, but also because they are often identified as shelter sites for a community. Due to this sheltering role, it is essential that these buildings function after a seismic event. A community can develop a survey procedure and guidance document to inventory structural and non-structural hazards in and near school buildings. Survey results can be used to determine mitigation priorities that can be incorporated into capital improvement plans.
Capital Improvement Planning	School districts, local governments, corporations, and others have developed capital improvement plans to ensure that facilities remain operational for years down the road. It is more efficient and cost effective to incorporate structural and non-structural seismic strengthening actions into ongoing building plans and activities, rather than to rehab later.
Guidelines and Model Ordinances	Earthquake hazards can be mitigated through land use planning. Communities can develop and distribute guidelines or pass ordinances that require developers/building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant seismic hazards. Particular consideration should be given to enforcing such ordinances in areas with steep slopes or subject to ground displacement, severe ground shaking, or liquefaction.
Building Codes	Although land use management that avoids building on hazardous sites is an effective way to reduce earthquake risk, there may be times when it is necessary to build on such sites. Engineers and architects have designed buildings in ways that reduce the impact of ground shaking. Encouraging all local governments to adopt and enforce updated building code provisions is one effective way to reduce earthquake damage risk.
Seismic Code Training	Legislators often enact seismic building provisions that do not get enforced because architects, engineers, and building departments are unaware of the provisions. Conducting information sessions or other forms of outreach on seismic code provisions for new and existing buildings can enhance code use and enforcement by local architects, engineers, contractors and code enforcement personnel.
Buildings as Structural Hazards	Homeowners and businesses can take simple measures to strengthen their buildings before the next earthquake. Bracing walls and bolting sill plates to the foundation are examples. Non-reinforced masonry buildings and non-ductile concrete facilities are particularly vulnerable to ground shaking.

	These buildings should be strengthened and retrofitted against future seismic events.
Non-Structural Hazards	Many injuries in earthquakes are caused by nonstructural hazards, such as attachments to buildings. These include lighting fixtures, windows (glass), pictures, tall bookcases, computers, ornamental decorations on the outside of the buildings (like parapets), gas lines, etc. Activities that can reduce the risk of injury and damage include: anchoring tall bookcases and file cabinets, installing latches on drawers and cabinet doors, restraining desktop computers and appliances, using flexible connections on gas and water lines, mounting framed pictures and mirrors securely, and anchoring and bracing propane tanks and gas cylinders.
Technical Assistance for Homeowners	Developing a technical assistance information program for homeowners and teaching them how to seismically strengthen their houses can be an effective mitigation activity. The program could include providing local government building departments with copies of existing strengthening and repair information for distribution to homeowners. Other potential distribution sources include insurance companies, realtors and libraries.
Infrastructure Hardening	Identification and hardening of critical lifeline systems, i.e., critical public services such as utilities and roads, to meet "Seismic Design Guidelines and Standards for Lifelines," or equivalent standards, may distinguish a manageable earthquake from a social and economic catastrophe.
Bridge Strengthening	State and local highway departments should review construction plans for all bridges to determine their susceptibility to collapse. Problem bridges should be retrofitted.
Hazard Mitigation Awareness	Local or state governments can use community outreach activities to foster an awareness of earthquake mitigation activities in homes, schools and businesses.
Financial Incentives	Local or state governments can support financial incentives like low interest loans or tax breaks for home and business owners who seismically retrofit their structures.
Insurance	Local or state governments can work with insurance industry representatives to increase public awareness of the importance of earthquake insurance. Home structural improvements can be factored into the process of obtaining insurance coverage or reduced deductibles.
Reference Library	A local or state government can establish a library consisting of technical documents on structural and nonstructural mitigation options, as well as model ordinances and procedures that have been used by other jurisdictions to reduce earthquake risk.
Drought - Periods of time with little or no precipitation can pose risks that can be managed with conservation and preparation.	
Water-Saving	Citizens can be encouraged to take water-saving measures, especially when extra water is needed for irrigation and farming. Possibilities include installing low-flow water saving showerheads and toilets, and turning water flow off while brushing teeth or during other cleaning activities.
Water Storage	Human consumption is the primary reason to maintain storage of water. People cannot live without consuming water regularly.
Water Use Ordinances	Communities can pass ordinances to prioritize or control water use, particularly for emergency situations like firefighting.
Contingency Plans	Drought contingency plans can help anticipate needs and actions to take during a drought.

Water Delivery Systems	Designs or plans for water delivery systems can include consideration of drought events.
Crop Insurance	Crop insurance can preserve economic stability for farmers during a drought.
Wildfire - Wildfires typically start in woodland or prairie areas. They can occur naturally though they are often exacerbated by human activities. Wildfires can be hard to control as they threaten homes and communities located nearby. Although preventing or controlling wildfires is preferable, there are many mitigation efforts we can take to prevent or alleviate damage to our homes and communities when fires inevitably occur.	
Public Education	Outreach efforts can promote such items as non-combustible roof covering, fire safe construction, and the importance of clearing brush and grass away from buildings. It is important to promote public education on smoking hazards and the risks of recreational fires.
Neighborhood Groups	Citizens may organize neighborhood wildfire safety coalitions to plan how their neighborhoods can work together to prevent a wildfire.
Zoning	Zoning can be used to cluster development into defensible areas and keep development away from fire hazards such as steep slopes, where fires are difficult to contain.
Defensible Space	Damage potential can be reduced by ensuring that structures are surrounded by defensible space or buffer zones. Buffer zones are manageable areas, generally 30 to 100 feet and cleared of combustible materials.
GIS Mapping	GIS mapping of vegetative coverage can facilitate analysis and planning decisions through comparison with topography, zoning, developments, infrastructure, or other markers.
Power Line Maintenance	Local power companies can help prevent or alleviate wildfires by proper maintenance and separation of power lines, as well as efficient response to fallen power lines.
Insurance Company Promotions	Insurance companies can include wildfire safety information in materials provided to area residents.
Property Maintenance	Maintenance of property in or near wildfire prone areas can go a long way toward preventing or reducing the spread of fire. Maintenance includes fuel management techniques such as pruning and clearing dead vegetation, selective logging, keeping grass short, planting fire-resistant vegetation, and creating fuel/fire breaks, i.e., areas where the spread of wildfires will be slowed or stopped by the removal of fuels. Other helpful techniques include use of fire resistant roofing and building materials; use of functional shutters on windows; keeping flammables such as curtains secured away from windows, or using heavy fire-resistant drapes; taking advantage of the fire department's home safety inspections; sweeping/cleaning dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches and yards; keeping woodpiles and other combustibles away from structures; use of boxed or enclosed eaves on a house; thorough clean-up of spilled flammable fluids; and keeping garage areas protected from blowing embers, whether from a chimney or outdoor fire place.
Fireplace and Chimney Maintenance	Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year. Safe fireplace/chimney use and maintenance includes spark arrestors and emphasis on proper storage of flammable items.
Building Codes	Building codes can be used to require upgrades to existing as well as new structures.

Waste Disposal	Wildfire risk can be reduced by safe disposal of yard and household waste rather than through open burning.
Arson Prevention	Wildfires can be prevented by arson prevention clean up activities in areas of abandoned or collapsed structures, accumulated junk or debris, and in areas with a history of storing flammable materials where spills or dumping may have occurred.
Burning Restriction	Local ordinances can require burn permits and restrict campfires and outdoor burning.
Road and Driveway Clearance	Roads and driveways should be kept accessible to emergency vehicles and fire equipment. Driveways should be relatively straight and flat, with at least some open spaces to turn. Bridges should be strong enough to support emergency vehicles, with clearance wide and high enough for two-way traffic and emergency vehicle access. Addresses should be visible from the road, and keys to gates around property should be provided to the local fire department.
Hillside Construction	It is important to note that hillsides facing south or west are more vulnerable to increased dryness and heat from sun exposure. Structures should be set back from slopes outside of the "convection cone" of intense heat that is projected up the slope of a hill as a wildfire "climbs" it.
Building Foundations	In wildfire prone areas, risk may be decreased by enclosing the foundations of homes and other buildings, rather than leaving them open where undersides can be exposed to blown embers or other materials.
Motorized Equipment	Proper maintenance and storage of motorized equipment can decrease wildfire risk.
Flammable Materials	Wildfire risk can be alleviated by safely using and storing necessary flammable materials, including machine fuels. Approved safety cans should be used for storing gasoline, oily rags and other flammable materials. Firewood should be stacked at least 100 feet away and uphill from homes.
Smoke/Fire Detectors and Sprinklers	Citizens can install and maintain smoke detectors and fire extinguishers on each floor of their homes or other buildings. This equipment should be tested and/or inspected regularly, and smoke detector batteries should be changed twice a year. Everyone in a household or building can be taught how to use a fire extinguisher. Other valuable fire mitigation systems include interior and exterior sprinkler systems.
Spotters	Early detection of wildfires, while fires are smaller, can help make firefighting more successful. Detection can be accomplished by fire spotters who work from either towers or planes.
Media	The media can broadcast information about fire watches and fire warnings.
Response Personnel	Response personnel should have regular training and exercise experience.
Water Supplies	Water supplies for emergency firefighting should be maintained in accordance with National Fire Protection Association (NFPA) standards. Residents should identify and maintain any number of outside water sources such as small ponds, cisterns, wells, swimming pools or hydrants. It is a good idea to have a garden hose that is long enough to reach any area of a home or other structures on a property. Freeze-proof exterior water outlets are recommended for at least two sides of a home or other structures. Additional outlets can be installed at least 50 feet from a home. It may be a good idea to obtain a portable gasoline powered pump in case electrical power is cut off.
Evacuation	Residents should be instructed on proper evacuation procedures, such as wearing protective clothing (e.g., sturdy shoes, cotton or woolen clothing, long pants, a long-sleeved shirt, gloves and a handkerchief to protect the

	face); taking a Disaster Supplies Kit; and choosing a route away from fire hazards.
Individual Response	Fire emergency telephone numbers should be posted at every telephone. Residents should plan several escape routes away from their homes, by car and foot. It is a good idea to keep a set of hand tools that can be used as fire tools, such as a rake, axe, hand/chainsaw, bucket and shovel. When wildfire threatens, residents should be instructed to carry and listen to battery-operated radios for reports and evacuation information, and follow instructions from local officials. Cars should be backed into garages or parked in open space facing the direction of escape, with doors and windows closed and the key in the ignition. Garage windows and doors should be closed but left unlocked. If residents have time, they can take steps to protect their homes by closing windows, vent doors, venetian blinds and heavy drapes; removing lightweight curtains; shutting off natural gas at the meter; turning off pilot lights; closing fireplace screens; and moving flammable furniture into the center of the home away from windows and sliding-glass doors. Outside, residents can seal attic and ground vents with precut plywood or commercial seals; turn off propane tanks; place combustible patio furniture inside; connect garden hose to outside taps; set up a portable gasoline-powered pump; place lawn sprinklers on the roof and near aboveground fuel tanks; wet the roof, wet or remove shrubs within 15 feet of the home; and gather fire tools.
Structure Fires - The risk of structure fires varies by location and demographics. Studies commissioned by the U.S. Fire Administration find that certain populations are more at risk of death or injury from structure fires. These groups include people who are economically disadvantaged, very young or very old.	
Codes and Enforcement	Building codes and enforcement are the first measure for preventing structure fires.
Building Design	Building designs can include firewalls and fire doors, as well as alarm and sprinkler systems, especially in tall buildings, dormitories, and attached structures.
Public Education and School Programs	Communities can encourage public education and school programs, especially regarding stoves, heaters, fireworks, matches/lighters, smoke detectors, and evacuation. Public education can particularly focus on safe handling and disposal of cigarettes, cigars, pipes, and matches, as careless smoking and children playing with matches and lighters are significant hazards in some neighborhoods. Alcohol and other drug use can exacerbate the risks.
Personal Preparation	Citizens can install and maintain fire extinguishers and smoke detectors. Everyone in a household or workplace can be taught how to use a fire extinguisher. Residential standards established by the National Fire Protection Association (NFPA) require a smoke detector in each bedroom, or adjacent to all sleeping areas. All equipment should be tested and/or inspected regularly, and smoke detector batteries should be changed twice a year. Installing a sprinkler system is another valuable mitigation measure. Also, fire emergency telephone numbers should be posted at every telephone, and residents or building occupants should plan escape routes and assembly points away from their homes or workplaces.
Heating Systems	Fire risk can be controlled through proper installation and maintenance of heating systems.
Space Heaters	If electric space heaters are necessary, they should be placed at least 3

	feet from objects, particularly combustible objects. Kerosene heaters pose additional risks relating to flammable liquids and carbon monoxide.
Fireplace and Chimney Maintenance	Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year. Safe fireplace/chimney use and maintenance includes installation of spark arrestors and emphasis on proper storage of flammable items.
Electrical Outlets	Fire risk can be controlled through safe installation, maintenance and use of electrical wiring, outlets and fault interrupters.
Arson Prevention	Structure fires can be prevented by cleanup activities in areas of abandoned or collapsed structures, accumulated junk or debris, and in areas that have a history of storing flammable materials where spills or dumping may have occurred. Older communities in particular should consider establishing a quick process to secure and/or demolish abandoned structures.
Flammable Materials	Fire risk can be controlled by using proper procedures, from training and exercising to safe handling of explosive and flammable materials.
Power Line Maintenance	Local power companies can help prevent or alleviate fires by proper maintenance and separation of power lines, as well as efficient response to fallen power lines.
Fire Departments	Fire departments should be deployed, equipped and trained per NFPA standards and ISO recommendations.
Transportation Planning	Transportation planning is important for assessing roads, overpasses, etc., in order to maximize access and improve emergency response times to all inhabited or developed areas of a community. Subdivisions should include more than one entrance to allow access if one of the entrances becomes blocked.
Civil Disturbances	It is important to gain control of civil disturbances and criminal activities that could lead to arson.
Fireworks	It is important to enforce fireworks regulations.
Illegal Drug Laboratories	Fire risk can be improved by elimination of clandestine methamphetamine, or other illegal drug, laboratories through law enforcement and public education.
Hazardous Materials - Various government agencies regulate the use, storage, release, and disposal of hazardous substances, because exposure to these substances can result in imminent injury, illness, or damage to property. Mitigation begins with regulatory compliance.	
Safety Procedures and Policies	Regulations require training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.
Public Awareness and Worker Education	The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as SARA Title III, provides an infrastructure at the state and local levels to plan for chemical emergencies. Facilities that store, use, or release certain chemicals may be subject to reporting requirements. Reported information is publicly available so that interested parties may become informed about potentially dangerous chemicals in their community. Employers must also communicate the hazards of workplace chemicals and ensure that workers receive education and training.
Local Emergency Planning Committee	To address the possibility of hazardous material incidents, communities are required under Federal law (SARA Title III) to maintain an active and viable Local Emergency Planning Committee (LEPC) to develop an emergency plan for preparing for and responding to chemical emergencies, such as spills, leaks, explosions, or

	other releases. The LEPC is required to review, test, and update the plan each year.
Emergency Plans	The community's emergency plan must include the following: identification of local facilities and transportation routes where hazardous materials are present; procedures for immediate response in case of an accident, including a community-wide evacuation plan; a plan for notifying the public that an incident has occurred; names of response coordinators at local facilities; and a plan for conducting simulation exercises that test the plan.
Risk Management Plans	U.S. Environmental Protection Agency (EPA) regulations require development of Risk Management Plans for sites that manufacture, store, or handle hazardous materials. The details of Chemical Accident Prevention and Risk Management Programs are managed by EPA's Chemical Emergency Preparedness and Prevention Office (CEPPO).
Transportation	The U.S. Department of Transportation (USDOT) administers a labeling and placarding system for identifying the types of hazardous materials that are transported along the nation's highways, railways, and waterways. This system enables local emergency officials to identify the nature and potential health threat of chemicals being transported. If an accident were to occur, local emergency officials would be able to determine the proper emergency response procedures for the situation. Local law enforcement and other emergency officials should be well-versed in compliance with and enforcement of USDOT and state regulations regarding hazardous material and hazardous waste transportation.
Disposal	The U.S. EPA's Office of Solid Waste regulates disposal of hazardous waste, as required by the Federal Resource Conservation and Recovery Act (RCRA). RCRA's goals are to: 1) protect us from the hazards of waste disposal; 2) conserve energy and natural resources by recycling and recovery; 3) reduce or eliminate waste; and 4) cleanup waste that may have spilled, leaked, or been disposed of improperly.
Emergency Response Teams	Regulations require trained, equipped, and prepared emergency response teams, for hazardous material sites and for the community in general.
Search and Rescue	Search and rescue teams need to be trained, equipped, and prepared to work among hazardous materials.
Industrial Site Buffering	Hazardous material exposure can be prevented or reduced by separation and buffering between industrial areas and other land uses. Industrial areas should be located away from schools, nursing homes, hospitals, and other facilities with large or vulnerable populations.
Radioactivity and Radon	Radioactive soils and high-radon areas can pose risks that should not be ignored. Mitigation actions may include avoiding development, removing soils, and capping openings in basements.
Cleanup of Brownfields	A brownfield site is real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleanup activities are expensive, but they are recommended for preventing exposure to harmful substances. Grants, low interest loans, or tax relief may be available to assist in the cost of mitigating these sites. Cleaned sites may then be redeveloped and added back to a community's tax roles.
Security	Security considerations should include preparedness for terrorism, sabotage, or civil disturbance.

Transportation Accidents - Ground, air, and water transportation issues can pose risks to transportation users and to the general public.	
Driver Education	The risk of transportation accidents can be reduced through improvements in driver education, traffic law enforcement, and transportation planning that balances needs of public transportation conveyers with safety of the general public. Commercial operators also need training and skill enhancement programs.
Road Design	Improved design, routing, and traffic control at problem roadway areas can reduce risk of transportation accidents. Designated truck routes, as well as enforcement of weight and truck travel restrictions, can help. In long-term planning, communities can consider establishing more connector roads to reduce congestion on arterial roads.
Railroads	Accidents can be reduced through railroad inspections and improved designs at problem railway/roadway intersections.
Airports	Airport maintenance, security, and safety programs are essential for reducing accident risk.
Marine Safety	Accident risk can be reduced through programs that address marine safety and general boater awareness.
Mass Casualty Preparation	It is important to consider training, planning, and preparedness for mass-casualty incidents involving all modes of transportation.
Traffic Control	Road closures and traffic control in accident areas become especially critical during a hazardous material incident response.
Utility Failure - Public utilities are critical infrastructure for any community. The potential for failure needs to be reviewed, and inadequacies need to be addressed.	
Water and Sewer	Consideration is needed for proper location, design, and maintenance of water and sewer systems, including insulation of critical components to prevent damage from ground freeze. Sewer and storm water systems should be separated or expanded to handle anticipated storm water volumes.
Electrical Lines	A community may consider burying electric and telephone lines, where possible, to resist damage from severe winds, lightning, ice, and other hazards.
System Redundancies	One place where redundancies are recommended is in utility and communications systems, especially lifeline systems, e.g., essential public utilities. The intention is that if one system fails, the other shadow system can take over.
Backup Power	Generators can be used for backup power at critical facilities.
Maintenance	Regular maintenance and equipment checks are important, along with replacement or renovation of aging structures and equipment, which should be made as hazard-resistant as economically possible.
Rolling Blackouts and Brownouts	Sometimes it is a good idea to implement “rolling blackouts” in electrical systems that will otherwise fail completely due to overloading.
Lightning Protection	Electrical and communications systems should be protected from lightning strikes.
Tree Trimming	Tree trimming and maintenance is important for preventing limb breakage and for safeguarding nearby utility lines. A model measure would be to establish a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public right-of-ways.
Digging Hotlines	Most, if not all, states have a utility damage prevention hotline that people

	can call before digging.
Vulnerable Populations	Communities can develop programs/networks for contacting and assisting elderly or homebound persons during periods of infrastructure failure.
Oil and Natural Gas Wells; Petroleum and Natural Gas Pipelines - Regions with oil and natural gas wells and/or petroleum and natural gas pipelines need to consider the risks of release.	
Safety Regulations	The first step in oil and natural gas well accident prevention is community and operator compliance with industry safety regulations and standards.
Contingency Plans	Companies and surrounding communities need to address contingency planning for worker and public protection, including rescue and evacuation procedures.
Well Segregation	Accidents can be prevented by using buffer strips of land to segregate wells, storage tanks, and other production facilities from transportation routes and adjacent land uses, in accordance with state regulations, and consistent with the level of risk.
Pipeline Location and Design	Pipelines should be well-marked and located away from dense development, critical facilities, special needs populations, and environmentally vulnerable areas whenever possible. Proper pipeline design, construction, maintenance and inspection are essential, especially in high hazard seismic zones.
Digging Hotlines	Most, if not all, states have a utility damage prevention hotline that people can call before digging.
Radiological Emergencies - People receive radiation exposure each day from the sun, radioactive elements in soil and rocks, household appliances like television sets and microwave ovens, and medical and dental x-rays. These exposures may prompt controversy, but they do not pose the risk of imminent danger from radiation release that might occur if a nuclear power plant had a meltdown. Serious radiological accidents can occur anywhere radioactive materials are used, stored, or transported. A nuclear power plant, hospital, university, research laboratory, industrial plant, major highway, railroad line, or shipping yard could be the site of a radiological emergency.	
Users of Radiological Materials	Users, transporters, and disposers of radiological materials are required to follow strict procedures that prevent or minimize radiation release.
Emergency Planning For Transportation Routes	Communities located along major transportation routes should develop and practice an emergency plan for handling transportation accidents involving radiological materials.
Radiological Emergency Preparedness for Nuclear Plants	Radiological Emergency Preparedness (REP) for communities surrounding nuclear power plants requires proper awareness of, training on, and implementation of radiological emergency procedures. Specific planning requirements for communities within primary and secondary Emergency Planning Zones are found in the Code of Federal Regulations (44 CFR § 350, 351, 352) and in a Nuclear Regulatory Commission guidance document (NUREG-0654).
Three Ways To Minimize Exposure	A community can promote the following three ways to minimize radiation exposure: 1) distance; 2) shielding; and 3) time. The more distance between a person and the source of the radiation, the less radiation received. Like distance, the more heavy, dense materials between a person and the source of the radiation, the better. Finally, most radioactivity loses its strength fairly quickly. Limiting the time spent near the source of radiation reduces the amount of radiation received.
Shelters and Warning Systems	Communities can promote awareness of designated fallout shelters and accident warning systems. They also may develop and promote workable population protection plans, i.e., evacuation and in-place sheltering plans.

Safe Rooms	Concrete safe rooms or shelters can be constructed in houses, trailer parks, community facilities, and business districts.
Building Materials	Public buildings and critical facilities can be constructed using laminated glass, metal shutters, structural bracing, and other hazard-resistant, durable construction techniques.
Sabotage, Terrorism, Weapons of Mass Destruction - Sabotage, terrorism, and the potential for exposure to weapons of mass destruction (WMD) have become part of our social conscious and should be considered in mitigation planning.	
Assessment	Local governments can start with development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.
Critical Infrastructure Protection	Critical Infrastructure Protection (CIP) is extremely important. The federal government has begun a systematic effort to define, prioritize, and develop effective strategies for protecting the Nation's critical infrastructure. Local governments are an integral part of the effort with regard to critical local services, such as water, electricity, telephones, roads and bridges. CIP should be a prominent part of community risk and threat assessment.
Computers	Every person and institution with computers that interface with other computers should consistently use computer data back-up systems and anti-virus software.
Building Materials	Public buildings and critical facilities can be constructed or retrofitted using laminated glass, metal shutters, structural bracing, and other hazard-resistant, durable construction techniques.
Monitoring and Reporting	Prevention can be addressed through alertness, awareness, and monitoring of organizations and activities that may threaten a community. A community can establish a system for reporting information that can be used to prevent terrorist incidents or sabotage. One model may be the U.S. Department of Justice's Operation TIPS, the Terrorism Information and Prevention System.
Emergency Responder Preparedness	Communities can establish programs for law enforcement and emergency responder training, planning, and preparedness for terrorist/sabotage/WMD attacks.
School Violence	School safety and violence prevention programs are valuable, particularly since school violence is unfortunately becoming more common.
Public Gatherings	Communities may consider heightening security at public gatherings, special events, and critical community facilities and industries.
Mental Health Services	Communities can develop a greater awareness of, and provision for, mental health services in schools, workplaces, and other institutional settings.
Private Emergency Plans	Communities can encourage private sector development and testing of internal emergency plans and procedures, including Continuity of Operations (COOP) planning.
Civil Disturbance - The potential for civil disturbance and resulting problems should be addressed in mitigation planning. Civil disturbances can include prison or institutional rebellions, disruptive political gatherings, violent labor disputes, urban protests or riots, or problems at large-scale events.	
Law Enforcement	Local and state governments can provide law enforcement agencies with training, staffing, and resources.
Planning and Documentation	Local governments or other organizations can anticipate and plan for incidents. When a civil disturbance occurs, it may be a good idea to record the event on videotape for later study and use in prosecutions.

Facility Design	Emergency and security provisions can be included in design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other similar facilities.
Environmental Design	Crime Prevention Through Environmental Design (CPTED) is a field of planning that examines design, management, integration, and lowered density of poor or blighted areas with the goal of reducing vandalism, crime, and some types of riot events.
Public Health Emergencies - If left unchecked, various diseases or environmental conditions can result in widespread illness and threats to life.	
Immunization	Immunization against communicable diseases can be encouraged among residents of a community.
Ventilation	The spread of communicable diseases can be thwarted by compartmentalizing ventilation systems in areas/facilities prone to crowding, or areas that may involve exposure to contagions or noxious atmospheres.
Radon	Communities can increase public awareness of radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings.
Water and Sewer	Communities need to maintain water and sewer infrastructure at acceptable operating standards. Back-up generators for water and wastewater treatment facilities can help maintain acceptable operating levels during power failures. Separation of storm and sanitary sewer systems can also prevent release of untreated sanitary waste when stormwater might otherwise overfill a sewer system.
Vacant Structures	Demolition and clearance of vacant condemned structures can prevent rodent infestations.
Public Health Systems and Public Awareness	Communities can maintain public health systems with sufficient disease monitoring and surveillance capabilities to protect the population from large-scale outbreaks; they can also support free or reduced-cost clinics and school health services. Public awareness campaigns can emphasize the causes, symptoms, and protective actions for disease outbreaks or other potential public health emergencies.
Contamination	Containment Public contact with contaminated sites or waters, including floodwaters, should be prevented as much as possible.
Waste Disposal	Communities need to address pollution control, enforcement, and cleanup. Particular procedures need to be followed for disposing of chemicals, including hazardous waste and scrap materials.
Septic Tanks	Septic tanks need to be properly located, installed, cleaned, monitored, and maintained.

Insights on Plan Approval

The "Insights on Plan Approval" includes the various FEMA Plan Review Tool citations, excerpts of how the requirement was satisfied in the 2014 County of Los Angeles All-Hazard Mitigation Plan update.

Example:

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT E: PLAN ADOPTION | E1
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

Above is an example of a requirement from the FEMA Review Tool.

Below is an excerpt of how the FEMA Requirement was addressed in the 2014 County of Los Angeles All-Hazard Mitigation Plan (AHMP):

2013 AHMP SOLUTION:

Board of Supervisors Letter of Promulgation

LETTER OF PROMULGATION

TO: OFFICIALS, EMPLOYEES, AND RESIDENTS OF LOS ANGELES COUNTY

Preservation of life and property is an inherent responsibility of local, State, and Federal government. The County of Los Angeles developed this All-Hazard Mitigation Plan to cover mitigation responsibilities of County departments as well as the unincorporated communities. The Hazard Mitigation Plan ensures the most effective allocation of resources for the maximum benefit and protection of the public in time of emergency.

While no plan can guarantee prevention of death and destruction, well-developed plans, carried out by knowledgeable and well-trained personnel, can minimize losses. The Hazard Mitigation Plan establishes the County's emergency policies and procedures in the event of a disaster. Because of the complex array of local governments, the plan could not reasonably address mitigation planning for each of the 88 cities, 94 school districts and over 100 other special districts covered by the law. The plan addresses all major natural, human-caused and technological disasters that fall within the responsibilities of County-owned and operated department facilities. Sheriff, Fire Department and Public Works provide contracted services to many of the 88 cities in Los Angeles County. Each of the individual cities and special districts are responsible for completion of their own mitigation plans.

The All-Hazard Mitigation Plan conforms to the requirements of FEMA Disaster Mitigation Act of 2000. FEMA published their requirements for all future hazard mitigation planning in February 2002. The State of California implemented the program in California in the summer and fall of 2003 with guidelines and training sessions. The law requires extensive documentation of the community, the region, its hazards, history and future plans.

The Los Angeles County Board of Supervisors gives its full support to the All-Hazard Mitigation Plan and urges all officials, employees, and residents, individually and collectively, to share in our commitment to the effective preparedness and response to disasters.

This letter promulgates the All-Hazard Mitigation Plan which becomes effective upon approval by the Los Angeles County Board of Supervisors.

Signed _____ Date: 2/24/14

Don Knabe, Chair
Los Angeles County Board of Supervisors

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A1
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

AHMP SOLUTION:

Credits

Special Thanks

Hazard Mitigation Planning Advisory Committee:

NAME	AGENCY
Yvette Countee, County Project Manager	Office of Emergency Management
John Cvjetkovic	Department of Public Social Services
Cpt. D Chetwood	Fire Department
Connie Chung	Department of Regional Planning
Michael Contreras	Department of Public Health
Cpt. Angus Alexander	Fire Department/Lifeguard
Margaret Ayala	Department of Mental Health
Ana DeLaTorre	Department of Mental Health
Barbara Engleman	Department of Mental Health
Anush Gambaryan	Department of Parks and Recreation
Luis Gomez	Department of Health Services
Robert Held	Public Library
Sherryl Jones	Cal EMA
Ron Lacayo	Department of Public Works
Cpt. Daniel Martin	Fire Department
Linda Estrada	Internal Services Department
Enrique Orta	Department of Parks and Recreation
Edward Ramos	Public Library
Anne Russet	Department of Regional Planning
Susan Tae	Department of Regional Planning
Michael Takeshita	Fire Department/Forestry Division
Pablo Valadez	Fire Department
Martin Zimmerman	Chief Executive Office

Plan Development and Approval Timeline

Table 2-1: Plan Development and Approval Timeline

	Dec 2010	Jan 2011	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2013	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Conduct initial meeting with county OEM project manager – Confirm scope of work and discuss project logistics	X																																	
Update hazard information contained in the 2005 HMP and prepare recommendations on streamlining plan	X																																	
Conduct Planning Advisory Committee Meeting #1 – Kickoff Meeting	X																																	
Conduct department-specific planning meetings		X	X	X	X	X																												
Create department-specific mitigation actions matrix						X																												

Hazard Mitigation Planning Advisory Committee Meeting

December 7, 2010

Agenda

1. Introductions
   a. Facilitator: Carolyn Harshman
   b. Willdan Staff
   c. Participants
2. Overview to Hazard Mitigation Planning Process
   a. Disaster Mitigation Act of 2000
3. History of Major Disasters in the United States
   a. Review of cause and damages
4. Hazards Posing Significant Threats in Los Angeles County
   a. Earthquake
   b. Flooding
   c. Wildfire
   d. Tsunami
5. Calculated Priority Risk Index
   a. Introduction to CPRI Index
   b. Initial Hazard Ratings
6. Steps Ahead
   a. Updating Mitigation Strategies

Hazard Mitigation Planning Advisory Committee Meeting Sign-in Sheet 12-8-10

LAST	FIRST	AGENCY	EMAIL	PHONE
Planning Advisory Committee Members				
Alexander	Cpt. Angus	LACOFD/Lifeguard	Aalexand@fire.lacounty.gov	(310) 386-4057
Cvietkovic	John	DPSS	johncvietkovic@dpss.lacounty.gov	(562) 345-7729
Chetwood	Cpt. D	Fire	dchetwood@fire.lacounty.gov	Not provided
Chung	Connie	Planning	cchung@planning.lacounty.gov	(213) 974-6417
Contreras	Michael	Public Health	micontreras@ph.lacounty.gov	(210) 250-8681
Countee	Yvette	OEM	Ycountee@ceooem.lacounty.gov	(323) 980-2253
DeLaTorre	Ana	DMH	ADelaTorre@dmh.lacounty.gov	(213) 305-3238
Engleman	Barbara	DMH	BEngleman@dmh.lacounty.gov	(213) 216-8811
Gambaryan	Anush	Parks	agambaryan@parks.lacounty.gov	(213) 738-3011
Gomez	Luis	DHS	lugomez@dhs.lacounty.gov	(323) 594-1029
Held	Robert	Library	Bheld@library.lacounty.gov	(562) 879-0601

Hazard Mitigation Planning Public Participation Website Announcement



Town Hall Invitation

County of Los Angeles
Hazard Mitigation Plan Update
Town Hall Meetings

Disasters

Throughout the history of civilization, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense and damaged businesses can fail or decrease in their abilities to contribute to the economy. The time, money, and effort to respond to and recover from these disasters also diverts public resources and attention from other important programs and problems.

DMA 2000

Recognizing the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards, the U. S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) which mandates the preparation of a Local Hazard Mitigation Plan by each state and local government. In 2005, the County of Los Angeles prepared and received approval, by the Federal Emergency Management Agency (FEMA), of its first All-Hazard Mitigation Plan. Because DMA 2000 regulations also identify the need for five-year updates, **an analysis is currently underway to update the County's All-Hazard Mitigation Plan.**

Public Outreach

A critical component of the plan update process is to involve the public in the planning process. During the 2005 planning process, Public Outreach included a variety of Town Hall meetings, disaster expos, and the distribution of a hazards questionnaire. This year's strategy includes the delivery of six (6) Hazard Mitigation Town Hall meetings to interested citizens.

with hazards. A mitigation plan includes a thorough analysis of hazards posing a significant threat against the region, a review of vulnerability to those hazards, and the development of past, present, and future "action items" that mitigate the hazards. The County of Los Angeles 2005 Plan identified the following as "high risk" hazards:

- Earthquake
- Flooding
- Tsunami
- Dam Inundation
- Wildland Fire
- Terrorism – Weapons of Mass Destruction
- Utility Loss
- Drought
- Biological/Health Emergencies
- Wastewater and Water Emergencies
- Economic Disruption
- Data/Telecommunications Emergencies
- Civil Unrest

The 2011 mitigation plan update process involves assessing the status and threat of each of the above listed hazards.

Your input is needed to complete this process, as well as to help identify any additional hazards and mitigation strategies.

This year's public outreach will involve the delivery of multiple Town Hall meetings, utilizing each of the Board of Supervisor Districts. One Town Hall meeting will be delivered in District 1, District 2, District 3, and District 4. Because of the size of District 5, multiple Town Hall meetings will be delivered.

Please plan on attending one of the listed Town Hall meetings in your area to provide input and participate in the development of the updated Hazard Mitigation Plan. The locations, dates, and times are indicated below.

3rd Supervisorial District – April 26

Location: King Gillette Ranch - Dorm Dining Room
26800 West Mulholland Highway
Calabasas, CA 91302
Date: Tuesday – April 26, 2011
Time: 6:00-7:30 pm

2nd Supervisorial District – April 27

Location: A.C. Bilbrew Public Library
150 E. El Segundo Blvd.
Los Angeles, CA 90061
Date: Wednesday – April 27, 2011
Time: 6:00-7:30 pm

4th Supervisorial District – April 28

Location: Burton Chace Park - Community Room
13650 Mindanao Way
Marina Del Rey, CA 90292

5th Supervisorial District – May 23

Location: Altadena Community Center - Community Room
730 E. Altadena Drive
Altadena, CA 91001
Date: Monday – May 23, 2011
Time: 6:00-7:30 pm

5th Supervisorial District – May 24

Location: Sports Complex - Activities Center
Canyon Room A & B
20880 Centre Pointe Parkway
Santa Clarita, CA 91351
Date: Tuesday – May 24, 2011
Time: 6:00-7:30 pm

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A2
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2)

AHMP SOLUTION:

Outside Agency Involvement

A variety of agencies and individuals provided data and expertise during plan development. The agencies were informed of the availability of the draft mitigation plan. Any comments received have been incorporated into the final document.

Special District Invitee List

ABC Unified School District
Acton–Agua Dulce Unified School District
Alhambra Unified School District
Altadena Library District
Antelope Valley East Kern Water Agency
Antelope Valley Health Care District
Antelope Valley Mosquito Vector Control District
Antelope Valley Union High School District
Arcadia Unified School District
Artesia Cemetery District
Athens-Woodcrest-Olivita Garbage Disposal District
Azusa Unified School District
Baldwin Park Unified School District
Bassett Unified School District
Beach Cities Health Care District
Bellflower Unified School District
Belvedere Garbage Disposal District
Beverly Hills Unified School District
Bonita Unified School District
Bradbury Estates Community Services District
Burbank Unified School District
Calabasas School District
California American Water Co.
CalPoly Pomona Police Department
……..

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A3
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

AHMP SOLUTION:

Public Input

The plan will be available to the public through different venues that will engage the public, involve them in ongoing planning and evaluation, and facilitate communication. The Hazard Mitigation Planning Advisory Committee recognizes that community involvement increases the likelihood that hazard mitigation will become a standard consideration in the county's evolution.

The Hazard Mitigation Planning Advisory Committee posted a public notice on its Web site and held a meeting/presentation to introduce hazard mitigation. The resources and information cited in the mitigation plan provide a strong local perspective and help identify strategies and activities to make the County of Los Angeles more disaster resistant.

Hazard Mitigation Planning Public Participation Website Announcement



Handouts were Distributed at Special District Workshops and Town Hall Meetings

County of Los Angeles Hazard Mitigation Plan Update

DMA 2000

The Disaster Mitigation Act of 2000 (DMA 2000) mandates the preparation of a Local Hazard Mitigation Plan by each state and local government. The County of Los Angeles wrote its first All-Hazard Mitigation Plan in 2005. This planning effort is focused on the update of information pertaining to hazards, demographics, land use development, mapping, and mitigation activities.



Mitigation

Mitigation is defined as the actions taken to minimize or eliminate threats associated with hazards.

Simply put, mitigation includes actions taken to avoid the need for an emergency response.

As an example, proactive cleaning of storm drains in advance of heavy rains prevents blockage at a critical time of need.

Mitigation Measure Categories

FEMA has identified six "mitigation measure categories", including:

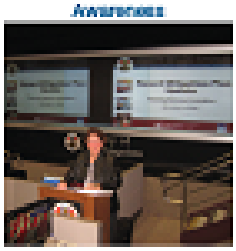
Prevention



Property Protection



Public Education and Awareness



Natural Resource Protection



Emergency Services



Structural Projects



Hazards

The hazards identified for the County of Los Angeles were compared using a weighted system that analyzes Probability, Magnitude/ Severity, Warning Time, and Duration. The highest risk hazards for County of Los Angeles are Earthquake, Flooding, and Wildfire. Although other hazards may pose a focused and immediate threat to an isolated part of the region, the focus of the updated mitigation plan is on hazards that are so large in scope that the County government's ability to respond effectively is significantly impacted.

Public Input

Any public planning effort would be incomplete without adequate opportunities for public input. During this plan update, a total of fourteen Hazard Mitigation Workshops will be conducted for participation from the general public and representatives from Special Districts.

Staying in Touch

Updated information, access to the Draft Updated Plan, web links, and other resources pertaining to hazard mitigation will be posted on the County of Los Angeles, Office of Emergency Management website at http://lacoa.org.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A4
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

AHMP SOLUTION:

Review and Incorporation of Existing Information

This section contains a detailed listing of documentation used to develop this plan. Each of the documents in the plan development resource list was reviewed. Incorporation of information from these existing plans, studies, reports, and technical documents were based on their applicability and timeliness. The incorporation of information from existing specific mitigation plans and studies was used to enhance the relevance of sections of this plan. Selected documents have been footnoted throughout the plan where a specific reference is incorporated.

Plan Development Resource List

County of Los Angeles General Plan (Draft 2012)

A Road Map to Fire Safety (2009)

Brush Management Plant ID Guide

County of Los Angeles Floodplain Management Plan (2009)

Citizens Guide to County Services (2010)

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A5
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

AHMP SOLUTION:

Continued Public Involvement

The Los Angeles County OEM is dedicated to involving the public directly in review and updates of the plan. OEM and a representative from other participating organizations will be responsible for monitoring, evaluating, and updating the plan as described above. During all phases of plan maintenance, the public will have the opportunity to provide feedback.

A copy of the plan will be publicized and available for review on the OEM Web site. In addition, copies of the plan will be catalogued and kept at all of the appropriate agencies in the County. The existence and location of these copies will also be posted on the County Web site. The site will contain contact information for members of the Hazard Mitigation Advisory Committee to which people can direct their comments and concerns.

All public feedback will be forwarded to the Hazard Mitigation Advisory Committee for review and incorporation (if deemed appropriate). This information will also be forwarded to OEM personnel responsible for keeping track of public comments on the plan.

A press release requesting public comments will also be issued after each evaluation, or when deemed necessary by the Hazard Mitigation Advisory Committee. The press release will direct people to the Web site or to an appropriate local agency location where the public can review proposed updated versions of the plan. This will provide the public with an outlet through which they can express their concerns, opinions, or ideas about any updates/changes that are proposed to the plan. The OEM will be responsible for using County resources to publicize the press releases and maintain public involvement through public access channels, Web pages, and newspapers, as deemed appropriate.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT A: PLANNING PROCESS | A6
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

AHMP SOLUTION:

Method and Scheduling of Plan Implementation

The Committee that was involved in research and writing of the Plan will also be responsible for implementation. The Committee will be led by a Planning Department Senior Planner. Please refer to the Credits on page 2 of the Plan for a full list of Committee members.

	Year 1		Year 2		Year 3		Year 4		Year 5	
Monitoring	X	X	X	X	X	X	X	X	X	X
Evaluating									X	X
Updating									X	X

Monitoring, Evaluating, and Updating

The Hazard Mitigation Planning Advisory Committee participants will be responsible for monitoring the plan annually for updates to goals, objectives, and action items. If needed, these participants will coordinate through OEM to integrate these updates into the plan. OEM will be responsible for monitoring the overall plan for updates on an annual basis.

Plan Evaluation

1. The plan will be evaluated by OEM and by each participating department at least every quarter to determine the effectiveness of programs, to ensure the plan reflects changes in land development or programs that may affect mitigation priorities, and to update the "status" of the individual mitigation action items.
2. The plan will also be reevaluated by the Hazard Mitigation Planning Advisory Committee members (or their designated representatives) based on the initial rating criteria used to draft goals, objectives, and action items.
3. OEM representatives will also review the goals and action items to determine their relevance to changing situations in the County, as well as changes in state or federal regulations and policy.
4. OEM representatives will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data.
5. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, any difficulties encountered, the success of coordination efforts, and which strategies should be revised.
6. OEM will distribute quarterly reminders to the departments with assignments in the Mitigation Actions Matrix. Any updates or changes necessary will be forwarded to OEM for inclusion in further updates to the plan. It is envisioned that the Hazard Mitigation Planning Advisory Committee and each departmental mitigation planning team will meet annually to discuss the status of the plan.
7. The plan will be updated every five years.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B1
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

AHMP SOLUTION:

Table 4-9: Vulnerability: Location, Extent, and Probability for County of Los Angeles

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often)*
Earthquake	Entire project area	The Southern California Earthquake Center (SCEC) in 2007 concluded that there is a 99.7 % probability that an earthquake of M6.7 or greater will hit California within 30 years.[1]	Moderate
Flood	Throughout project area	Potential 100- and 500-year flood inundation zones, as well as tsunami Inundation areas along the coast	Moderate
Wildfire	Throughout the northern 2/3 of the project area	The affected areas are classified as Very High Fire Hazard Severity Zones. Over half the county could be affected.	High
Tsunami	Coastal regions	Up to 40 foot run-up along coastal region.	Low
* Probability is defined as: Low = 1:1,000 years, Moderate = 1:100 years, High = 1:10 years			
[1] Uniform California Earthquake Rupture Forecast			

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B2
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

AHMP SOLUTION:

Table 4-9: Vulnerability: Location, Extent, and Probability for County of Los Angeles

Hazard	Location (Where)	Extent (How Big an Event)	Probability (How Often)*
Earthquake	Entire project area	The Southern California Earthquake Center (SCEC) in 2007 concluded that there is a 99.7 % probability that an earthquake of M6.7 or greater will hit California within 30 years.[1]	Moderate
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Tsunami	Coastal regions	Up to 40 foot run-up along coastal region.	Low
* Probability is defined as: Low = 1:1,000 years, Moderate = 1:100 years, High = 1:10 years			
[1] Uniform California Earthquake Rupture Forecast			

Also, the following excerpts should be cited:

Why Are Earthquakes a Threat to the County of Los Angeles?

The most recent significant earthquake event affecting Southern California was the January 17, 1994, Northridge earthquake. At 4:31 a.m. on Monday, January 17, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

Why Are Floods a Threat to the County of Los Angeles?

The nearest major waterways are the Los Angeles River, the Santa Clara River, the Rio Hondo River, the San Gabriel River, and Coyote Creek. The San Gabriel River is 1 mile to the west, and it does create a potential for flooding for the County of Los Angeles. As stated in the *County of Los Angeles Emergency Operations Plan*, the county has been identified as a "Zone B" area by the National Flood Insurance Program (NFIP), which means the county has minimal flood risk. The most recent flood event to impact the County was the 2007 flash flood that caused $300 thousand in damages. According to NOAA, strong thunderstorms dumped heavy rain over the Barham burn area.

Why Are Wildfires a Threat to Los Angeles County?

The most recent significant wildfire event to afflict the County of Los Angeles was the Station Fire in 2009.

Why Are Tsunamis a Threat to the County of Los Angeles?

The most recent tsunami to strike the County of Los Angeles was the 2011 tsunami caused by the earthquake in Japan. History has shown that the probability of a tsunami in the planning area is extremely low. However, if a tsunami should occur, the consequences could be severe. The impact could cause loss of life, destroy thousands of high-priced homes, and greatly affect the region's downtown and coastal businesses—with a profound secondary impact on tourism. Even if all residents and visitors were safely evacuated, the damage to property in this densely populated, high-property-value area would still be substantial.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

AHMP SOLUTION:

Table 4-12: Proximity of Land Use Types to Hazards

Earthquake	Flood	Wildfire	Landslide	Windstorm	Drought	Tsunami	Land Use Types
X	X	X	X	X	X		Rural
X	X	X		X	X	X	Residential
X	X			X	X	X	Commercial/Office
X	X			X	X	X	Mixed Use
X	X			X	X	X	Industrial/Manufacturing
X	X			X	X	X	Public and Semi-Public
X	X	X	X	X	X	X	Open Space
X	X			X	X		Overlays

Also, the following excerpts should be cited:

Impact of Earthquakes in the County of Los Angeles

Based on the risk assessment, it is evident that earthquakes will continue to have potentially devastating economic impacts to certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community

- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Impact of Flooding on the County of Los Angeles

Floods and their impacts vary with the location and severity of any given flood event, and generally only affect certain areas of the county during specific times. However, based on the risk assessment, it is evident that floods will continue to have devastating economic impacts on certain areas of the county.

Potential impacts that are not quantified, but that are anticipated and likely in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in a loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers (as temporary facilities and relocations would likely be needed)

Impact of Wildfires in the County of Los Angeles

Wildfires and their impacts vary by location and severity of any given wildfire event, and will likely only affect certain areas of the county during specific times. Based on the risk assessment, it is evident that wildfires will have potentially devastating economic impact on certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

Impact of Tsunamis in the County of Los Angeles

Based on the risk assessment, it is evident that tsunamis will continue to have potentially devastating economic impacts to certain areas of the county. Impacts that are not quantified, but can be anticipated in future events, include the following:

- Injury and loss of life
- Commercial and residential structural damage
- Disruption of and damage to public infrastructure
- Secondary health hazards (e.g., mold and mildew)
- Damage to roads/bridges, resulting in loss of mobility
- Significant economic impact (jobs, sales, tax revenue) on the community
- Negative impact on commercial and residential property values
- Significant disruption to students and teachers, as temporary facilities and relocations would likely be needed

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B4
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

AHMP:

Table 6-7: Repetitive-Loss Properties in the County of Los Angeles (updated 2011)

Rank	Losses	Properties	Community	Building $	Contents $	Total $	CRS Rating	FEMA Plan
10	142	45	Los Angeles County	1,461,070.07	543,404.07	2,004,474.14	8	Presentation
4	284	120	City of Los Angeles	2,779,104.58	494,007.21	3,273,111.79	9	Yes
2	464	169	City of Malibu	7,228,124.92	1,190,328.89	8,418,453.81		Yes

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C1
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

AHMP SOLUTION:

Existing Institutions, Plans, Policies, and Ordinances

The administrative and technical capabilities of the county are shown in the table below, which identifies the staff, personnel, and department resources available to implement the actions specified in the mitigation section of the plan. Specific resources reviewed include those involving technical personnel such as planners/engineers with knowledge of land development and land management practices, engineers trained in construction practices related to building and infrastructure, planners and engineers with an understanding of natural or human-caused hazards, floodplain managers, surveyors, personnel with GIS skills, and scientists familiar with hazards in the community.

Administrative and Technical Capacity

Staff/Personnel Resources	Y/N	Department/Agency and Position
A. Planners or engineers with knowledge of land development and land management practices	Y	Department of Public Works
B. Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Y	Department of Public Works
C. Planners or engineers with an understanding of natural and/or human-caused hazards	Y	Department of Public Works
D. Floodplain manager	Y	Department of Public Works
E. Surveyors	Y	Department of Public Works
F. Staff with education or expertise to assess the community's vulnerability to hazards	Y	Department of Public Works Office of Emergency Management (OEM)
G. Personnel skilled in GIS and/or HAZUS	Y	GIS Managers – DPW OEM
H. Scientists familiar with the hazards of the community	Y	County Science Advisory Board
I. Emergency manager	Y	Office of Emergency Management
J. Grant writers	Y	OEM and other departments determine their own level of service.

Legal and Regulatory Capability

The legal and regulatory capabilities of the county are shown in the table below, which presents the existing ordinances and codes that affect the physical or built environment of the county. Examples of legal and/or regulatory capabilities can include the county's building codes, zoning ordinances, subdivision ordnances, special-purpose ordinances, growth management ordinances, site plan review, general plans, capital improvement plans, economic development plans, emergency response plans, and real estate disclosure plans.

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Does State Prohibit (Y/N)
Building code	Y	N
Zoning ordinance	Y	N
Subdivision ordinance or regulations	Y	N
Special-purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Y	N
Growth management ordinances (also called "smart" growth or anti-sprawl programs)	Y	N
Site plan review requirements	Y	N
General or comprehensive plan	Y	N
A capital improvements plan	Y	N
An economic development plan	Y	N
An emergency response plan	Y	N
A post-disaster recovery plan	Y	N
A post-disaster recovery ordinance	N	N
Real estate disclosure requirements	Y	N
2001 flood hazard mitigation plan	Y	N

Fiscal Resources

The table below shows specific financial and budgetary tools available to the county, such as community development block grants; capital improvements project funding; authority to levy taxes for specific purposes; fees for water, sewer, gas, or electric services; impact fees for homebuyers or developers for new development; ability to incur debt through general obligations bonds; and withholding spending in hazard-prone areas.

Financial Resources	Accessible or Eligible to Use (Yes/No)
Community development block grants (CDBG)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
Fees for water, sewer, gas, or electric service	Yes
Impact fees for homebuyers or developers for new developments/homes	Yes
Incur debt through general obligation bonds	Yes
Incur debt through special tax and revenue bonds	Yes
Incur debt through private activity bonds	Yes
Withhold spending in hazard-prone areas	Yes

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C2
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

AHMP SOLUTION:

NFIP Participation

The County of Los Angeles participates in NFIP. Flood maps and flood insurance studies (FIS) are often used to identify flood-prone areas. The NFIP was established in 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In Los Angeles County, the NFIP and related building code regulations went into effect on March 1, 1978. NFIP regulations (44 Code of Federal Regulations (CFR) Ch. 1, §60.3) require that all new construction in floodplains must be elevated at or above base flood level.

Flood insurance rate maps (FIRM) and FIS floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A FIRM is the official map produced by FEMA that delineates SFHA in communities where NFIP regulations apply. FIRMs are also used by insurance agents and mortgage lenders to determine if flood insurance is required, and what insurance rates should apply.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C3
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))

AHMP SOLUTION:

Goals

The Hazard Mitigation Planning Advisory Committee reviewed the goals identified in the 2005 All-Hazard Mitigation Plan and decided to amend the goals to make them less specific and more general in nature. It was agreed that more generalized goals would be easier to work with, and ultimately easier to implement. The resulting mitigation goals avoid or reduce long-term vulnerabilities to all hazards.

The goals are also based on the risk assessment, representing a long-term vision for hazard reduction or enhanced mitigation capabilities. The goals are compatible with community needs and goals expressed in other planning documents prepared by the County. The five mitigation goals and descriptions are listed below.

Protect Life and Property

Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural, human-caused, and technological hazards.

Improve hazard assessment information to make recommendations for avoiding new development in high-hazard areas and encouraging preventive measures for existing development in areas vulnerable to natural, human-caused, and technological hazards.

Enhance Public Awareness

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural, human-caused, and technological hazards.

Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Preserve Natural Systems

Support management and land use planning practices with hazard mitigation to protect life.

Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.

Encourage Partnerships and Implementation

Strengthen communication and coordinate participation with public agencies, citizens, nonprofit organizations, business, and industry to support implementation.

Encourage leadership within the County and public organizations to prioritize and implement local and regional hazard mitigation activities.

Strengthen Emergency Services

Establish policy to ensure mitigation projects are considered for critical facilities, services, and infrastructure.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, nonprofit organizations, business, and industry.

Coordinate and integrate hazard mitigation activities (where appropriate) with emergency operations plans and procedures.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C4
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

AHMP SOLUTION:

Mitigation Actions Matrix

The following is the Mitigation Actions Matrix which identifies the existing and future mitigation activities developed by the Committee.

Table 10-2: Mitigation Actions Matrix

Action Item Identifier	Coordinating Organization	Action Item Description	Timeline	Funding Source (unk=unknown, G=Grant, GF= General Fund, CIP=Capital Improvement Program)	Estimated Cost (unk = unknown)	Ranking Future Actions (L=Low, M=Med, H=High, na=not applicable)	Action Item Comments (New, Completed, Deleted, Revised, Deferred)
All-Hazard							
AH-1	OEM	Survey the systems available with the goal of installing a biochemical and radiation warning system for the County Office of Emergency Management (OEM) Emergency Operations Center (EOC). This strategy would include the installation of biochemical and radiation warning and detection equipment. System would be deployed both internally and externally of the EOC.	2012-2015	G, GF	$125,000 (2005)	H	Deferred due to lack of funding.
AH-2	OEM	Design, engineer, and replace the HVAC system for the building that houses the Emergency Operations Center. Ventilation system to be self-contained and closed to outside and inside contamination. System would require an air purification system, specialized air intake components, and a dedicated power source.	2012-2015	G, GF	$75,000 (2005)	H	Deferred, Revised

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C5
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

AHMP SOLUTION:

Ranking

To assist with implementing the All-Hazard Mitigation Plan, the Hazard Mitigation Planning Advisory Committee adopted the following process for ranking mitigation action items (refer to attachment 2-1: Prioritizing Mitigation Action Items). Designations of "High," "Medium," and "Low" priority have been assigned to each action item using the following criteria (a positive response = one point):

Does the action
- ✓ solve the problem?
- ✓ address vulnerability assessment?
- ✓ reduce the exposure or vulnerability to the highest priority hazard?
- ✓ address multiple hazards?
- ✓ offer benefits that equal or exceed costs?
- ✓ implement a goal, policy, or project identified in the General Plan or Capital Improvement Plan?

Can the action
- ✓ be implemented with existing funds?
- ✓ be implemented by existing state or federal grant programs?
- ✓ be completed within the five-year life cycle of the LHMP?
- ✓ be implemented with currently available technologies?

Will the action
- ✓ be accepted by the community?
- ✓ be supported by community leaders?
- ✓ adversely affect segments of the population or neighborhoods?
- ✓ require a change in local ordinances or zoning laws?
- ✓ result in positive or neutral impact on the environment?
- ✓ comply with all local, state, and federal environmental laws and regulations?

Is there
- ✓ sufficient staffing to undertake the project?
- ✓ existing authority to undertake the project?

During the prioritization meeting of the Hazard Mitigation Planning Advisory Committee, department representatives were provided worksheets for each of their assigned action items. Answers to the criteria above determined the priority according to the following scale:
- ✓ 1–6 = Low priority
- ✓ 7–12 = Medium priority
- ✓ 13–18 = High priority

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT C. MITIGATION STRATEGY | C6
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

AHMP SOLUTION:

Implementing through Existing Programs

The County will implement many of the recommended action items (Mitigation Actions Matrix) through existing County programs and procedures. As an example, several action items are identified for funding through the County's next Capital Improvement Program or General Fund. Upon approval and adoption of the 2012 Plan, the departments with responsibilities identified in the 2012 Mitigation Plan will schedule quarterly meetings with department representatives to ensure that the items within their charge are monitored, funded, and executed within the identified timeline. Each quarter, the various department subcommittees will come together to track the status of their mitigation action items. OEM will distribute department-specific copies of the Mitigation Actions Matrix to the individual departments. Those spreadsheets will serve as "tracking tools" for use by the departments.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT D. MITIGATION STRATEGY | D1
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

AHMP SOLUTION:

Development Patterns

Since the adoption of the 2005 Plan, there have been no significant alterations to the development pattern of the County in the hazard prone areas. This conclusion was reached after a thorough review of the General Plan and discussion with the Advisory Committee.

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT D. MITIGATION STRATEGY | D2
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))
ELEMENT D. MITIGATION STRATEGY | D3
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3

AHMP SOLUTION:

Mitigation Actions Matrix

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AH-2	OEM	Design, engineer, and replace the HVAC system for the building that houses the Emergency Operations Center. Ventilation system to be self-contained and closed to outside and inside contamination. System would require an air purification system, specialized air intake components, and a dedicated power source.	2012-2015	G, GF	$75,000 (2005)	H	Deferred, Revised

FEMA PLAN REVIEW TOOL REQUIREMENT:

ELEMENT E: PLAN ADOPTION | E1
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))

AHMP SOLUTION:

LETTER OF PROMULGATION

TO: OFFICIALS, EMPLOYEES, AND RESIDENTS OF LOS ANGELES COUNTY

Preservation of life and property is an inherent responsibility of local, State, and Federal government. The County of Los Angeles developed this All-Hazard Mitigation Plan to cover mitigation responsibilities of County departments as well as the unincorporated communities. The Hazard Mitigation Plan ensures the most effective allocation of resources for the maximum benefit and protection of the public in time of emergency.

While no plan can guarantee prevention of death and destruction, well-developed plans, carried out by knowledgeable and well-trained personnel, can minimize losses. The Hazard Mitigation Plan establishes the County's emergency policies and procedures in the event of a disaster. Because of the complex array of local governments, the plan could not reasonably address mitigation planning for each of the 88 cities, 94 school districts and over 100 other special districts covered by the law. The plan addresses all major natural, human-caused and technological disasters that fall within the responsibilities of County-owned and operated department facilities. Sheriff, Fire Department and Public Works provide contracted services to many of the 88 cities in Los Angeles County. Each of the individual cities and special districts are responsible for completion of their own mitigation plans.

The All-Hazard Mitigation Plan conforms to the requirements of FEMA Disaster Mitigation Act of 2000. FEMA published their requirements for all future hazard mitigation planning in February 2002. The State of California implemented the program in California in the summer and fall of 2003 with guidelines and training sessions. The law requires extensive documentation of the community, the region, its hazards, history and future plans.

The Los Angeles County Board of Supervisors gives its full support to the All-Hazard Mitigation Plan and urges all officials, employees, and residents, individually and collectively, to share in our commitment to the effective preparedness and response to disasters.

This letter promulgates the All-Hazard Mitigation Plan which becomes effective upon approval by the Los Angeles County Board of Supervisors.

Signed _____ Date: 2/24/14

Don Knabe, Chair
Los Angeles County Board of Supervisors

LETTER OF PROMULGATION

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Signed _____ Date: 2/24/14

Don Knabe, Chair
Los Angeles County Board of Supervisors

Master Map Resources Directory

The following directory was developed to facilitate the process of plan writing for individual jurisdictions and special districts within Los Angeles County. Look up the name of the jurisdiction to find the hazard-related mapping resources.

Cities and Unincorporated Areas	Seismic Hazards - Critical Facilities	Seismic Hazards - Schools	Shake Intensity - Critical Facilities	Shake Intensity - Schools	Dam Failure - Critical Facilities	Dam Failure - Schools	Flood - Critical Facilities	Flood - Schools	Fire - Critical Facilities	Fire - Schools	HAZUS Total Damage	HAZUS General Building Stock Damage
District 1												
Avocado Heights	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Azusa	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Baldwin Park	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Bandini (unincorporated area)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Bassett	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Bell	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Bell Gardens	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Belvedere Gardens	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Boyle Heights (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Chinatown (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Citrus (Covina islands) (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
City Terrace	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Commerce	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Cudahy	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Downtown Los Angeles (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Eagle Rock (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
East Azusa (islands-part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
East Los Angeles	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Eastmont	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44

Echo Park (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
El Monte	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
El Sereno (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Expo Park (part)(Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Firestone (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Florence (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Glassell Park (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Graham (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Hacienda Heights (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Highland Park (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Huntington Park	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Industry	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Irwindale	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
La Puente	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Lincoln Heights (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Little Tokyo (Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Los Feliz (part)(Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Los Nietos (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Maywood	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Montebello	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Monterey Park	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
North Claremont (islands-part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Pico Rivera	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Pomona	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Rosemead	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Rowland Heights (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Santa Fe Springs	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Silverlake (part)(Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
South El Monte	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44

South Gate	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
South San Gabriel	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
South San Jose Hills	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
South Whittier (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Sunshine Acres	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Valinda	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Vernon	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Walnut	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Walnut Park	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
West Puente Valley	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
West Whittier (part)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Westlake (part)(Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Whittier Narrows	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
Wholesale District (part)(Los Angeles)	5-5	5-10	5-32	5-37	6-14	6-21	6-4	6-9	7-4	7-9	5-43	5-44
District 2												
Adams (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Athens (or West Athens)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Baldwin Hills	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Barnes City (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Carson	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Central Avenue (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Compton	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Crenshaw (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Culver City	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Del Aire	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
East Compton	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
El Camino Village	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Expo Park (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Firestone (part)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44

Florence (part)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Gardena	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Graham (part)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Green Meadows (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Hawthorne	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Hollywood (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Inglewood	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Koreatown (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
La Brea (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Ladera Heights	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Lawndale	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Lennox	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Lynwood	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Mar Vista (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Marina del Rey (part)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Miracle Mile (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
North Shoestring (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Palms (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Rancho Dominguez	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Sawtelle (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
South Park (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
South Vermont (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Venice (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Vermont Square (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
View Park	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Watts (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
West Adams (Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
West Carson (part)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
West Rancho Dominguez	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44

Westchester (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Westlake (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Westmont	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Wholesale District (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Willowbrook	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Wilshire Center (part)(Los Angeles)	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Windsor Hills	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
Wiseburn	5-6	5-11	5-33	5-38	6-15	6-22	6-5	6-10	7-5	7-10	5-43	5-44
District 3												
Agoura	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Agoura Hills	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Arleta (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Atwater Village (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Bel Air (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Benedict-Coldwater Canyons (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Beverly Glen (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Beverly Hills	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Brentwood (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Calabasas	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Calabasas (adjacent)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Calabasas Highlands	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Canoga Park (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Chatsworth (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Cornell	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Encino (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Fernwood	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Franklin Canyon	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Glenview	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Hancock Park (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44

Hidden Hills	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Hollywood (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Lakeview Terrace (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Las Virgenes/Malibu Canyon	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Los Feliz (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibou Lake	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibu	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibu Bowl	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibu Highlands	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibu Vista	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Malibu/Sycamore Canyon	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Miracle Mile (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Mission Hills (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Monte Nido	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Monte Nido	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Mount Olympus (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Mulholland Corridor	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
North Hills (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
North Hollywood (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Northridge (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Pacific Palisades (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Pacoima (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Palms (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Panorama City (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Park La Brea (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Rancho Park (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Reseda (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
San Fernando	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Santa Monica	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44

Sawtelle (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Seminole Hot Springs	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sepulveda (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sherman Oaks (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Silverlake (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Studio City (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sun Valley (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sunland (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sunset Mesa	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sylmar (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Sylvia Park	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Tarzana (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Toluca Lake (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Topanga	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Topanga Canyon	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Trifuno Canyon	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Universal City	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Valley Village (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Van Nuys (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Venice (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Veterans Administration Center	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Warner Center (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
West Chatsworth (part)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
West Hollywood	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
West Los Angeles (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Westlake Village	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Westwood (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Wilshire Center (part)(Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
Winnetka (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44

Woodland Hills (Los Angeles)	5-7	5-12	5-34	5-39	6-16	6-23	6-6	6-11	7-6	7-11	5-43	5-44
District 4												
Artesia	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Avalon	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Bellflower	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Cerritos	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Diamond Bar	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Downey	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
East Whittier	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
El Segundo	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Hacienda Heights (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Harbor City (Los Angeles)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Hawaiian Gardens	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Hermosa Beach	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
La Habra Heights	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
La Mirada	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
La Rambla	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Lakewood	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Lomita	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Long Beach	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Long Beach (unincorporated area)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Los Cerritos Wetlands	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Los Nietos (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Manhattan Beach	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Marina del Rey (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Northeast Whittier (island)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Northwest Whittier	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Norwalk	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Norwalk/Cerritos (unincorporated areas)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44

Palos Verdes Estates	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Paramount	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Playa del Rey (Los Angeles)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Rancho Palos Verdes	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Redondo Beach	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Rolling Hills	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Rolling Hills Estates	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Rowland Heights (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
San Clemente Island	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
San Pedro (Los Angeles)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Santa Catalina Island	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Signal Hill	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
South Whittier (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Torrance	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
West Carson (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
West Whittier (part)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Westchester (part)(Los Angeles)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Westfield	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Whittier	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
Wilmington (Los Angeles)	5-8	5-13	5-35	5-40	6-17	6-24	6-7	6-12	7-7	7-12	5-43	5-44
District 5												
Acton	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Agua Dulce	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Alhambra	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Alpine	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Altadena	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Antelope Acres	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Arcadia	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Big Pines	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44

Bouquet Canyon	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Bradbury	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Burbank	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Canoga Park (part)(Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Canyon Country	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Castaic	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Castaic Junction	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Charter Oak (unincorporated area)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Chatsworth (part)(Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Citrus (Covina islands) (part)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Claremont	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Covina	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Crystalaire	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Deer Lake Highlands	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Del Sur	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Duarte	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
East Azusa (islands-part)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
East Pasadena	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
East San Gabriel	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
El Dorado	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Elizabeth Lake	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Fairmont	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Forrest Park	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Glendale	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Glendora	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Glendora (unincorporated area)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Gorman	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Granada Hills (Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Green Valley	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44

Hi Vista	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Juniper Hills	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Kagel Canyon	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Kinneola Mesa	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
La Canada-Flintridge	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
La Crescenta	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
La Verne	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Lake Hughes	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Lake Los Angeles	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Lakeview	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Lancaster	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Lang	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Leona Valley	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Littlerock	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Llano	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Longview	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Mint Canyon	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Mission Hills (part)(Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Monrovia	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Monrovia/Arcadia/ Duarte (unincorporated areas)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Montrose	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Neenach	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Newhall	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
North Claremont (islands-part)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Northeast San Dimas (unincorporated area)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Oat Mountain	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Olive View Hospital (in Sylmar) (Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Palmdale	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44

Pasadena	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Pearblossom	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Placerita Canyon	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Porter Ranch (Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Quartz Hill	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Redman	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Roosevelt	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
San Dimas	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
San Gabriel	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
San Marino	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
San Pasqual	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Santa Clarita	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Saugus	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sierra Madre	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Soledad	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
South Pasadena	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Stevenson Ranch	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sulphur Springs	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sun Valley (part)(Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sun Village	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sunland (part)(Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Sunland/Sylmar/Tujunga (adjacent unincorporated areas)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Temple City	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Three Points	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Tujunga (Los Angeles)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Twin Lakes	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Val Verde	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Valencia	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Valyermo	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44

Vasquez Rocks	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
West Arcadia (unincorporated areas)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
West Chatsworth (part)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
West Covina	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
West Pomona (unincorporated area)	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
White Fence Farms	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Wilsona Gardens	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44
Wrightwood	5-9	5-14	5-36	5-41	6-18	6-23	6-8	6-13	7-8	7-13	5-43	5-44

APPENDIX B:
LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: County of Los Angeles	**Title of Plan:** All-Hazard Mitigation Plan	**Date of Plan:** Final Draft 2012 **Resubmitted Sections 2, 10, 11: 13 November 2012**
Local Point of Contact: Yvette Countee		**Address:** 1275 North Eastern Avenue Los Angeles, California 90022
Title: Project Manager		
Agency: Office of Emergency Management		
Phone Number: 323-980-2253		**E-Mail:** YCountee@ceooem.lacounty.gov

State Reviewer:	**Title:**	**Date:**
Wendy Boemecke	Emergency Services Coordinator	20 March 2012
Paula Schulz	Plan Review Specialist	8 May 2012

FEMA Reviewer: Wynne Kwan	**Title:** Lead Planner	**Date:** 13 June 2012 **Sections Resubmittal: 8 March 2013**
Date Received in FEMA Region ***(insert #)***	**13 November 2012**	
Plan Not Approved		
Plan Approvable Pending Adoption	November 19, 2013	
Plan Approved	March 3, 2014	

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 1, p. 5-20; Section 2, p. 2-95; Section 4, p. 1-12; Section 10, 1-2	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2, p. 14, 77-92	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2, p.9, 64-76	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2, p. 1; throughout document by virtue of excerpting	X	
A5. Is there discussion of how the community (ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 11, p. 5-6	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 11, p. 1-5; Section 2, p. 8	X	
ELEMENT A: REQUIRED REVISIONS			

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4 – Risk Assessment; Section 5 – Earthquakes; Section 6 – Flooding; Section 7 – Wildfire; Section 8 – Tsunami; Section 9 – Non-Significant Hazards (Natural: Drought, Landslides, Windstorms)	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4 – Risk Assessment; Section 5 – Earthquakes; Section 6 – Flooding; Section 7 – Wildfire; Section 8 – Tsunami; Section 9 – Non-Significant Hazards (Natural: Drought, Landslides, Windstorms)	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 4 – Risk Assessment; Section 5 – Earthquakes; Section 6 – Flooding; Section 7 – Wildfire; Section 8 – Tsunami; Section 9 – Non-Significant Hazards (Natural: Drought, Landslides, Windstorms)	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 6, p. 27-29	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 3, p. 105-115	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 6, p. 16, 27-28	X	

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 10, p. 2-3	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 10, p. 13-175 Tsunami Mitigation Actions, Revised Section 10, p. 151-152	**X**	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 10, p. 13-175; Section 11, p. 6	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 11, p. 5	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 1 – Executive Summary; Section 3 – Community Profile; Throughout document	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 1 – Executive Summary; Section 10, p. 13-175	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 1 – Executive Summary; Throughout document	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))		X	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A	N/A	N/A
ELEMENT E: REQUIRED REVISIONS **E1:** Provide supporting documentation (e.g., signed resolution) showing formal adoption of the Plan by the County of Los Angeles Board of Supervisors. The Plan must be adopted within 1 year of FEMA approval (Approval Pending Adoption status).			

ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

This Plan provides a lot of information to support hazard mitigation planning. A good portion of the information provided is very generic and can be cut out so that resultant narrative includes information relevant and specific to the County of Los Angeles. Additionally, the Plan excerpts wholesale portions of various documents (e.g., the County's General Plan), when it would be better to summarize and make reference to. Although, overall, the general flow of the plan (in terms of presentation of the sections) is logical, the narrative within each section (especially the hazard profiles) could be better presented; for example, there are some instances where data/information/narrative was repetitive, or presented in an illogical sequencing. It would be a good idea to consider appendices to provide background information that is important to the Plan, but also not specific to County of Los Angeles. All the graphics in the document would benefit from being bigger, as some are very hard to read.

ELEMENT A: PLANNING PROCESS

Plan Strengths:

- **The Plan includes a comprehensive discussion of the planning process, including a great table of activities over the course of the plan development timeline and the roles and activities of each person on the Planning Advisory Committee**
- **The Plan includes an in-depth account of the changes made in this plan from the previously-prepared plan, and the reasoning behind those changes (or lack of changes).**
- **The Plan includes a section on "Identified Mitigation Constraints."**
- **Good number of community town hall meetings; also, interesting Special District Meetings.**

Opportunities for Improvement:

- **The Plan should include a discussion on how the County of Los Angeles will address identified mitigation constraints.**
- **The Plan should include other stakeholders in the planning process, including the City/County planners/engineers/public works/building officials, Regional planning agencies, the private sector (corporations and local businesses), homeowners associations, NGOs, higher education/academia, State and Federal agencies (Caltrans, DWR, USACE, DFG, FWS, etc), neighboring counties/cities, etc.**
- **The Plan should include a discussion on the comments received from the various meetings, if any, and how they were addressed in the Plan.**

ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT

Plan Strengths:

- **Good discussion on process to identify most significant hazards and showing how they are also broken down by Districts to show differing patterns.**
- **Comprehensive incorporation of both natural and man-made hazards that the County of Los Angeles could potentially face.**

Opportunities for Improvement:

- **In the future, the Plan should include other buildings/structures/infrastructure (e.g., residential, commercial, industrial, and institutional buildings; transportation systems; lifeline**

utility systems; communication systems; and hazardous materials facilities) to get a fuller picture of vulnerability/impact in the event of a hazard event and how best to mitigate.

- **In the future, the Plan should identify potential dollar losses for critical facilities (and other assets). This can be done using GIS overlay methods or Hazus. This information would provide a better assessment of what and how much will be impacted by potential hazards.**

ELEMENT C: MITIGATION STRATEGY

Plan Strengths:

- **The Plan includes very thorough description of the criteria/questions to determine priority mitigation actions.**
- **The Plan includes an interesting crosswalk on how the General Plan policies meet/address mitigation plan goals.**

Opportunities for Improvement:

- **The Plan does not explain the significance of the mitigation actions highlighted in yellow.**
- **The Mitigation Actions Matrix does not include for each mitigation action which plan goal(s) are addressed, as stated on p. 13 of Section 10.**

ELEMENT D: PLAN UPDATE, EVALUATION, AND IMPLEMENTATION

Plan Strengths:

- **The Plan includes a good narrative of the planning process to review the previous plan and the results of that review with discussions of the status of mitigation actions and revised priorities.**

Opportunities for Improvement:

- **The Plan should include a discussion on how the County of Los Angeles provided continued public involvement since the approval and adoption of the previously-prepared plan.**
- **The Plan should include any documentation/discussion of the monitoring and evaluation activities since the approval and adoption of the previously-prepared plan.**

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township / village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requirements
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township / village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requi re-ments
15												
16												
17												
18												
19												
20												

Appendix E: CVWD Board Resolution Adopting 2020 UWMP

Crescenta Valley Water District 2020 Urban Water Management Plan

Appendix F: Two-Week & One-Week Notification of Public Hearing

Crescenta Valley Water District 2020 Urban Water Management Plan

Appendix G: 60-Day Notification of Public Hearing

Crescenta Valley Water District 2020 Urban Water Management Plan

Crescenta Valley Water District

2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
Judy L. Tejeda
James D. Bodnar
Kerry D. Erickson
Kenneth R. Putnam
Sharon Raghavachary

Officers
Nemesciano Ochoa, P.E.
General Manager
James Lee
Director of Finance & Administration

March 09, 2021

Amy J. Bodek
Headquarters - Regional Planning
320 West Temple Street, 13th Floor
Los Angeles, California 90012

Subject: 2020 Crescenta Valley Water District Urban Water Management Plan

This letter serves as formal 60-day notice to inform all affected agencies that the Crescenta Valley Water District (District) is intending to review and update its 2015 Urban Water Management Plan and Water Shortage Plan, pursuant to California State Water Code Section 10610-10610.4. A public hearing for the District's Urban Water Management Plan and revised Water Shortage Plan is scheduled to take place on or after June 8, 2021 at the District's main office- 2700 Foothill Blvd., La Crescenta, CA 91214.

Another notice will be sent two weeks prior to the actual public hearing date. Please contact Christy Colby at ccolby@cvwd.com or 818-236-4110 for more information.

Sincerely,

CJColby

Christy J. Colby

Crescenta Valley Water District

2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
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Kerry D. Erickson
Kenneth R. Putnam
Sharon Raghavachary

Officers
Nemesciano Ochoa, P.E.
General Manager
James Lee
Director of Finance & Administration

March 09, 2021

Susan Koleda
City of La Canada-Flintridge
Planning Dept.
1327 Foothill Blvd.
La Canada, CA 91011

Subject: 2020 Crescenta Valley Water District Urban Water Management Plan

This letter serves as formal 60-day notice to inform all affected agencies that the Crescenta Valley Water District (District) is intending to review and update its 2015 Urban Water Management Plan pursuant to California State Water Code Section 10610-10610.4. A public hearing for the District's Urban Water Management Plan is scheduled to take place on or after June 8, 2021 at the District's main office- 2700 Foothill Blvd., La Crescenta, CA 91214.

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Sincerely,

CJColby

Christy J. Colby

Crescenta Valley Water District

2700 Foothill Boulevard, La Crescenta, California 91214
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Nemesciano Ochoa, P.E.
General Manager
James Lee
Director of Finance & Administration

March 09, 2021

Bradley Calvert
City of Glendale
Assistant Director of Community Development
141 N. Glendale Avenue
Glendale, CA 91206

Subject: 2020 Crescenta Valley Water District Urban Water Management Plan

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Sincerely,

CJColby

Christy J. Colby

Crescenta Valley Water District

2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

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Sharon Raghavachary

Officers
Nemesciano Ochoa, P.E.
General Manager
James Lee
Director of Finance & Administration

March 09, 2021

Nina Jazamadarian
General Manager
Foothill Municipal Water District
4536 Hampton Road
La Canada, CA 91011

Subject: 2020 Crescenta Valley Water District Urban Water Management Plan

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Sincerely,

CJColby

Christy J. Colby

Appendix H: WUE Tool 2020 Population

Crescenta Valley Water District 2020 Urban Water Management Plan

WUEdata - Crescenta Valley Community Water District

Sign Out

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Phong Tran	Crescenta Valley Community Water District	5912641227	2/25/2021 3:27:36 PM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	No Boundary Selected	N/A
2000	No Boundary Selected	N/A
2010	CVWD Service Boundary Polygon 05-11-2016.kml	1098
1990	No Boundary Selected	N/A
2000	No Boundary Selected	N/A
2010	CVWD Service Boundary Polygon 05-11-2016.kml	1098
1990	No Boundary Selected	N/A
2000	No Boundary Selected	N/A
2010	CVWD Service Boundary Polygon 05-11-2016.kml	1098

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period: 10

Year beginning baseline period range: 1996

Year ending baseline period range[1]: 2005

5-year baseline period

Year beginning baseline period range: 2003

Year ending baseline period range[2]: 2007

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons-Per-SF Connection and Persons-Per-MF/GQ Connection

	Census Block Group Level	Census Block Level						
Year	% Population in SF Housing	Service Area Population	Population in SF Housing (calculated)	Population in MF/GQ Housing (calculated)	# SF Connections	# MF/GQ Connections	Persons per SF Connection	Persons per MF/GQ Connection
1990	N/A	0	N/A	N/A			3.41	12.69
1991	-	-	-	-	-	-	3.41	12.69
1992	-	-	-	-	-	-	3.41	12.69
1993	-	-	-	-	-	-	3.41	12.69
1994	-	-	-	-	-	-	3.41	12.69
1995	-	-	-	-	-	-	3.41	12.69
1996	-	-	-	-	-	-	3.41	12.69
1997	-	-	-	-	-	-	3.41	12.69
1998	-	-	-	-	-	-	3.41	12.69
1999	-	-	-	-	-	-	3.41	12.69
2000	N/A	0	N/A	N/A			3.41	12.69
2001	-	-	-	-	-	-	3.41	12.69
2002	-	-	-	-	-	-	3.41	12.69
2003	-	-	-	-	-	-	3.41	12.69
2004	-	-	-	-	-	-	3.41	12.69
2005	-	-	-	-	-	-	3.41	12.69
2006	-	-	-	-	-	-	3.41	12.69
2007	-	-	-	-	-	-	3.41	12.69
2008	-	-	-	-	-	-	3.41	12.69
2009	-	-	-	-	-	-	3.41	12.69
2010	72.29%	32,469	23,473	8,996	6879	709	3.41	12.69
2011	-	-	-	-	-	-	3.41	12.69
2012	-	-	-	-	-	-	3.41	12.69
2013	-	-	-	-	-	-	3.41	12.69
2014	-	-	-	-	-	-	3.41	12.69
2015	-	-	-	-	-	-	3.41	12.69
2020	-	-	-	-	-	-	3.41 *	12.69 *

Population Using Persons-Per-SF Connection and Persons-Per-MF/GQ Connection

Year		# SF Connections	# MF/GQ Connections	Persons per SF Connection	Persons per MF/GQ Connection	SF Population	MF/GQ Population	Total Population
10 to 15 Year Baseline Population Calculations								
Year 1	1996			3.41	12.69			
Year 2	1997			3.41	12.69			
Year 3	1998			3.41	12.69			
Year 4	1999			3.41	12.69			
Year 5	2000			3.41	12.69			
Year 6	2001			3.41	12.69			
Year 7	2002			3.41	12.69			
Year 8	2003			3.41	12.69			
Year 9	2004			3.41	12.69			
Year 10	2005			3.41	12.69			
5 Year Baseline Population Calculations								
Year 1	2003			3.41	12.69			
Year 2	2004			3.41	12.69			
Year 3	2005			3.41	12.69			
Year 4	2006			3.41	12.69			
Year 5	2007			3.41	12.69			
2020 Compliance Year Population Calculations								
2020		**6955**	**688**	3.41 *	12.69 *	**23,732**	**8,730**	**32,462**

Hide Print Confirmation

QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

Appendix I: DWR Data Tables & UWMP Checklist

Crescenta Valley Water District 2020 Urban Water Management Plan

CVWD DWR SUBMITTAL TABLES

2020 URBAN WATER MANAGEMENT PLAN

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
Add additional rows as needed			
1910028	Crescenta Valley Water District	8,225	4,216
	TOTAL	8,225	4,216
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
Add additional rows as needed
Foothill Municipal Water District
NOTES:

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	32,462	32,974	33,494	34,022	34,558	35,103
NOTES:						

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family		Drinking Water	2,490
Multi-Family		Drinking Water	836
Commercial	w/ Institutional	Drinking Water	279
Landscape		Drinking Water	234
Losses		Drinking Water	376
		TOTAL	4,216

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water - Projected						
Use Type	Additional Description (as needed)	Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family		2,350	2,387	2,425	2,463	2,502
Multi-Family		789	802	814	827	840
Commercial	w/ Institutional	263	267	271	276	280
Landscape		221	225	228	232	235
Losses		355	361	366	372	378
	TOTAL	3,979	4,041	4,105	4,170	4,236

[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. [2]
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES:

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	4,216	3,979	4,041	4,105	4,170	4,236
Recycled Water Demand[1] *From Table 6-4*	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	4,216	3,979	4,041	4,105	4,170	4,236

[1] Recycled water demand fields will be blank until Table 6-4 is complete

*[2] Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier **may** deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.*

NOTES:

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
01/2016	332
01/2017	357
01/2018	155
01/2019	335
01/2020	376
[1] Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. *[2] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	No
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES:	

Submittal Table 5-1 Baselines and Targets Summary
From SB X7-7 Verification Form
Retail Supplier or Regional Alliance Only

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	*1996*	*2005*	*161*	*142*
5 Year	*2003*	*2007*	*159*	

**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

Submittal Table 5-2: 2020 Compliance
From SB X7-7 2020 Compliance Form
Retail Supplier or Regional Alliance Only

2020 GPCD				
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*	2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
116	*0*	*0*	*142*	*Y*

**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Verdugo Basin	1968	1699	1655	1964	2075
	TOTAL	1,968	1,699	1,655	1,964	2,075
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020

☐	There is no wastewater collection system. The supplier will not complete the table below.
	Percentage of 2020 service area covered by wastewater collection system *(optional)*
	Percentage of 2020 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
CVWD	Estimated	3,373	Los Angeles County Sanitation District	Los Angeles-Glendale Water Reclamation Plant	No	
Total Wastewater Collected from Service Area in 2020:		3,373				

**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3* **.**

NOTES: Estimated 80% of Total Water Consumption

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020

☑ **No wastewater is treated or disposed of within the UWMP service area.** The supplier will not complete the table below.

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
						Total	0	0	0	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area

☑ Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Name of Supplier Producing (Treating) the Recycled Water:	
Name of Supplier Operating the Recycled Water Distribution System:	
Supplemental Water Added in 2020 (volume) *Include units*	
Source of 2020 Supplemental Water	

Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units* [1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030 [1]	2035 [1]	2040 [1]	2045 [1] (opt)
Agricultural irrigation										
Landscape irrigation (exc golf courses)										
Golf course irrigation										
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
				Total:	0	0	0	0	0	0
				2020 Internal Reuse						

[1] ***Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☑	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.	
Beneficial Use Type	**2015 Projection for 2020 [1]**	**2020 Actual Use [1]**
Insert additional rows as needed.		
Agricultural irrigation		
Landscape irrigation (exc golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	0	0
[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.		
NOTE:		

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
☑	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Add additional rows as needed			
		Total	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 7	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				
Add additional rows as needed						
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	from FMWD	2,141	Drinking Water	2,154
Groundwater (not desalinated)	CVWD Wells	1,933	Drinking Water	3,294
Groundwater (not desalinated)	Well #16 (Glendale)	142	Drinking Water	500
	Total	4,216		5,948
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*				
NOTES:				

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☐	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	**% of Average Supply**
Average Year	2015-2020		100%
Single-Dry Year	2013-2015		100%
Consecutive Dry Years 1st Year	2011		100%
Consecutive Dry Years 2nd Year	2012		100%
Consecutive Dry Years 3rd Year	2013		100%
Consecutive Dry Years 4th Year	2014		100%
Consecutive Dry Years 5th Year	2015		100%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.

***Units of measure (AF, CCF, MG**) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: See Section 3.9.4, page 3-28

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	5,748	5,748	5,748	5,748	5,748
Demand totals *(autofill from Table 4-3)*	3,979	4,041	4,105	4,170	4,236
Difference	1,769	1,707	1,643	1,578	1,512
NOTES:					

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	5,748	5,748	5,748	5,748	5,748
Demand totals*	4,412	4,481	4,552	4,624	4,697
Difference	1,336	1,267	1,196	1,124	1,051
Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES:					

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,531	4,603	4,676	4,749	4,824
	Difference	1,217	1,145	1,072	999	924
Second year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,781	4,857	4,933	5,011	5,090
	Difference	967	891	815	737	658
Third year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,836	4,912	4,989	5,068	5,148
	Difference	912	836	759	680	600
Fourth year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	4,565	4,637	4,710	4,785	4,860
	Difference	1,183	1,111	1,038	963	888
Fifth year	Supply totals	5,748	5,748	5,748	5,748	5,748
	Demand totals	3,789	3,849	3,910	3,972	4,034
	Difference	1,959	1,899	1,838	1,776	1,714
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	3,929
Total Supplies	5,741
Surplus/Shortfall w/o WSCP Action	1,812
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	1,812
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	3,942
Total Supplies	5,745
Surplus/Shortfall w/o WSCP Action	1,803
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	1,803
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	3,954
Total Supplies	5,748
Surplus/Shortfall w/o WSCP Action	1,794
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	1,794
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	3,966
Total Supplies	5,748
Surplus/Shortfall w/o WSCP Action	1,782
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	1,782
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	3,979
Total Supplies	5,748
Surplus/Shortfall w/o WSCP Action	1,769
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	1,769
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions** (*Narrative description*)
1	Up to 10%	Phase 1 - Color Code "Blue" – Normal Water Conservation Alert: FMWD can meet all Member Agency demands. Voluntary water conservation applies.
2	Up to 20%	Phase 2 - Color Code "Green" – Increased Voluntary Water Conservation Alert: Some supplies have been impacted, and customers should increase efforts to conserve.
3	Up to 30%	Phase 3 - Color Code "Yellow" – Extraordinary Water Conservation Alert: MWD is withdrawing water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers.
4	Up to 40%	Phase 4 - Color Code "Orange" – Rationing Water Conservation Alert: MWD has implemented its allocation plan to its member agencies. Thus, supplies are limited.
5	Up to 50%	Phase 5 - Color Code "Red" – Critical Water Conservation Alert: Water supplies are reduced drastically.
6	>50%	Phase 6 - Color Code "Purple" – Emergency Water Conservation Alert: Water supplies are only available for health and safety needs.
NOTES: See Section 5.4.3, page 5-15		

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
NOTES:				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
NOTES:			

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
La Canada Flintridge	☑	☑
Glendale	☑	☑
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Los Angeles County	☑	☑
NOTES:		

CVWD ENERGY USE TABLES

2020 URBAN WATER MANAGEMENT PLAN

Urban Water Supplier: *Crescenta Valley Water District*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach

Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**		
End Date	12/31/2020			
☐ Is upstream embedded in the values reported?		**Sum of All Water Management Processes**	**Non-Consequential Hydropower**	
Water Volume Units Used	*AF*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*4216*		*4216*
Energy Consumed (kWh)		*4297984*		*4297984*
Energy Intensity (kWh/vol. converted to MG)		*3128.6*	*#DIV/0!*	*3128.6*

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Volume shown is based on total water volume delivered. All water volumes are metered. Energy consumption is based on all water related facilities within CVWD's service area as well as Well #16 from GWP. Energy data is metered and obtained from SCE and GWP.

Narrative:

Energy Intensity is based on the total energy consumption and total water volume. Energy and volumes for each of the processes within CVWD's system is unavaliable.

CVWD SBx7-7 VERIFICATION FORM

2020 URBAN WATER MANAGEMENT PLAN

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	5,311	Acre Feet
	2008 total volume of delivered recycled water	-	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	1996	
	Year ending baseline period range[3]	2005	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	
	Year ending baseline period range[4]	2007	
[1] If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period. *[2] The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*			
[3] The ending year must be between December 31, 2004 and December 31, 2010.			
[4] The ending year must be between December 31, 2007 and December 31, 2010.			
NOTES:			

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1996	30,390
Year 2	1997	30,475
Year 3	1998	30,560
Year 4	1999	30,645
Year 5	2000	30,731
Year 6	2001	30,817
Year 7	2002	30,903
Year 8	2003	30,989
Year 9	2004	31,075
Year 10	2005	31,162
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2003	30,989
Year 2	2004	31,075
Year 3	2005	31,162
Year 4	2006	31,249
Year 5	2007	31,336
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *

Baseline Year *Fm SB X7-7 Table 3*		Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	Deductions					Acre Feet
			Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	Annual Gross Water Use
10 to 15 Year Baseline - Gross Water Use								
Year 1	1996	5,277			-		-	5,277
Year 2	1997	5,497			-		-	5,497
Year 3	1998	5,076			-		-	5,076
Year 4	1999	5,608			-		-	5,608
Year 5	2000	5,717			-		-	5,717
Year 6	2001	5,635			-		-	5,635
Year 7	2002	5,792			-		-	5,792
Year 8	2003	5,724			-		-	5,724
Year 9	2004	5,726			-		-	5,726
Year 10	2005	5,327			-		-	5,327
Year 11	0	-			-		-	-
Year 12	0	-			-		-	-
Year 13	0	-			-		-	-
Year 14	0	-			-		-	-
Year 15	0	-			-		-	-
10 - 15 year baseline average gross water use								**5,538**
5 Year Baseline - Gross Water Use								
Year 1	2003	5,724			-		-	5,724
Year 2	2004	5,726			-		-	5,726
Year 3	2005	5,327			-		-	5,327
Year 4	2006	5,463			-		-	5,463
Year 5	2007	5,525			-		-	5,525
5 year baseline average gross water use								**5,553**

* **Units of measure** (AF, MG , or CCF) must remain consistent throughout the UWMP, as reported in Table 2-3.

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)
Complete one table for each source.

Name of Source	Groundwater & Imported
This water source is:	
☑	The supplier's own water source
☑	A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System[1]	Meter Error Adjustment[2] *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	5,277		5,277
Year 2	1997	5,497		5,497
Year 3	1998	5,076		5,076
Year 4	1999	5,608		5,608
Year 5	2000	5,717		5,717
Year 6	2001	5,635		5,635
Year 7	2002	5,792		5,792
Year 8	2003	5,724		5,724
Year 9	2004	5,726		5,726
Year 10	2005	5,327		5,327
Year 11	0			-
Year 12	0			-
Year 13	0			-
Year 14	0			-
Year 15	0			-
5 Year Baseline - Water into Distribution System				
Year 1	2003	5,724		5,724
Year 2	2004	5,726		5,726
Year 3	2005	5,327		5,327
Year 4	2006	5,463		5,463
Year 5	2007	5,525		5,525

[1] ***Units of measure*** *(AF, MG , or CCF) must remain consistent throughout the UWMP, as reported in Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 5: Baseline Gallons Per Capita Per Day (GPCD)				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1996	30,390	5,277	155
Year 2	1997	30,475	5,497	161
Year 3	1998	30,560	5,076	148
Year 4	1999	30,645	5,608	163
Year 5	2000	30,731	5,717	166
Year 6	2001	30,817	5,635	163
Year 7	2002	30,903	5,792	167
Year 8	2003	30,989	5,724	165
Year 9	2004	31,075	5,726	165
Year 10	2005	31,162	5,327	153
Year 11	0	-	-	
Year 12	0	-	-	
Year 13	0	-	-	
Year 14	0	-	-	
Year 15	0	-	-	
10-15 Year Average Baseline GPCD				**161**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2003	30,989	5,724	165
Year 2	2004	31,075	5,726	165
Year 3	2005	31,162	5,327	153
Year 4	2006	31,249	5,463	156
Year 5	2007	31,336	5,525	157
5 Year Average Baseline GPCD				**159**
NOTES:				

SB X7-7 Table 6: Baseline GPCD *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	161
5 Year Baseline GPCD	159
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		**Supporting Tables**
☐	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D
☑	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator *Located in the WUE Data Portal at wuedata.water.ca.gov* Resources *button*
NOTES:		

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
		2020 Target *(If more than one region is selected, this value is calculated.)*		**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target					
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	**Calculated 2020 Target [2]**			**Confirmed 2020 Target[4]**
		As calculated by supplier in this SB X7-7 Verification Form	**Special Situations[3]**		
			Prorated 2020 Target	Population Weighted Average 2020 Target	
159	151	142			**142**

[1] ***Maximum 2020 Target*** *is 95% of the 5 Year Baseline GPCD except for suppliers at or below 100 GPCD.*

[2] ***Calculated 2020 Target*** *is the target calculated by the Supplier based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target. Supplier may only enter one calculated target.*

[3] ***Prorated targets and population weighted target*** *are allowed for special situations only. These situations are described in Appendix P, Section P.3*

[4] ***Confirmed Target*** *is the lesser of the Calculated 2020 Target (C5, D5, or E5) or the Maximum 2020 Target (Cell B5)*

NOTES:

CVWD SBx7-7 COMPLIANCE FORM

2020 URBAN WATER MANAGEMENT PLAN

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	32,462
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	4,216			-		-	**4,216**

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	2,075	-	2,075

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Foothill Municipal Water District
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	2,141		2,141

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)

2020 Gross Water *Fm SB X7-7 Table 4*	2020 Population *Fm SB X7-7 Table 3*	2020 GPCD
4,216	32,462	**116**

NOTES:

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
116	-	-	-	-	116	142	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Executive Summary
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	N/A
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 8.2
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 8.2
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 3.7
	x	Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 1.6
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 2.2.1
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 2.2.2, Table 2.1
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 2.2.2
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Section 2.2.2, Table 2.1
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Section 2.2.3
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 2.3.2 Table 2.3 Section 2.6.1, Table 2.10
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 2.3.3, Table 2.4
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Section 2.6.1
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 2.6
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 2.3.3, Table 2.4
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 2.6.2
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 5.2.2
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Section 2.4.5 and 2.4.6
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 2.4.7
	x	Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	N/A, no adjustments made
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 2.4.7 Appendix I
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Section 2.4.7 Appendix I
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 3.9.4 Section 5.2.1, Tables 5.1, 5.2, and 5.3
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Section 3.9.4 Section 5.2.1, Tables 5.1, 5.2, and 5.3
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 3.2 and 3.3
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 3.9.4 Section 5.2.1, Tables 5.1, 5.2, and 5.3
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 3.3
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 3.3
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 3.3
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Appendix A
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	N/A
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 3.3, and Section 3.5.2
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 3.7, Table 3.7
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 7.4
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.2.1
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.3
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.4
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.4
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.4
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 7.6
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.2
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 3.9
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 3.10.3 Appendix I
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 3.4
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 5.4.3 Section 7.3
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 3.9.4
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 5.2.2
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 5.2.2
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 5.2.2
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 3.9.4, Tables 3.15 - 3.19
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 3.6

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Section 5
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Section 5.2.1
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 5.3
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 5.3
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 5.3
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 5.4.3
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 5.4.3
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 5.4
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 5.4.5
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 5.5
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 5.4.4
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 5.4.5
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 5.4.7
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 5.5
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 5.5
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Section 5.6
x		Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 5.7
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 5.7
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 5.5
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 5.8
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 5.8, Tables 5.13 and 5.14
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Section 5.8
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 5.9
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 5.10
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 5.11
x	x	Section 8.12	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Section 5.11
	x	Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Section 4.2
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 8.1.1
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 8.1.1 Appendix G
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2 Appendix E
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.1
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2 Appendix E
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 8.3
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 8.3
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2
x	x	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A, CVWD not regulated by PUC
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 8.1.1, Table 8.2


CRESCENTA VALLEY WATER DISTRICT
2700