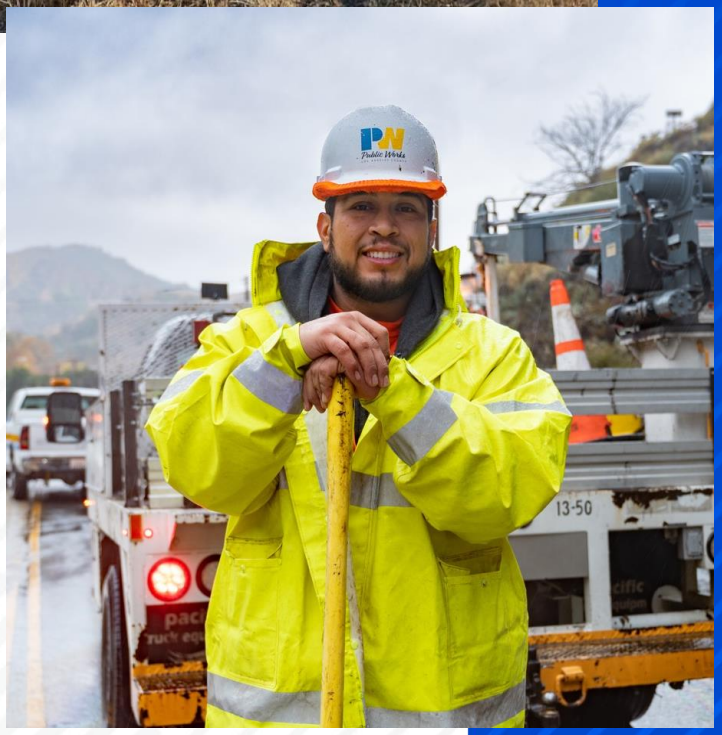


BURNS McDONNELL

COUNTY OF LOS ANGELES

COMPREHENSIVE FLOODPLAIN MANAGEMENT PLAN



September 3, 2025

FINAL

CONTENTS

EXECUTIVE SUMMARY I

Part 1 – Planning Process and Project Background 1-1

1 Introduction 1-1

1.1 Background 1-1

1.2 Purpose 1-1

1.3 Previous Floodplain Management Plans 1-2

1.4 CRS Steps for Floodplain Management Planning 1-3

2 Plan Development Methodology 2-1

2.1 Formation of the Planning Team 2-1

2.2 Defining the Planning Area 2-1

2.3 The Floodplain Management Committee 2-2

2.4 Coordination with Other Agencies 2-4

2.4.1 Agency Participants 2-4

2.4.2 Agency Notifications 2-6

2.4.3 Pre-Adoption Review 2-7

2.5 Review of Existing Programs 2-7

2.6 Public Involvement 2-7

2.6.1 Strategy 2-7

2.6.2 Public Involvement Results 2-17

2.7 Program for Public Information 2-19

2.8 Floodplain Management Plan Development – Chronology/Milestones 2-20

3 Los Angeles County Profile 3-1

3.1 Historical Overview 3-3

3.1.1 County Inception 3-3

3.1.2 Water Supply 3-4

3.1.3 Historical Flooding and Response 3-5

3.2 Physical Setting 3-8

3.2.1 Topography 3-8

3.2.2 Geology and Soils 3-11

3.2.3 Drainage and Watersheds 3-13

3.2.4 Climate 3-26

3.3 Development Features 3-27

3.3.1 Land Use 3-27

3.3.2 Critical Facilities and Infrastructure 3-28
3.4 Demographics 3-31
3.4.1 Population Characteristics 3-31
3.4.2 Age Distribution 3-32
3.4.3 Race, Ethnicity and Language 3-33
3.5 Economy 3-37
3.5.1 Income 3-37
3.5.2 Industry, Business and Institutions 3-38
3.5.3 Employment Trends and Occupations 3-39
4 Relevant Programs and Regulations 4-1
4.1 Federal and State 4-1
4.2 Local 4-7
4.2.1 General Plan 4-7
4.2.2 Community-Based Plans 4-11
4.2.3 Watershed Management Program 4-11
4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan 4-13
4.2.5 Los Angeles County Flood Control District 4-13
4.2.6 Antelope Valley Comprehensive Plan and Amendments 4-14
4.2.7 Antelope Valley Integrated Regional Water Management Plan and Salt and Nutrient Management Plan 4-14
4.2.8 Upper Santa Clara River Watershed IRWM 4-14
4.2.9 Sediment Management Strategic Plan 4-15
4.2.10 Local Coastal Programs 4-15
4.2.11 Los Angeles County Low Impact Development Ordinance 4-15
4.2.12 County of Los Angeles Operational Area Emergency Operations Plan 4-16
4.2.13 Topanga Creek Watershed Management Plan 4-16
4.2.14 Rio Hondo Watershed Management Plan 4-16
4.2.15 Gateway Watershed Management Program 4-16
4.2.16 Los Angeles River Master Plan and Corridor Highlights 4-17
4.2.17 Los Angeles County Annual Hydrologic Reports 4-18
4.2.18 Los Angeles County Flood Control District and Los Angeles County Drainage Area Systems 4-18
4.2.19 Trash Best Management Practices 4-20
4.2.20 Los Angeles County Response to ADA 4-20

4.2.21 Los Angeles County Repetitive Loss Area Analysis 2025 4-21
4.3 Capability Assessment 4-21

Part 2 – Risk Assessment 4-1

5 Risk Assessment Methodology 5-1
5.1 Purpose of Risk Assessment 5-1
5.2 Risk Assessment Approach 5-2
5.2.1 FEMA's Hazus Software 5-2
5.2.2 Sources of Data Used in Hazus Modeling 5-3
5.2.3 Flood Depth Grid Generation 5-3
5.2.4 Mapping 5-4
5.2.5 Limitations 5-4
6 Los Angeles County Flood Hazard Profile 6-1
6.1 General Concepts 6-1
6.1.1 Measuring Floods and Floodplains 6-1
6.1.2 Effects of Human Activities 6-2
6.1.3 Floodplain Ecosystems 6-2
6.2 Flooding Types in Los Angeles County 6-2
6.2.1 FEMA Special Flood Hazard Areas 6-2
6.2.2 Flash Flooding 6-4
6.2.3 Non-SFHA Urban Drainage Flooding 6-4
6.2.4 Non-SFHA Coastal Flooding 6-5
6.2.5 Dam Failure 6-7
6.2.6 Levee Failure 6-14
6.2.7 Geologic Hazard Areas 6-19
6.3 Principal Flooding Sources in Los Angeles County 6-19
6.3.1 Watersheds 6-19
6.3.2 Climate Variations 6-22
6.3.3 Development Effects 6-22
6.4 Major Flood Events 6-22
6.4.1 March 2024 Storm Event 6-24
6.4.2 February 2024 Storm Events 6-24
6.4.3 August 2023 Storm Event 6-24
6.4.4 Winter Storms 2023 6-24
6.4.5 Tropical Storm Kay, September 2022 6-25
6.4.6 Summer 2017 Storm Event 6-25
6.4.7 2016-17 Storm Season 6-25
6.4.8 2015-16 Storm Season 6-25

6.4.9 October 2015 Antelope Valley Flood 6-26
6.4.10 2014 Hurricane Marie 6-26
6.4.11 2013-14 Storm Season 6-26
6.4.12 2009-2010 Storm Season 6-26
6.4.13 2004/5 Storm Season 6-28
6.4.14 1997-1998 El Niño 6-30
6.4.15 March 1995 Storm 6-30
6.4.16 1993 Storms 6-30
6.4.17 1992 Storms 6-31
6.4.18 1980 Storm 6-32
6.4.19 1977-1978 Winter Storms 6-33
6.4.20 Summer Storm 1969 6-33
6.4.21 February 1969 Storm 6-33
6.4.22 January 1969 Storm 6-34
6.4.23 Summer Storms, 1968 6-35
6.4.24 November 1967 Storm 6-35
6.4.25 1966 Storm 6-35
6.4.26 1965 November-December Storms 6-35
6.4.27 1965 August Storm 6-36
6.4.28 1961-62 Storm Season 6-36
6.4.29 1958 February Storm 6-36
6.4.30 December 1951-January 1952 Storms 6-37
6.4.31 1943 Storm 6-37
6.4.32 1938 Storm 6-37
6.4.33 1934 La Crescenta Mudflows 6-38
6.4.34 1927 Flood 6-38
6.4.35 1916 Flood 6-38
6.4.36 Flood of 1914 6-38
6.4.37 Dam Failures 6-39
6.5 Location 6-39
6.5.1 Mapped FEMA Flood Zones 6-39
6.5.2 County Floodways 6-40
6.5.3 Non-SFHA Urban Drainage Flood Areas 6-40
6.6 Frequency 6-45
6.7 Severity 6-45
6.7.1 Riverine Flooding 6-45
6.7.2 Coastal Flooding 6-54

6.8 Warning Time 6-56
6.9 Secondary Hazards 6-60
6.10 Future Trends 6-60
6.11 Scenario 6-61
6.12 Issues 6-62
7 Flood Hazard Exposure 7-1
7.1 Population 7-1
7.2 Property 7-7
7.2.1 Structures in the Floodplain 7-7
7.2.2 Land Use in the Floodplain 7-12
7.2.3 Exposed Value 7-14
7.3 Critical Facilities and Infrastructure 7-19
7.3.1 Hazardous Materials Facilities 7-24
7.3.2 Utilities and Infrastructure 7-24
7.4 Environment 7-25
7.4.1 The Riparian Environment 7-25
7.4.2 Significant Ecological Areas and Coastal Resource Areas 7-25
8 Flood Hazard Vulnerability 8-1
8.1 Population 8-1
8.1.1 Vulnerable Populations 8-1
8.1.2 Public Health and Safety 8-4
8.1.3 Impacts on People 8-5
8.2 Property 8-6
8.2.1 Loss Estimates 8-6
8.2.2 National Flood Insurance Program Statistics 8-6
8.3 Critical Facilities and Infrastructure 8-15
8.4 Environment 8-16
9 Climate Change Considerations for Floodplain Management 9-1
9.1 Climate Change Overview 9-1
9.2 How Climate Change Affects Floodplain Management 9-2
9.3 Current Global Indications of Climate Change 9-3
9.4 Projected Future Impacts 9-3
9.4.1 Global Projections 9-3
9.4.2 Projections for the County of Los Angeles 9-4
9.5 Responses to Climate Change 9-5
9.5.1 Mitigation and Adaptation 9-5
9.5.2 Future Modeling Efforts 9-6

9.5.3 Response to Climate Change in California 9-6
9.6 Potential Climate Change Impact on Flood Hazards 9-6
9.6.1 Coastal Erosion 9-6
9.6.2 Dam Failure 9-7
9.6.3 Flood 9-8
9.6.4 Storm Surge 9-9
9.6.5 Sea Level Rise 9-9

Part 3 – Mitigation Strategy 9-1
10 Guiding Principles, Goals and Objectives 10-1
10.1 Mission Statement 10-1
10.2 Goals 10-1
10.3 Objectives 10-1
11 Alternatives Analysis 11-1
11.1 Alternative Analysis 11-1
11.1.1 Alternatives to Mitigate the Flood Hazard 11-2
11.1.2 Alternatives to Mitigate the Dam Failure Hazard 11-4
11.1.3 Community Lifeline Framework 11-4
11.2 Selected Mitigation Actions 11-6
11.3 Status of Actions from Previous Plan 11-15
11.4 Benefit/Cost Analysis 11-15
11.5 Action Plan Prioritization 11-16
11.6 Analysis of Mitigation Actions 11-22

Part 4 – Plan Maintenance 11-1
12 Plan Adoption 12-1
13 Plan Maintenance Strategy 13-1
13.1 Implementing the Plan 13-1
13.2 Monitoring, Evaluating, and Updating the Plan 13-1
13.2.1 Floodplain Management Committee (Formerly Steering Committee) 13-1
13.2.2 Annual Progress Report 13-2
13.2.3 Plan Update 13-3
13.3 Maintaining Public Involvement 13-3
13.4 Incorporating the Plan Into Other Mechanisms 13-4
14 Program for Public Information 14-5
14.1 Step 1: The PPI Committee 14-5
14.2 Step 2: Assess the Community's Public Information Needs 14-6
14.2.1 Identify the Target Areas 14-6

14.2.2 Identify Target Audiences 14-8
14.2.3 Inventory of Other Public Information Efforts 14-9
14.3 Step 3: Formulate Messages 14-10
14.4 Step 4: Identify Outreach Projects to Convey the Messages 14-11
14.4.1 Flood Response Preparation 14-14
14.5 Step 5: Examine Other Public Information Initiatives 14-24
14.5.1 Website 14-24
14.6 Step 6: Prepare the PPI Document 14-25
14.7 Step 7: Implement, Monitor and Evaluate the PPI 14-25

References 14-26

APPENDIX A – CRS GUIDELINES FOR FLOOD PLANNING
APPENDIX B – FLOODPLAIN MANAGEMENT COMMITTEE GROUND RULES
APPENDIX C – PUBLIC OUTREACH MATERIALS
APPENDIX D – CRITICAL FACILITIES AND INFRASTRUCTURE MAPS
APPENDIX E – FEDERAL AND STATE AGENCIES, PROGRAMS, AND REGULATIONS
APPENDIX F – FEMA FLOOD ZONE AND CAPITAL FLOODPLAIN MAPS
APPENDIX G – DATA TABLES
APPENDIX H – EXAMPLE PROGRESS REPORT
APPENDIX I – REPETITIVE LOSS AREA ANALYSIS

FIGURES

Figure 2-1: Sample Page from Floodplain Management Plan Website 2-9
Figure 2-2: Sample Page from Survey 2-11
Figure 2-3: Post Card Mailing Advertising the Survey 2-12
Figure 2-4: Flyer Announcing Phase 1 Public Meeting for the Floodplain Management Plan 2-14
Figure 2-5: Printouts at Phase 1 Public Meeting 2-15
Figure 2-6: FMP Presentation at Malibou Lake Public Meeting Phase 1 July 18th 2024 2-15
Figure 2-7: Open House Activity at Public Meeting, ... 2-19
Figure 3-1: Planning Area 3-2
Figure 3-2: Los Angeles Plaza, 1858 3-3
Figure 3-3: Orange grove in the San Fernando Valley circa 1937 3-4
Figure 3-4: 1914 Los Angeles Flood 3-6
Figure 3-5: Topography of Los Angeles County 3-10

Figure 3-6: Hydrologic Groups of Los Angeles County....3-12
Figure 3-7: Major (HUC-8) Watersheds in Los Angeles County....3-24
Figure 3-8: Smaller (HUC-10) Watersheds in Los Angeles County....3-25
Figure 3-9: Santa Ana Winds....3-26
Figure 3-10: California and Los Angeles County Population Growth....3-32
Figure 3-11: Los Angeles County Age Distribution....3-33
Figure 3-12: Los Angeles County Race Distribution....3-35
Figure 3-13: Los Angeles County Ethnicity Distribution....3-36
Figure 3-14: Los Angeles County Language Spoken at Home....3-37
Figure 3-15: Industry in Los Angeles County....3-38
Figure 3-16: California and Los Angeles County Unemployment Rate....3-39
Figure 3-17: Occupations in Los Angeles County....3-40
Figure 4-1: Los Angeles County Significant Ecological Areas and Coastal Resource Areas....4-10
Figure 4-2: Alondra Park Multi-Benefit Stormwater Capture Project....4-12
Figure 4-3: Los Angeles County Flood Control District Area....4-19
Figure 6-1: Coastal Hazard Zones....6-4
Figure 6-2: Approved Dam Inundation Boundaries of Los Angeles County....6-13
Figure 6-3: Unincorporated Area Flood Control Levees in Los Angeles County; Santa Clarita Area....6-16
Figure 6-4: Unincorporated Area Flood Control Levees in Los Angeles County; Los Angeles Area....6-17
Figure 6-5: Unincorporated Area Flood Control Levees in Los Angeles County; East Los Angeles Area....6-18
Figure 6-6: Watersheds and Hazard Zones....6-20
Figure 6-7: Main Rivers and Streams in Los Angeles County....6-21
Figure 6-8: Northern Los Angeles County Flood-Prone Areas Outside SFHA (West)....6-41
Figure 6-9: Northern Los Angeles County Flood-Prone Areas Outside SFHA (East)....6-44
Figure 6-10: Wave Run-Up....6-55
Figure 6-11: Stream Gage Locations in Los Angeles County....6-59
Figure 6-12: Ballona Creek Hydrograph at Sawtelle Boulevard....6-60
Figure 7-1: Exposed Population in 10year floodplain....7-3
Figure 7-2: Exposed Population in 50year floodplain....7-4
Figure 7-3: Exposed Population in 100year floodplain....7-5
Figure 7-4: Exposed Population in 500year floodplain....7-6
Figure 7-5: Structures in 10year floodplain....7-8

Figure 7-6: Structures in 50year floodplain 7-9
Figure 7-7: Structures in 100year floodplain 7-10
Figure 7-8: Structures in 500year floodplain 7-11
Figure 7-9: Land Use 7-13
Figure 7-10: Value of Structures in 10year floodplain 7-15
Figure 7-11: Value of Structures in 50year floodplain 7-16
Figure 7-12: Value of Structures in 100year floodplain 7-17
Figure 7-13: Value of Structures in 500year floodplain 7-18
Figure 7-14: Critical Facilities in the 10year Floodplain 7-20
Figure 7-15: Critical Facilities in the 50year Floodplain 7-21
Figure 7-16: Critical Facilities in the 100year Floodplain 7-22
Figure 7-17: Critical Facilities in the 500year Floodplain 7-23
Figure 7-18: Significant Ecological Areas, Coastal Resource Areas & FEMA Flood Hazard Areas 7-27
Figure 8-1: Global Carbon Dioxide Concentrations Over Time (U.S. EPA) 8-3
Figure 8-2: Location of Flood-Insured Properties in Unincorporated Los Angeles County 8-12
Figure 8-3: Graph of Claims Paid Since 1978 8-13
Figure 9-1: Global Carbon Dioxide Concentrations Over Time (U.S. EPA) 9-2
Figure 11-1: Community Lifeline Framework 11-5
Figure 14-1: Los Angeles County Public Works Flood Information Website 14-13

TABLES

Table 2-1: Floodplain Management Committee 2-3
Table 2-2: Category Representation of Governmental Floodplain Management Committee Members 2-4
Table 2-3: Floodplain Management Plan Public Meetings 2-13
Table 2-4: Summary of Public Meetings 2-19
Table 2-5: Plan Development Milestones 2-20
Table 3-1: Soil Types in Los Angeles County 3-11
Table 3-2: NRCS Watersheds in Unincorporated Los Angeles County 3-13
Table 3-3: Major Improved Tributary Channels 3-22
Table 3-4: Average Los Angeles County Climate Data 3-27
Table 3-5: Land Use Distribution in Unincorporated Los Angeles County 3-28
Table 3-6: County of Los Angeles Critical Facilities 3-29

Table 4-1: Summary of Relevant Federal Agencies, Programs and Regulations 4-2
Table 4-2: Summary of Relevant State Agencies, Programs and Regulations 4-5
Table 4-3: Significant Ecological Areas and Coastal Resource Areas in Unincorporated Los Angeles County 4-9
Table 4-4: Los Angeles County Legal and Regulatory Capability 4-22
Table 4-5: Administrative and Technical Capability 4-24
Table 4-6: Fiscal Capability 4-25
Table 4-7: Community Classifications 4-26
Table 4-8: National Flood Insurance Program Compliance 4-26
Table 5-1: Hazus Model Data Documentation 5-3
Table 6-1: Significant and High Hazard Dams with Flood Hazard for Unincorporated Los Angeles County 6-10
Table 6-2: History of Los Angeles County Flood Events with Federal Disaster Declarations 6-23
Table 6-3: Summary of Peak Discharges in Unincorporated Los Angeles County 6-45
Table 6-4: Total Stillwater Elevations for Coastal Areas of Unincorporated Areas in Los Angeles County 6-56
Table 7-1: Present Land Use Within the Floodplain in Unincorporated Areas 7-12
Table 8-1: Estimated Flood Impact on Persons in Unincorporated Areas 8-6
Table 8-2: Flood Insurance Statistics for Los Angeles County 8-7
Table 8-3: Estimated Damage to Critical Facilities in Unincorporated Areas from 100-Year Flood 8-16
Table 8-4: Estimated Damage to Critical Facilities in Unincorporated Areas from 500-Year Flood 8-16
Table 8-5: Estimated Flood-Caused Debris in Unincorporated Areas 8-17
Table 9-1: Temperature Increases in the Los Angeles Region 9-4
Table 11-1: Alternatives to Mitigate the Flooding Hazard 11-2
Table 11-2: Alternatives to Mitigate the Dam Failure Hazard 11-4
Table 11-3: Action Plan- Flood Mitigation Actions 11-7
Table 11-4: Prioritization of Mitigation Actions 11-17
Table 11-5: Analysis of Mitigation Actions 11-22
Table 14-1: PPI Committee Members 14-6
Table 14-2: Public Information Efforts 14-9
Table 14-3: Priority Topics and Messages 14-11
Table 14-4: Outreach Projects 14-12
Table 14-5: PPI Implementation Plan 14-15

List of Abbreviations

Abbreviation	Term/Phrase/Name
ADA	Americans with Disabilities Act
BLS	Bureau of Labor Statistics
BRIC	Building Resilient Infrastructure and Communities
C	Communication
CEO OEM	Chief Executive Office/Office of Emergency Management
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CLOMR-F	Conditional Letters of Map Revision Based on Fill
CRA	Coastal Resource Area
CRS	Community Rating System
C-RU	Rural commercial
DEM	Digital Elevation Model
DR	Disaster Declarations
DRRA	Disaster Recovery Reform Act
DSOD	Division of Safety of Dams
E	Energy
EAP	Emergency Action Plan
EDD	Employment Development Department
EM	Emergency Management
EMA	Emergency Management Agency
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FAQs	Frequently Asked Questions
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMP	Floodplain Management Plan
FRP	Flood Response Preparations
FWS	Food, Water, Shelter

GHG	Greenhouse gas
GIS	Geographic Information System
Hazus	Hazards, United States-Muti Hazard
HM	Health & Medical
HUC	Hydrologic Unit Code
HZM	Hazardous Material
IBA	Important bird area
IPCC	Intergovernmental Panel on Climate Change
IRWM	Integrated Regional Water Management
LACDA	Los Angeles County Drainage Area
LACFCD	Los Angeles County Flood Control District
LCP	Local Coastal Program
LID	Low Impact Development
LiMWA	Limit of moderate wave action
LOMR-F	Letters of Map Revision Based on Fill
MPP	Map Production Pro
MS4	Municipal Separate Storm Sewer System
MXD-RU	Rural mixed use
NASA	National Aeronautics and Space Administration
NED	National Elevation Dataset
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NSI	Nationwide Structure Inventory
NWS	National Weather Service
PPI	Program for Public Information
SB	Senate Bill
SEA	Significant Ecological Area
SFHA	Special Flood Hazard Area
SR	State Route
SS	Safety & Security
T	Transportation
TWL	Total Stillwater Elevation

USACE	U.S. Army Corps of Engineers
USGCRP	U.S. Global Change Research Program
WFO	Weather forecast office
WRCC	Western Regional Climate Center

Executive Summary

WHY PLAN FOR FLOODING?

Despite the repeated drought conditions that impact Southern California on a regular basis, the potential for flooding that results in personal and economic losses remains an issue in Los Angeles County. Since 1974, communities in Los Angeles County have been affected by a total of 16 flood-related events for which federal disaster declarations were issued, and over 100 that caused damage though no federal declarations were made (FEMA, 2024a). The following are the most recent flood event occurrences as of February 2024:

- **February 2025 Storm Event**: Evacuation orders and warnings were in effect for some areas near recent wildfire burn scars. The region has been under severe drought conditions after a dry start to the wet season. After two seasons of above-average rainfall, a several month-long dry spells left hillsides covered in dry brush providing fuel for wildfires. The dry brush was burned in extensive wildfires throughout the county, leaving bare hillslopes. In a 48-hour period total rainfall across the Los Angeles Area ranged from 5.82in to 1.74in (NBC Los Angeles 2025). Street flooding and mudslides were reported across the region, which closed various roads. Mud flows and flash floods were reported in the Eaton fire burn area in Altadena.

- **March 2024 Storm Event:** A portion of Topanga Boulevard was shut down from March to June of 2024 due to unstable conditions caused by rainstorms and further expected rain (NBC Los Angeles, 2024). A flood advisory was issued for Central and Southern Los Angeles County March 30th, 2024, due to an atmospheric river. Total rainfall across the area ranged from 0.7 to 2.6 inches (Los Angeles County Public Works, 2024a).

- **February 2024 Storm Events**: From February 3rd to February 5th, 2024, an atmospheric river impacted California. On February 4th, 2024, Los Angeles County proclaimed a Local Emergency. Total rainfall accumulation in the area ranged from 4.2 to 13.7 inches (Los Angeles County Public Works, 2024b). The storm caused multiple mudslide events throughout Hollywood Hills leaving many stranded (Los Angeles Times, 2024). Another storm event occurred on February 18th, 2024, with rainfall totaling from 1.1 to 7.9 inches (Los Angeles County Public Works, 2024c).

- **August 2023 Storm Event:** On August 18th, 2023, the first-ever tropical storm watch for southern California was issued due to record precipitation and flooding from remnants of Hurricane Hilary (NOAA, 2023a). On August 20th, 2.48 inches of rain fell over a 24-hour period and a total of 2.99 inches of rain fell from August 20th to 21st (FEMA, 2024a).

- **Winter Storms 2023**: The winter of 2023 was a record year for precipitation. The county experienced three federal declaration flooding events within the span of three months. The first disaster was declared January 9th, 2023, and the second on January 14th. The incident period for these two events covered December 27th, 2022, to January 31st, 2023 (FEMA, 2024a). More than 1.5 inches of rain fell over a 24-hour period on January 14th, 2023, and a total of 7.3 inches fell

over the incident period (NOAA, 2023b). The third disaster declaration was declared on March 10th,2023, the incident period for this declaration covered March 9th, 2023, to July 10th, 2023 (FEMA, 2024a). On March 14th, 2023, 1.97 inches of rain fell , and a total of 7.65 inches of rain fell over the entirety of the incident period (NOAA, 2023b).

- **Tropical Storm Kay, September 2022**: On September 9th, 2022, Tropical Storm Kay impacted California (NHC, 2022). By September 13th, rainfall totaled up to 0.30 inches along the coast and in valleys and rainfall totals ranged from 0.10 to 1.30 inches in foothills and mountains (Los Angeles County Public Works, 2022a). A mudslide event in the Lake Hughes area stranded more than 50 people (ABC7, 2022).

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

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

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

WHAT IS A FLOODPLAIN MANAGEMENT PLAN?

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

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

The 2025 *Los Angeles County Comprehensive Floodplain Management* Plan identifies and prioritizes mitigation actions, chosen through a facilitated process that focused on meeting these objectives. A companion document prepared in conjunction with this plan, the Los Angeles County Repetitive Loss Area Analysis, provides a detailed assessment of areas in unincorporated Los Angeles County that have experienced repeated flood damage. This report includes recommended actions to mitigate flooding at each specific repetitive loss area. The Plan also includes an enhanced strategy for communicating flood risk to residents and property owners of Los Angeles County referred to as a "Program for Public Information."

An updated Program for Public Information is included in the 2025 Floodplain Management Plan. An updated Repetitive Loss Area Analysis is incorporated as a functional annex to the plan.

THE COMMUNITY RATING SYSTEM

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

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

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

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

CRS Class	CRS Credit Points	CRS Discount (Premium Reduction)
1	4,500+	45%
2	4,000-4,499	40%
3	3,500-3,999	35%
4	3,000-3,499	30%
5	2,500-2,999	25%
6	2,000-2,499	20%
7	1,500-1,999	15%
8	1,000-1,499	10%
9	500-999	5%
10	0-499	0

Source: FEMA, 2023a

Los Angeles County has participated in the CRS program since 1990. The County has a Class 6 rating. As a result, NFIP policy holders in unincorporated areas of Los Angeles County can receive a 20 percent discount on their NFIP flood insurance premium for residential and nonresidential structures in all flood zones. This equates to average savings of $190 per policy, for a total countywide premium savings of almost $149,029 (FEMA, 2023a). The floodplain management plan will help the County maximize its credit potential under the CRS.

PLAN DEVELOPMENT METHODOLOGY

The first priority for this plan is to benefit the residents and property owners of unincorporated Los Angeles County by providing protection against the hazard posed by potential flooding. In addition, the plan was developed under the CRS guidelines for a floodplain management plan. The community's process

for developing the plan must include at least one item from each of 10 steps. The organization of this document corresponds with these steps:

- Part 1—Planning Process and Project Background:
  - Step 1, Organize
  - Step 2, Involve the public
  - Step 3, Coordinate
- Part 2—Risk Assessment:
  - Step 4, Assess the hazard
  - Step 5, Assess the problem
- Part 3—Mitigation Strategy:
  - Step 6, Set goals
  - Step 7, Review possible activities
  - Step 8, Draft an action plan
- Part 4—Plan Maintenance:
  - Step 9, Adopt the plan
  - Step 10, Implement, evaluate and revise.

The following sections provide summaries of the planning process and recommendations of the 2025 *Los Angeles County Comprehensive Floodplain Management Plan* corresponding with the document organization presented above.

PLANNING PROCESS AND PROJECT BACKGROUND

A Floodplain Management Committee has been assembled to oversee the development of the plan. The Floodplain Management Committee met to provide guidance and oversight to a planning team consisting of County staff with the support of Burns & McDonnell Engineering Company, Inc. The planning team was responsible for the development of the plan. Coordination with regional, state and federal agencies involved in flood hazard mitigation occurred throughout the plan's development. A comprehensive review was completed of existing plans and programs that can support flood hazard mitigation.

The Floodplain Management Committee developed a public involvement strategy that was implemented by the planning team and included: a website (https://dpw.lacounty.gov/wmd/NFIP/FMP2025/), hazard mitigation survey, public meetings, social media posts and multiple media releases.

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

THE FLOOD HAZARD RISK ASSESSMENT

To assess the potential impact on the total population and more vulnerable segments of the population from flood hazard, FEMA's Hazards United States-Muti Hazard (Hazus) model was used to identify the areas of the floodplain for the 10-, 50-, 100- and 500-year storm events. The results of the Hazus model indicated the largest population exposures are in the more urbanized areas of the county within the Lower Los Angeles River and San Gabriel River Watersheds. These drainage areas have had the greatest investment in flood management infrastructure, including dams, levees, debris basins and channelization that have significantly reduced impacts to populations and property. These areas comprise a smaller portion of the total unincorporated county area. A greater percentage of the vulnerable portion of the total population was indicated in the sub-watersheds of the Antelope-Fremont Valleys Watershed.

The results of this exposure analysis for structures indicate the largest numbers are in the more urbanized areas which comprise the smaller areas of the unincorporated county. These highly urbanized portions of the unincorporated county are also where the most investment has been made to flood management infrastructure. The largest percentage of exposed structures in unincorporated areas is residential. In comparing the total number of structures in the unincorporated County (271,156) to the total number of exposed structures in the Hazus designated flood hazard zones, this percentage by flood event is as follows:

- 8.2% were in the 10-year flood zone
- 14.7% were in the 50-year flood zone
- 16.5% were in the 100-year flood zone
- 20.3% were in the 500-year flood zone

To further assess the exposure of flood hazards within the unincorporated county, the Hazus model was used to assess the potential impact on the community's economy based on flood losses to structures within the floodplain for the 10-, 50-, 100- and 500-year storm events. The percent replacement costs are a small portion of the total costs and range from 0.06% to 11.07%, and average 2.96% within the unincorporated county. These structures are predominantly residential. Impact to the economy would therefore be to community housing and potential temporary impact to loss or working days due to structural losses.

The findings of the assessment of critical facilities and infrastructure indicated that the majority of the exposed facilities within the floodplains consist of transportation related facilities that include bridges that span these floodplains. These structures are designed to function during flood events up to the design event. The next larger percentage of exposed critical facilities and infrastructure are food, water and sheltering. The watersheds with the most critical facilities include the Lower San Gabriel River, Lower Los Angeles River, San Jose Creek and Dominguez Channel. As previously discussed, these watersheds are heavily urbanized and have also received significant funding for the implementation of flood management infrastructure.

The findings of the assessment of economically disadvantaged populations indicated an estimated 5.0 percent of the people within the households in the census blocks that intersect the 100-year floodplain

are economically disadvantaged, defined as having household incomes of $30,000 or less. With regard to the assessment of older and younger population exposure to flood hazards, the results indicated an estimated 12.7 percent of the population in the census blocks that intersect the 100-year floodplain are over 64 years old. Greater than a third of the over-64 years old population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable. An estimated 23.2 percent of the population within census blocks located in or near that intersect the 100-year floodplain are under 18 years of age.

MITIGATION STRATEGY

Mitigation Mission Statement, Goals and Objectives

The Floodplain Management Committee identified a mission statement, goals and objectives

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

- Goals:

    - Enhance community resilience to the impacts of flood hazards while maximizing opportunities for local water supplies.
    - Communicate to residents and stakeholders what the flood risks are, based on best available data and science.
    - Increase resilience of infrastructure and critical facilities from flood hazards.
    - Account for flood risk in land use and planning.
    - Preserve, enhance or restore the natural environment's floodplain functions without increasing flood hazards.
    - Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.
- Objectives:

    1. Work cooperatively with other public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
    2. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
    3. Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
    4. Educate proponents of projects in known flood hazard areas about the potential flood risks and the need for mitigation measures to minimize flood risk
    5. Consider open space land uses within known flood hazard areas.
    6. Where feasible and cost effective, prioritize environmentally friendly natural systems including green infrastructure when reducing flood risk.

7. Encourage and support efforts to retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
8. Provide flood protection by maintaining flood control systems.
9. Implement flood response plan during and after a flood event.
10. Consider climate change in planning for flood and inundation hazards.
11. Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.

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

Mitigation Initiatives

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

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

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

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

Table ES- 2: Summary of Hazard Mitigation Initiatives

Action	Priority
1—Promote awareness of flood hazards to residents in flood hazard areas	High
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas.	High
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures.	High
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • Annually notify owners regarding local flood hazards and proper protection activities • Provide technical advice regarding flood protection and flood preparedness • Distribute a revised questionnaire to new Repetitive Loss Properties.	High
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials.	High
6—Provide public education about maintaining the stormwater system free of debris.	High
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness.	High
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA.	High
9—Provide emergency preparedness and flood protection information to the general public.	High
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.	High
11—Develop and maintain a list of priority maintenance-related problem sites	High
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites	High
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management.	High
14—Evaluate Los Angeles County Flood Control District (LACFCD) storm drain, open channel, and flood retention basin facilities for future improvements Drainage infrastructure outside of the LACFCD may be covered by the Road Maintenance Division where applicable.	High
15— Pursue appropriate flood hazard mitigation grant funding projects (i.e. Building Resilient Infrastructure and Communities (BRIC)) that use the Community Lifeline Framework, and address multiple hazards, where applicable.	High
16—Consider the conversion of high-risk properties into open space.	Medium
17—Refine the plan check system to track properties in the flood zone and address drainage.	Medium
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications	High
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit	High
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects, where appliable and funding is available.	High
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains.	Medium

Action	Priority
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits.	High
23—Maintain the Operational Area Emergency Response Plan.	High
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution.	High
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development.	High
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.	High
27—Use risked-based information from the Los Angeles County Comprehensive Floodplain Management Plan and the Los Angeles County Hazard Mitigation Plan to update the Safety Element of the County's General Plan.	High
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.	High
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program	High
30—Identify flood-warning systems for properties where such systems can be beneficially employed	Medium
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements	High
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties.	High
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions.	Medium
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities.	High
35—Continue County coordination with other agencies and stakeholders on issues of flood control.	Medium
36—Continue to identify and assess drainage needs.	High
37— Pursue Building Resilient Infrastructure and Communities (BRIC) program projects that use the Community Lifeline Framework.	Medium
38– Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties	High

Plan Maintenance

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

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

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

Part 1 – Planning Process and Project Background

1 Introduction

1.1 Background

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

Congress established the National Flood Insurance Program (NFIP) on August 1, 1968, with the passage of the National Flood Insurance Act (NFIA) of 1968, which has been modified over the years. The NFIP establishes an agreement between local communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risks, then the federal government will make flood insurance available within the community as a financial protection against flood losses. The NFIP is administered by the Federal Emergency Management Agency (FEMA). All communities that participate in the NFIP must adopt and enforce minimum standards for managing construction and development in designated "special flood hazard areas." Communities that achieve a higher level of safety and protection than provided by the minimum standards can participate in the NFIP's Community Rating System (CRS) to obtain discounts on flood insurance premiums. In 2023, FEMA fully implemented the NFIP pricing approach, Risk Rating 2.0 which applies the CRS discount uniformly to all policies throughout the community regardless of whether the structure is located inside the Special Flood Hazard Area (SFHA). Additionally, the Risk Rating 2.0 method for calculating NFIP flood insurance premiums accounts for individual property's actual flood risk and cost to rebuild by considering additional flood risk variables such as flood frequency, river overflow, storm surcharge, coastal erosion, heavy rainfall, distance to a water source, property and structure attributes, and cost to reconstruct (Los Angeles County Public Works, 2024d).

1.2 Purpose

Los Angeles County participates in both the NFIP and the CRS on behalf of the communities of unincorporated Los Angeles County. *The 2025 Los Angeles County Comprehensive Floodplain Management Plan (FMP)* is an important part of the County's participation in those programs. Developing a comprehensive floodplain management plan is among the activities that earn CRS credits toward reduced flood insurance rates. This floodplain management plan was developed to meet the following objectives:

- Comply with local, state and federal requirements for floodplain management planning.
- Meet requirements allowing Los Angeles County to maintain its CRS classification for unincorporated Los Angeles County.

- Coordinate existing plans and programs so that high-priority actions and projects to mitigate possible disaster impacts are funded and implemented.
- Create a linkage between the floodplain management plan and established plans of Los Angeles County so that they can work together in achieving successful mitigation.

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

1.3 Previous Floodplain Management Plans

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

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

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

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

The 2020 *Los Angeles County Comprehensive Floodplain Management Plan* and accompanying *Repetitive Loss Area Analysis* represented the 5-year update to the 2016 documents and were adopted by the Board of Supervisors on June 15th, 2021. This 2025 *Los Angeles County Comprehensive Floodplain Management*

Plan and accompanying *Repetitive Loss Area* Analysis represent the 5-year update to the 2020 documents, as required under Activity 510 of the CRS program.

1.4 CRS Steps for Floodplain Management Planning

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

- Planning process steps:
  - Step 1: Organize
  - Step 2: Involve the public
  - Step 3: Coordinate
- Risk assessment steps:
  - Step 4: Assess the hazard
  - Step 5: Assess the problem
- Mitigation strategy steps:
  - Step 6: Set goals
  - Step 7: Review possible activities
  - Step 8: Draft an action plan
- Plan maintenance steps:
  - Step 9: Adopt the Plan
  - Step 10: Implement, evaluate and revise

2 Plan Development Methodology

The process followed to develop the 2025 *Los Angeles County Comprehensive Floodplain Management Plan* had the following primary objectives:

- Define the planning area
- Establish a Floodplain Management Committee
- Coordinate with other agencies
- Review existing programs
- Engage the public in development of the floodplain management plan.

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

2.1 Formation of the Planning Team

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

- Anjero Asprer, PE, Associate Civil Engineer
- William Saunders, PE, Civil Engineer
- Patricia Wood, PE, Senior Civil Engineer
- Michael Chen, Principal Civil Engineering Assistant
- Thu Win, Principal Civil Engineering Assistant
- Aaron Christensen, PE, PG, ENV SP, Burns & McDonnell Program Manager
- David Pohl, Ph.D., PE, Burns & McDonnell Technical Project Manager
- Makenna Hobson, ENV SP, Burns & McDonnell Assistant Project Manager
- Stephaine Pavón, MIG, Public Strategic Planner
- Esmeralda García, MIG, Principal/ Equity Studio Co-Director
- Courtney Semlow, PE, CFM, ENV SP, Craftwater, Civil Design Manager
- Parth Shah, Craftwater, Water Resource Engineer

2.2 Defining the Planning Area

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

2.3 The Floodplain Management Committee

A Floodplain Management Committee was formed to oversee all phases of the planning effort and provide guidance and oversight to a planning team consisting of County staff with the support of Burns & McDonnell Engineering Company, Inc. The members of this committee included key Los Angeles County staff, residents, and other stakeholders from within the planning area. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. Table 2-1 lists the 20-member Floodplain Management Committee organized for this plan update effort.

Table 2-1: Floodplain Management Committee

Name	Department/Agency	Governmental[1]	Non-Governmental[2]
Patricia Wood	Public Works Stormwater Engineering - CRS Coordinator	X	
Loni Eazell	Public Works Emergency Management Group	X	
Tera Haramoto	Public Works Building & Safety	X	
Eden Berhan	Public Works Stormwater Maintenance	X	
Kari Eskridge, Lisette Guzman	Public Works Community Government Relations Group	X	
Marcela Benavides	Public Works Stormwater Planning	X	
Martin Araiza	Public Works Stormwater Engineering – Hydrology & Hydraulics	X	
Gina Natoli	Los Angeles County Regional Planning	X	
Mark Martinez	Los Angeles County Fire Department	X	
Samson Wong	City of Los Angeles Bureau of Engineering		X
Dorothy Wong	Altadena Town Council		X
Shannon Ggem	Malibou Lake Mountain Club		X
John Blalock	Antelope Valley Resident		X
Mark Caddick	Antelope Valley Resident, Acton		X
Erica Frausto-Aguado	Red Cross of Greater Los Angeles		X
Salomon Miranda	California Department of Water Resources		X
Dr. Stephen LaDochy	Cal State Los Angeles Geography, Geology & Environment		X
Debbie Sharpton	Environmental Restoration Group		X
Kevin Gaston	TreePeople Land Trust		X

1. "Governmental" refers to representatives of Los Angeles County government associated with County permit authority, who are responsible for the development and enforcement of County plans, programs, codes and standards.
2. "Non-governmental" refers to any stakeholder not affiliated with the permit authority of Los Angeles County who could have a stake in the outcome and directives of this plan.

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

Leadership roles and ground rules will be established during the Floodplain Management Committee's initial meeting. Appendix B will include the ground rules established by the Floodplain Management

Committee and a full list of members, including designated alternates. The Floodplain Management Committee met five times throughout the course of the plan's development. The planning team will facilitate each Floodplain Management Committee meeting, which will address a set of objectives based on an established work plan. Meeting agendas, notes and attendance logs will be provided in Appendix C. All Floodplain Management Committee meetings will be open to the public and advertised as such on Public Works' Floodplain Management Plan website. Agendas and meeting notes will be posted on the website.

Table 2-2: Category Representation of Governmental Floodplain Management Committee Members

Name	Preventive Measures	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information
Patricia Wood	X				X	
Loni Eazell				X		
Tera Haramoto	X	X				
Eden Berhan	X				X	
Gina Natoli	X		X			
Mark Martinez				X		
Kari Eskridge						X
Lisette Guzman						X
Marcela Benavides	X				X	
Martin Araiza					X	

2.4 Coordination with Other Agencies

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

2.4.1 Agency Participants

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

- California State Department of Water Resources
- California Office of Emergency Services
- FEMA Region IX
- Environmental Restorations Group
- Floodplain Management Association
- Los Angeles County Department of Regional Planning
- Los Angeles County Public Works:

  - Building & Safety Division
  - Stormwater Planning Division
  - Community Government Relations Group
  - Stormwater maintenance Division
  - Disaster Services Group
  - Stormwater Engineering Division
- County of Los Angeles Chief Executive Office, Office of Emergency Management
- Los Angeles County Fire Department
- Los Angeles County Community Emergency Response Team
- Los Angeles County Chamber of Commerce
- California State University, Los Angeles
- Altadena Town Council
- Mountains Restoration Trust
- Malibou Lake Mountain Club
- City of Los Angeles Bureau of Engineering
- Red Cross of Greater Los Angeles
- U.S. Army Corps of Engineers, Los Angeles District

2.4.2 Agency Notifications

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

- Acton Town Council
- Agua Dulce Town Council
- Ana Verde Hills Town Council
- Antelope Acres Town Council
- Association of Rural Town Councils
- Castaic Town Council
- City of Agoura Hills
- City of Arcadia
- City of Azusa
- City of Bradbury
- City of Calabasas
- City of Carson
- City of Claremont
- City of Compton
- City of El Monte
- City of El Segundo
- City of Gardena
- City of Glendale
- City of Glendora
- City of Harbor City
- City of Hawthorne
- City of Hidden Hills
- City of Industry
- City of Inglewood
- City of La Canada Flintridge
- City of La Habra Heights
- City of La Mirada
- City of La Puente
- City of La Verne
- City of Lancaster
- City of Lawndale
- City of Long Beach
- City of Malibu
- City of Monrovia
- City of Montebello
- City of Monterey Park
- City of Palmdale
- City of Pasadena
- City of Pomona
- City of Rancho Palos Verdes
- City of Rolling Hills Estates
- City of San Dimas
- City of San Marino
- City of San Pedro
- City of Santa Clarita
- City of Sierra Madre
- City of Temple City
- City of Torrance
- City of Walnut
- City of West Covina
- City of Westlake Village
- City of Whittier
- Crescenta Valley Town Council
- Fairmont Town Council
- Green Valley Town Council
- Insurance Services Office (ISO)-ISO/CRS Specialist
- Juniper Hills Town Council
- Kern County
- Lake Los Angeles Town Council
- Lakes Town Council
- Leona Valley Town Council
- Littlerock Town Council
- Monrovia/Arcadia/Duarte Town Council
- Mount Baldy Town Council
- Orange County Public Works
- Oso Town Council
- Pearblossom Rural Town Council
- Quartz Hill Town Council
- Roosevelt Town Council
- San Bernardino County Flood Control District
- San Gabriel Council of Governments
- Southern California Association of Governments
- Sun Village Town Council
- Three Points/Liebre Mountain Town Council
- Topanga Town Council
- Ventura County Watershed Protection District

2.4.3 Pre-Adoption Review

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

2.5 Review of Existing Programs

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

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

As part of this step, Floodplain Management Committee members were asked to provide feedback to the planning team on their opinion of the strength and weaknesses of the County's current capabilities in managing floodplains.

2.6 Public Involvement

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

2.6.1 Strategy

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

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

Stakeholders and the Floodplain Management Committee

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

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

CRS Step 2 awards credit for a planning process conducted through a committee that includes members of the public and/or non-governmental stakeholders. The 20-member Floodplain Management Committee includes 10 non-governmental stakeholders (50 percent).

Floodplain Management Plan Website

At the beginning of the development of the current plan, a floodplain management plan page was developed on Los Angeles County Public Work's website to keep the public informed about planning activities and to solicit input (see Figure 2-1). The site's address (https://www.dpw.lacounty.gov/Wmd/NFIP/FMP2025/) was publicized in all social media releases, mailings and public meetings. The site provided the public with information on the plan development process, the Floodplain Management Committee, a project survey, and drafts of the plan. Los Angeles County Public Works will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates.



Figure 2-1: Sample Page from Floodplain Management Plan Website

Survey

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

Multiple methods were used to solicit survey responses:

- A web-based version of the survey was made available on the plan website.
- Mailings to residents and property owners notifying them of public meetings included links to the online survey (see Figure 2-3).
- All attendees at public meetings were asked to complete a survey, using the web site or hard copies of the survey form available at the meetings.
- A flyer was prepared advertising the survey.
- E-mail was sent from Public Works to several of the town councils.
- Individual Floodplain Management Committee members contacted organizations to request that they publicize the link to the online survey.

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

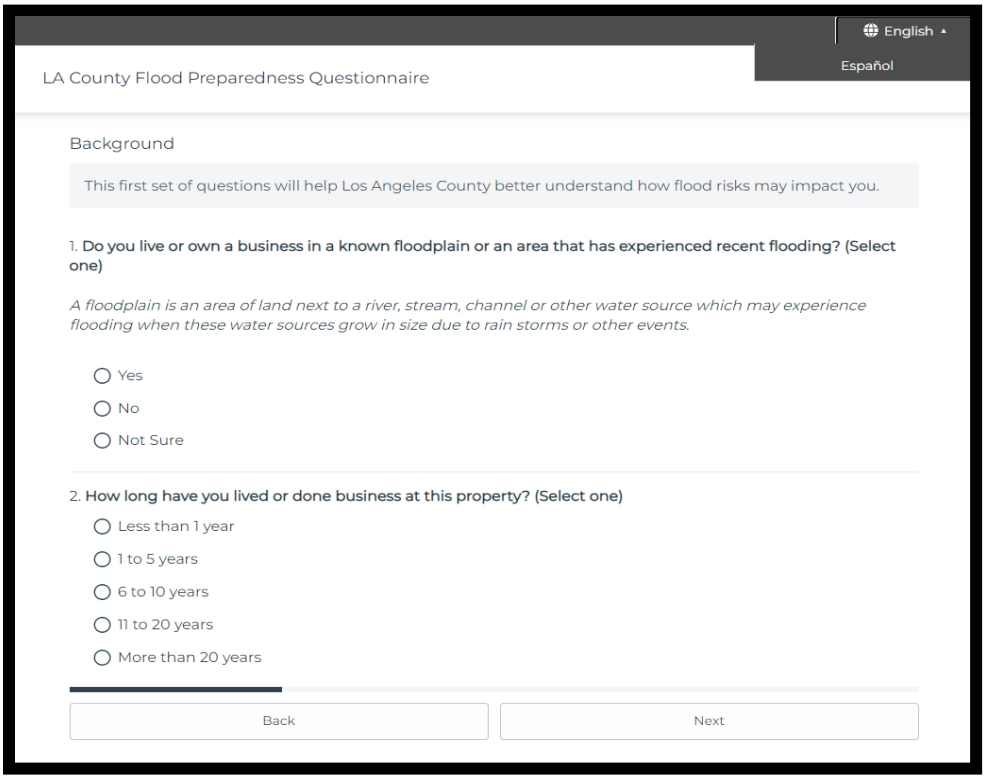


Figure 2-2: Sample Page from Survey



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U.S. POSTAGE
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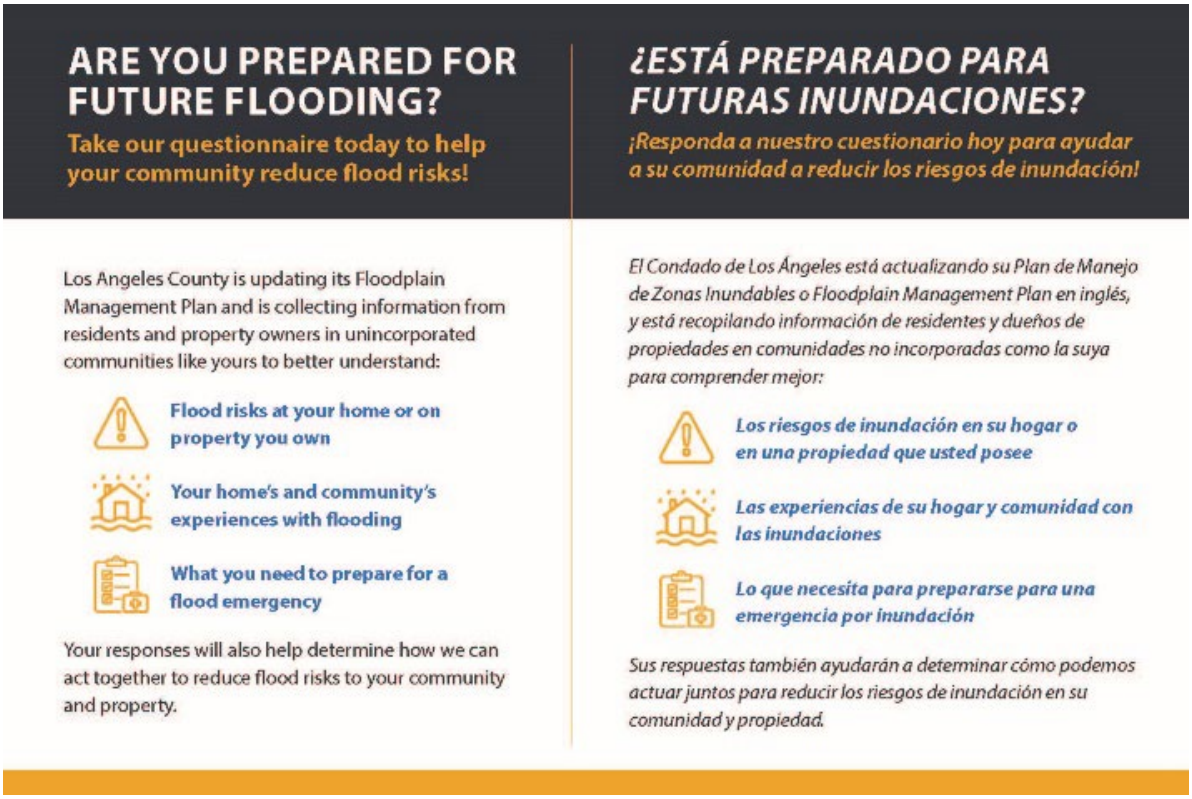


Figure 2-3: Post Card Mailing Advertising the Survey

Public Meetings

Meaningful public participation was essential for the planning process. The first public meeting was held in partnership with a local resident association in Malibou Lake during the planning phase to share information about the Floodplain Management Plan update and how residents can mitigate flood risk at their properties. Community members were also asked to share their thoughts about local flood hazards, programs and any questions they had about the plan and process.

The second public meeting was held during the public review period for the updated Floodplain Management Plan at the Quartz Hill Library. The public meeting included a presentation of the Updated Floodplain Management Plan and Repetitive Loss Area Analysis and how the public can access the plans for review and how to post comments. Following the presentation, the floor was open to community members' questions and comments. Information about the public meetings are summarized in Table 2-3.

Table 2-3: Floodplain Management Plan Public Meetings

When	Where
July 18th 2024 6:00-8:00pm	Malibou Lake Mountain Club 29033 Lake Vista Drive Agoura, CA 91301
April 3rd 2025 6:00-8:00pm	Quartz Hill Library 5040 West Ave M-2, Quartz Hill, CA 93536

Meeting Notification

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

- Notice of public meetings were posted on the floodplain management plan website.
- Flyers were developed and distributed throughout the communities (see Figure 2-4).
- Flyers were made available on the Floodplain Management Website and through various social media outlets.
- Notifications were also sent to the contact list of local governments and agencies and repetitive loss properties within the Malibou Lake area for the first public meeting and for Quartz Hill and the Antelope Valley area for the second public meeting.

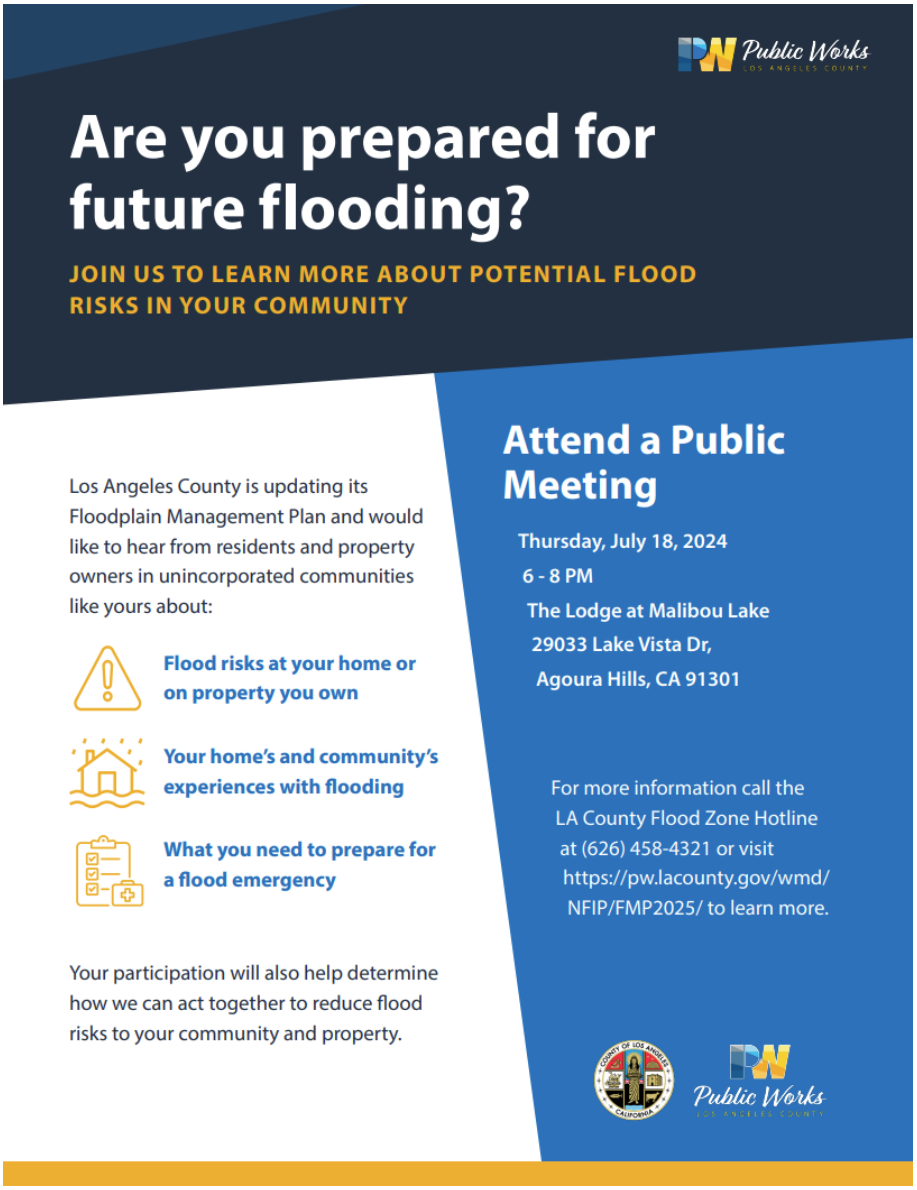


Figure 2-4: Flyer Announcing Phase 1 Public Meeting for the Floodplain Management Plan

Public Meeting During Planning Stage

At the first public meeting (open house) held at the Malibou Lake community, attendees examined maps and handouts and held direct conversations with project staff about their flood risks and past experiences with flood hazards at their properties.. The project team introduced the goals for the Floodplain Management Plan update, and discussed and displayed information generated for the risk assessment via community maps, shared with attendees via a PowerPoint presentation. Computer mapping workstations loaded with the FEMA and Los Angeles County Flood Maps were set up to allow attendees to access information on potential floodhazards on their property. Planning team members were present to answer questions. Attendees were asked to complete a survey, and each was given an opportunity to provide written comments to the Floodplain Management Committee. Example meeting activities are shown in Figure 2-5 and Figure 2-6.

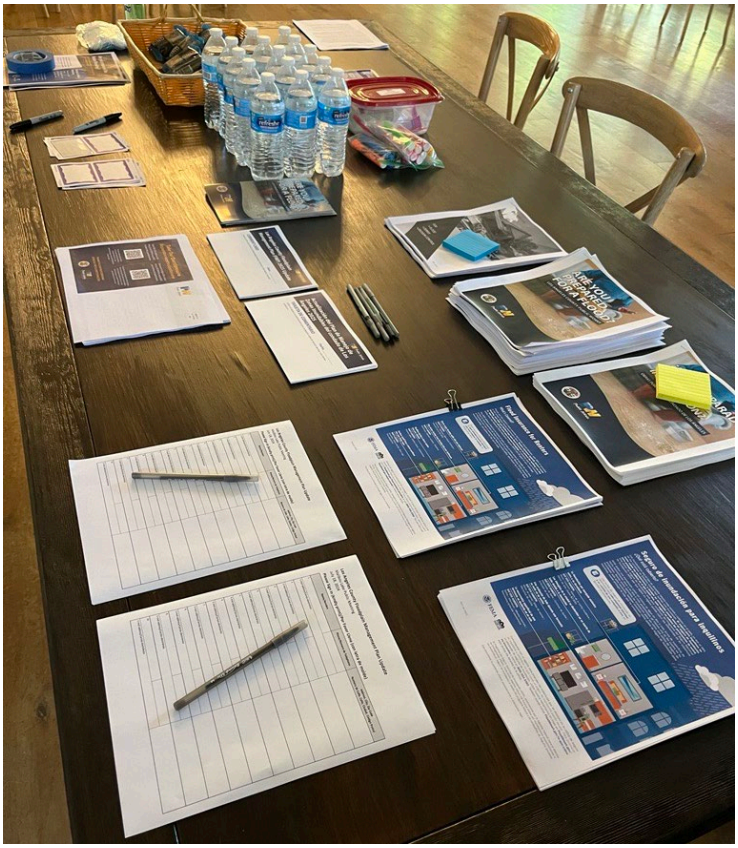


Figure 2-5: Printouts at Phase 1 Public Meeting



Figure 2-6: FMP Presentation at Malibou Lake Public Meeting Phase 1 July 18th 2024

Public Meeting During Public Review Period for the Draft Plan

At the second public meeting at the Quartz Hill Library on April 3, 2025, the focus of the presentation was the Draft Updated Floodplain Management Plan and Repetitive Loss Area Analysis and how the public can access the plans for review and how to post comments. This public meeting took place during the public review period for the Draft Floodplain Management Plan. Following the presentation, the floor was open to community members' questions and comments. Questions included how to obtain information on local flood maps and measures that private residents can take to mitigate impacts from flooding. Community members were provided with information and hands-on tutorials on how to access information on flood preparedness; local flood maps and measures that private residence can take to reduce impacts from flooding were provided to attendees. Hard copies of pamphlets and guides on flood preparedness and mitigation measures were also made available. The second public meeting was held during the public review period for the updated Floodplain Management Plan at the Quartz Hill Library. The public meeting included a presentation of the Floodplain Management Plan and Repetitive Loss Area Analysis and how the public can access the plans for review and how to post comments. Information and hands-on tutorials on how to access information on flood preparedness, local flood maps and measures that private residence can take to reduce impacts from flooding were provided to attendees. Hard copies of pamphlets and guides on flood preparedness and mitigation measures were also made available.



Figure 2-7: Presentation on FMP to Community Members



Figure 2-8: Los Angeles County Public Works Providing Information on Local Flood Hazards and Answering Questions from Community Members

2.6.2 Public Involvement Results

Survey Results

The County received 109 responses. 44 of these responses were complete (responded to all questions), 65 were partially complete (responded to some questions) and none were disqualified. The following percentages were rounded to the nearest whole number. Detailed results for the survey are provided in Appendix C.

Key results are as follows:

- Nearly half of respondents said their home or business is not located in a floodplain or experienced recent flooding; 36 percent said it is; 15 percent said they are not sure.
- Over half of respondents said they do not have flood insurance; 35 percent said they do; over 11 percent said they are not sure.
- The top responses for why those without flood insurance don't have it are that they feel they don't need it (property never flooded, located on high ground, or not in a flood zone, renting), they feel it is not worth it (too expensive, does not provide enough coverage), or they don't know about it (unsure if they qualify or if their other insurance covers it).
- 40 percent of the respondents said that the presence of a flood hazard at their current home was not disclosed to them prior to purchasing or moving into the property. 44 percent said such disclosure would have influenced their decision to buy or rent a home.
- The following flood hazards were identified as greatest issues of concern based on a scale of 1 (not concerned) to 5 (extremely concerned):

  - Post-fire mud/debris flow (weighted score of 3.05)
  - Detours caused by flooding of roads (weighted score of 2.98)
  - Failure of infrastructure (such as water/sewer main pipes, water storage tanks) (weighted score of 2.98)
  - Mud-flow hazards (weighted score of 2.95)
  - Climate change impacts (weighted score of 2.84)
  - Urban stormwater flooding/Drainage issues (weighted score of 2.78)
  - River/stream/channel overflow (weighted score of 2.62)
- 65 percent of respondents said they are at least adequately prepared for a flood event; 45 percent indicated feeling somewhat prepared or not at all prepared.
- About 28 percent of residents neither agree nor disagree that flood hazard and risk information is easy to find; 28 percent of residents somewhat agreed, 23 percent somewhat disagreed, 15 percent strongly agreed and 8 percent strongly disagreed.
- Respondents chose the following as the most effective means for providing general flood hazard and disaster information:
  - Internet (55 percent)
  - Community Events (38 percent)
  - Public awareness campaign, e.g., flood awareness week, winter storm preparedness month (38 percent)
  - Social media, such as X, Nextdoor or Facebook (38 percent).
  - Fire Department/ Rescue (30 percent)
  - Informational Brochures (25 percent)
  - Word of mouth (25 percent)
  - Local Government Newsletters (23 percent)
  - TV News (23 percent)
- Respondents' top preferred methods for receiving emergency notifications are text messages (73 percent), cell or mobile phone call (65 percent) , and email (50 percent).
- 73 percent of respondents agree or strongly agree that local, state and federal government should provide programs promoting resident action to reduce exposure to flood risks.
- Respondents ranked (1 for low priority and 3 for high priority) government-sponsored flood damage reduction projects in the following order of preference:
  - Retrofitting infrastructure (improving culverts, bridges, and local drainage) (weighted sore of 2.42)
  - Capital projects (dams, levees, flood walls, and drainage improvements) (weighted score of 2.41)
  - Projects that will mitigate future flood impacts caused by climate change (weighted score of 2.24)
  - Assisting vulnerable property owners with securing mitigation funding (weighted score of 2.19)
  - Providing better flood risk information to the public (weighted score of 2.11)
  - Strengthening codes and regulations to higher regulatory standards (weighted score of 1.94)

  - Acquiring vulnerable properties, removing any properties and maintaining them as open space (weighted score of 1.85)
- 20 percent of respondents stated they would not be willing to spend any money to retrofit their property to reduce flood risks, additionally, 17 percent stated they would only be willing to spend less than $1000. The respondents stated the following incentives would encourage spending money on retrofits:
  - Grant funding (55 percent)
  - Insurance premium discount (50 percent)
  - Mortgage discount (43 percent)
- 69 percent of respondents support the preservation of natural land containing a flood hazard and 17 percent of them support it only for properties other than their own.

Open House Public Meeting Attendance

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

Table 2-4: Summary of Public Meetings

Date	Location	Number of Attendees	Number of Surveys or Comments Received
July 18th 2024 6:00-8:00pm	Malibou Lake Mountain Club 29033 Lake Vista Drive Agoura, CA 91301	4	2
April 3rd 2025 6:00-8:00pm	Quartz Hill Library 5040 West Ave M-2, Quartz Hill, CA 93536	2	N/A Survey period ended in December 2024

2.7 Program for Public Information

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

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

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

2.8 Floodplain Management Plan Development – Chronology/Milestones

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

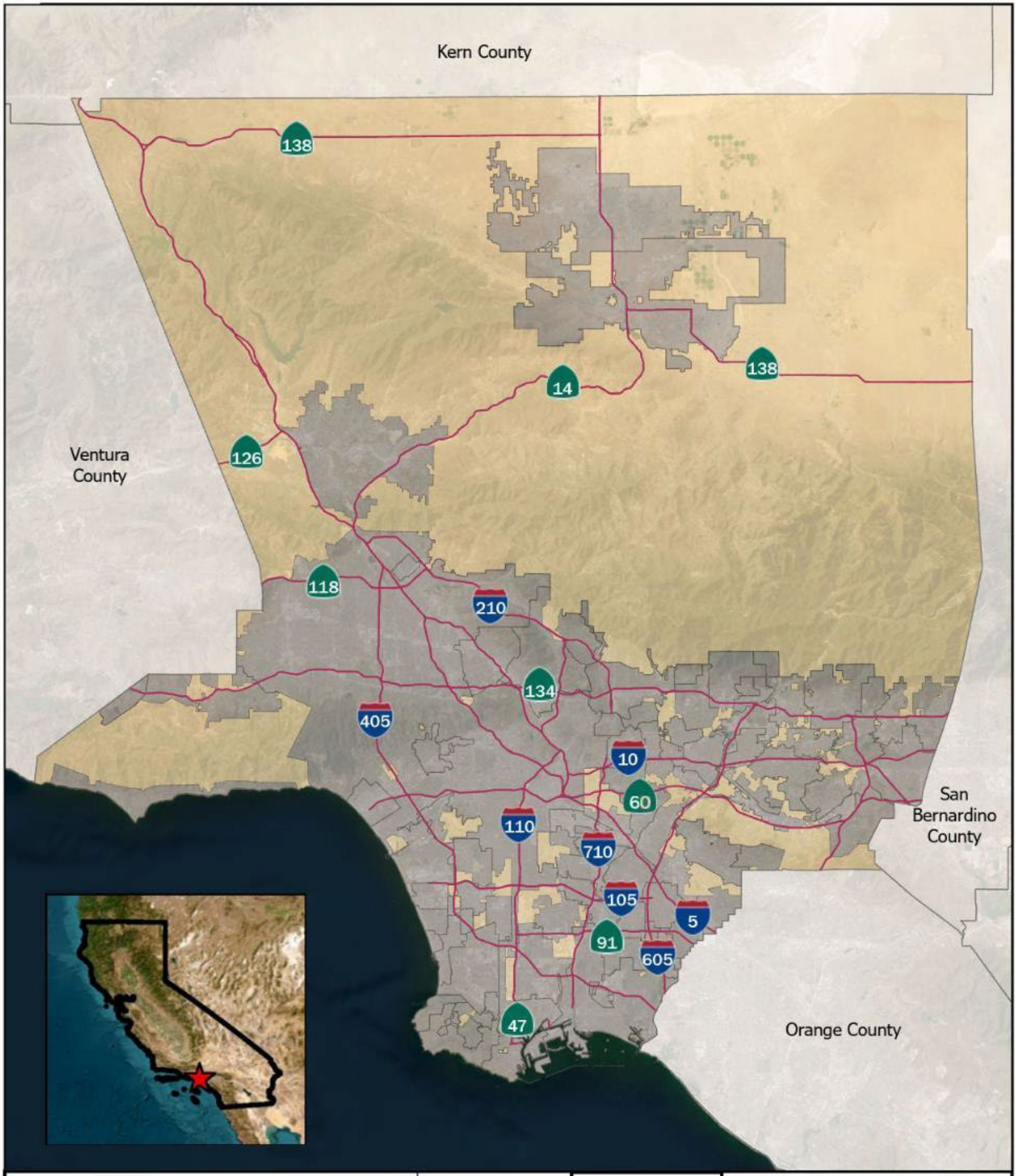
Table 2-5: Plan Development Milestones

Date	Event	Description	Attendance
2024			
May 28th	Floodplain Management Committee Meeting #1	• Introductions • Overview of FMP with timeline and milestones • Purpose, role & expectations of Floodplain Management Committee • Discuss and update current mission statement, goals, and objectives • Floodplain Management Committee input and comments • Public outreach – Questionnaire/survey and dissemination • Next Floodplain Management Committee meeting – FMP Part 1 Draft • Summary of action items and steps forward	33
June 18th	Public Outreach Strategy	• Survey Questionnaire Posted • Responses requested by December 20th – 6 months	N/A
Aug. 12th	Public Outreach Strategy	• First Notification Letter to RLPs and Agencies/Organizations on RLAA Update • Survey notice precedes this notification	N/A
July 18th	Public Outreach Strategy	• Phase 1 – Public Meetings – Malibou Lake Community Public Meeting held on July 18th.	4
July 24th	Floodplain Management Committee Meeting #2	• FMP Part 1 & RLAA Part 1 Draft Sent to Floodplain Management Committee • Repetitive Loss Area Analysis Overview • Comments on FMP Part 1 Draft and RLAA Part 1 Draft • Public outreach strategy – Planned Public Meetings Phase 1 • Define critical facilities/infrastructure	23
August 21st	PPI Committee Meeting #1	• Previous PPI & Potential Revisions • Planned Public Meetings & Outreach Activities – Phase 1	9
Oct. 1	Floodplain Management Committee Meeting #3	• RLAA Part 2 Draft to Floodplain Management Committee sent by August 8th and FMP Part 2 Draft to Floodplain Management Committees sent by Sept. 16th. • Repetitive Loss Area Analysis Results • Review comments on RLAA Part 2 Draft and FMP Part 2 Draft • Debrief on Public Meetings held and Survey participation	21

Date	Event	Description	Attendance
Sept. 17th	PPI Committee Meeting #2	• Previous PPI & Potential Revisions Tech Memo Review Comments • Debrief on Public Meetings completed Phase 1 & Survey Participation	11
Nov. 12th	Floodplain Management Committee Meeting #4	• FMP Report Part 3 Draft & RLAA Part 3 Draft Sent to Floodplain Management Committee by October 24th • Review comments on FMP Part 3 Draft & RLAA Part 3 Draft • Debrief on Phase 1 Public Meetings and Survey Results • Plan for Public Meetings – Phase 2	24
Nov. 19th	PPI Committee Meeting #3	• Updates to PPI Tech Memo Review Comments • Debrief on Phase 1 Public Meetings and Survey Results • Planned for Public Meetings – Phase 2	8
Dec. 12th	Public Outreach Strategy	• Second Notification & Final Letter to RLPs and Agencies/Organizations on Draft Final RLAA Update for Review – Submit Draft Final RLAA for Public Review	N/A
Dec. 16th, 2024-Jan 31st, 2025	Public Outreach Strategy	• 45 Day Public Review (RLPs & Agencies Distribution) of final Draft RLAA Update – Submit Draft Final RLAA for Public Review by Dec. 17, 2024	N/A
2025			
Jan 6th -16th	PPI Committee Meeting #4	• Submit PPI Draft by Dec 12th , 2024 for PPI Committee Review • Review Comments on Draft PPI for Part 4 of FMP • Public Meetings – Phase 2	8
Feb 25th	Floodplain Management Committee Meeting #5	• Submit FMP Part 4 Draft to Floodplain Management Committee by Feb. 4, 2025 • Review Comments on Draft FMP Part 4 • Public Meetings – Phase 2	15
April 3rd	Public Outreach Strategy	• Phase 2 – Public Meeting –Antelope Valley	2
Mar. 17th to April 30th	Public Outreach Strategy	• 45 Day Public Review of Draft Final FMP Report – Draft Final FMP Report all Parts submitted by Mar. 17th	N/A
May 10st – July 10st	Plan Review	• Review of Final Draft - FEMA, DWR, CalOES	N/A
2025-2026			
July 28th , 2025 – Jan 22nd, 2026	Plan Review	• Review and approval of FMP by Board of Supervisors	N/A
Feb 12, 2026	Plan Approval		N/A

3 Los Angeles County Profile

Los Angeles County, on the southwest coast of California, is the most populous county in California and the United States, with a 2022 estimated population of 9.72 million (24.9 percent of the total population of California and 2.9 percent of the total population of the United States) (U.S. Census, 2022a). It is the state's 11th largest county by area, at 4,083 square miles. There are 88 cities in the county; the City of Los Angeles is the largest and is the county seat. The unincorporated portions of the County, which are the planning area for this floodplain management plan, cover 2,600 square miles and is home to over 1 million people in over 120 unincorporated communities. Figure 3-1 shows the county location and main features.



BURNS McDONNELL

Los Angeles County Floodplain Management Plan

Figure 3-1: Planning Area

Source: County of Los Angeles, 2023

Issued: 1/25/2024

3.1 Historical Overview

The following history is summarized from historical information provided on the Los Angeles County website (Los Angeles County, 2014).

3.1.1 County Inception

Los Angeles County was one of California's original 27 counties established in 1850. Originally it was 4,340 square miles along the coast between Santa Barbara and San Diego. The county later grew to 34,520 square miles, extending east to the Colorado River. The County was subsequently divided up three times: Kern County received a large slice in 1851; San Bernardino County split off in 1853; and Orange County was established in 1889. Today, with 4,083 square miles, it is significantly smaller than its original size.



Figure 3-2: Los Angeles Plaza, 1858

The area covered by present-day Los Angeles County was settled by Native Americans for centuries before the first European contact in 1769. In the 1780s, a group of families from Mexico established a new settlement named El Pueblo de la Reyna de Los Angeles (The Town of the Queen of the Angels). Over time, the area became known as the Ciudad de Los Angeles (City of Angels), which was the largest town in Southern California by the 1840s, when the area came under U.S. control through treaties with Mexico. On February 18, 1850, the County of Los Angeles was established, and the City of Los Angeles was named the county seat. Today, the El Pueblo de Los Angeles Historical Monument, also known as the Los Angeles Plaza Historic District, commemorates the founding of the city. Figure 3-2 shows a view of the Los Angeles Plaza in 1858 (City of Los Angeles, 2024). After the Civil War, there was a large immigration into the Los Angeles area from Europe, Asia, and Central and South America, as well as the eastern United States. The Southern Pacific Railroad completed its Los Angeles route in 1880, followed by the Santa Fe Railroad six years later. The railroads set forth a long-term plan for growth. Southern California citrus farming, tourism and the building of towns were promoted to attract investors, and to increase the value of railroad shipments. The Los Angeles County population increased from about 33,000 in 1880 to about 101,000 in 1890 (Los Angeles Almanac, 2020).

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

In the early 1900s, growth in the City of Los Angeles led to the annexation of the large San Fernando Valley. By the 1920s, fruit—especially citrus—cultivation was San Fernando's biggest industry. Figure 3-3 shows a San Fernando Valley orange grove circa 1937 (Los Angeles Public Library, 1937). Olives also flourished in the Mediterranean-like climate. Other crops grown in the County included alfalfa, apricots, asparagus, barley, hay, beans, beets, cabbage, citrus, corn, lettuce, melons, peaches, potatoes, pumpkins, squash, tomatoes, and walnuts. From 1910 to 1955, Los Angeles County was the top agricultural area in the United States (KCET, 2011).



Figure 3-3: Orange grove in the San Fernando Valley circa 1937

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

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

Along with that of the State, Los Angeles County's population continued to grow, especially in the Santa Clara River watershed and the Antelope Valley. The County's population reached 7 million by 1970, 8.9 million by 1990, and 9.76 million in 2023 (Los Angeles Almanac, 2020; California Department of Finance, 2023).

3.1.2 Water Supply

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

The aqueduct opened November 5, 1913. However, the remaining cities and unincorporated areas in Los Angeles County were left with water supplies that were dwindling due to excessive groundwater pumping and dropping aquifer levels, and no way to fund additional sources. A few local water supply entities replenished aquifers at the mouth of San Gabriel Canyon using long ditches for percolation and

constructed shallow spreading basins in San Antonio Canyon at the San Bernardino County border. The City of Pasadena diverted water from the Arroyo Seco into its water supply system and constructed spreading grounds to replenish the aquifer under the city.

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

3.1.3 Historical Flooding and Response

Los Angeles Basin has a long history of flooding. Records of large floods before 1800 are not well documented; however, the earliest known record was from Father Crespi, who wrote about a flood that destroyed crops at the first San Gabriel Mission in 1771-1772. The "Old Mission" was located in the present City of Montebello near the intersection of San Gabriel Boulevard and Lincoln Avenue by the Rio Hondo. Following repeated flooding, the Mission was moved in 1775 to its present site in the City of San Gabriel.

The Los Angeles River was recorded to flood in 1811 destroying agricultural fields in Los Angeles Pueblo. In 1825, the Los Angeles River changed course to form the present channel. Other major floods occurred in 1832, 1842, 1859, and 1861 causing swells and new cut channels in Los Angeles River. The San Gabriel River cut a new channel in winter of 1867 causing the mouth of the river to change from San Pedro Bay to Alamitos Bay. Other floods occurred in 1876, 79, 84, 86, 89, 90 and 1891 (Wormer 1985). In 1884, a major flood damaged downtown Los Angeles, San Gabriel Valley, Santa Ana and other areas across Los Angeles County. Prior to the flood, the Los Angeles River flowed down to the harbor. The flood caused the river's flows to split when the water got so deep that it topped the river's west bank and flow went westerly down Ballona Creek. The lower Los Angeles, Rio Hondo, and San Gabriel Rivers merged into one giant muddy torrent nearly 15 miles long. After the 1886 Flood, the railroad constructed levees along the Los Angeles River in downtown Los Angeles. These levees generally held up during the storms, and fewer bridges washed out than from previous storm events. In the 1889 flood, there was less damage to the railroads, however, new bridges, thought to be able to withstand floods, washed out. The flood caused the Los Angeles River to cut yet another new channel south of the Los Angeles City limits turning sharply to the east, in present day Vernon, and joined the San Gabriel River north of its previous location. The 1889 Flood also resulted in the San Gabriel River shifting back to the Alamitos Bay outlet. The 1889 Flood damage prompted the County's Board of Supervisors to hire a team of engineers to investigate ways to reduce severe damage on the lower Los Angeles River south of the City of Los Angeles, the Rio Hondo, and the San Gabriel River.

Prior to the late 1880s, floods did not create a general demand for preventative measures as there was limited development and low property values. Between the 1880s and 1920, accelerated development and population growth occurred in the Los Angeles Basin. By 1910, the population of Los Angeles County increased from 101,454 in 1890 to 504,131. This has caused floods to become a serious problem and the need for flood measures (Wormer 1985).

The floods of 1910 and 1911 resulted in the formation of the San Antonio Protection District by local residents to provide flood control protection along the upper Rio Hondo and San Gabriel River channels. The district erected wooden pile dikes reinforced with barbed wire and stone to protect farmland from breaking banks. The total amount spent on flood control by 1913 was just under $300,000. Flood control methods were developed by Engineer Olmstead who recommended including retention and storage of flood waters in reservoirs, artificial spreading of flood water over gravel deposits to replenish the water table, and straightening and reinforcement of river channels so that maximum volume of water could be discharged to the ocean as quickly as possible. These ideas would be important for the future of flood control measures and water conservation in Los Angeles County (Wormer 1985).



Figure 3-4: 1914 Los Angeles Flood

In February 1914 a devastating flood hit Los Angeles County, which by that time had a population of almost 800,000 people in 31 cities and the unincorporated areas (Los Angeles County, 2012a). A photo of this flooding event is shown in Figure 3-4 (Homestead Museum, 2019). More than 50 people died and damages were estimated at $10 million (over $314 million in 2024 dollars) In the aftermath of the flood, the region's residents demanded action, and the Los Angeles County Board of Supervisors formed a Board of Engineers for Flood Control. Based on legislation drafted by that board, the California Legislature in 1915 created the Los Angeles County Flood Control District, the first regional flood control district in the state. The District was given a dual mission of flood control and conservation of flood waters for water supply. In 1916, flooding occurred in the Los Angeles River and other areas, costing approximately $775,000 worth of damage (over $22 million in 2024 dollars). The 1916 Flood reinforced support for the flood control plan the newly formed District plan was preparing for a proposed bond issue

By 1917, the District completed a plan for flood control (Bigger 1959). The flood control plan consisted of check dams and major dams in the mountains; one major dam in the flatlands; channel straightening and selective bank protection; instream percolation into the aquifers; and protection of the Los Angeles and Long Beach Harbors. Projects were proposed in all major watersheds in the District, including Ballona Creek, what is now known as Dominguez Channel, Los Angeles River, San Gabriel River, and Santa Clara River The 1917 Plan proposed flood protection measures in every community in the District, and endorsements from the leaders in those communities (Reagan, 1917). The District's 1917 Bond Issue, in the amount of $4.45 million (over $109 million in 2024 dollars) was approved by the voters. After a delay caused by the materials and personnel shortages of World War I, the District proceeded to construct three dams (Devils Gate, San Dimas, and Live Oak), straightening and defining courses for the main rivers, and work with the US Army Corps of Engineers to redirect the Los Angeles River outlet away from the ports to its current location in Long Beach. The District followed up with additional dam projects funded by another Bond Issue in the amount of $35.3 million (over $ 648 million in 2024 dollars) that was approved by the voters in 1924. A District bond issue in the amount of $26.9 million (over $477 million in 2024 dollars) to fund additional flood control projects was rejected by the voters in 1926.

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

In January 1934, a flood descended on the Crescenta Valley, devastating buildings, citrus groves, vineyards, villages, and highways in the communities of La Crescenta, Montrose, and Glendale. The estimated damages were $6 million (almost $141 million in 2024 dollars). The tragedy sparked public outcry and calls for action. This flood event resulted in the federal Emergency Relief Appropriations Act of April 1935, providing funds for channel, storm drain and debris basin construction by the U.S. Army Corps of Engineers. The Corps and the Los Angeles County Flood Control District worked with the federal Works Progress Administration to modify the District's Comprehensive Plan to provide more detailed plans and layouts. As a result of this effort, when Congress passed the Flood Control Act of June 1936, Los Angeles County garnered $70 million (almost $1.6 billion in 2024 dollars) of appropriations (about 25 percent of the legislation's total appropriation for the country) for the Corps to partner with the District and construct flood control projects in the Los Angeles and San Gabriel River systems. The 1936 Act was amended to add Ballona Creek to the Corps' scope of projects.

During the District's early flood control efforts, the County and cities financed and constructed local drains under various California statutes and improvement acts from 1903, 1911, 1913, and 1915. In unincorporated County areas and multi-jurisdictional local drains, construction was also carried out by local improvement districts under the Drainage District Improvement Act of 1919. These projects were funded by special assessments on properties within the drainage districts, which, although costly, provided essential flood relief. The oldest District Drainage Improvement (DDI) is DDI No. 1, built in 1916 by Long Beach to drain Hamilton Bowl into the Los Angeles River. The Los Angeles County Surveyor Department managed these drains, which included storm drains, small concrete channels, and engineered earth channels. These drains were often small and not part of a comprehensive plan due to limited funding. In 1937, the State allowed the transfer of 11 County-owned drainage districts and other storm drains to the Los Angeles County Flood Control District. In total, 17 drainage systems, consisting of 71 miles of storm drains and 1,387 catch basins, were transferred. The Flood Control District then assessed and upgraded these systems to improve their capacity and integrity.

In March of 1938, another tragic flood left 100 dead and $35 million in property damage.

Areas along the San Gabriel River were less severely impacted because of the District's dams (Cogswell and San Gabriel). Flooding on the Los Angeles River was more severe, but was lessened because of the District's Pacoima, Big Tujunga, and Devil's Gate Dams. The river had been graded in various areas and had some temporary improvements, but still had erosion, damage, and overflows in some areas. Some areas and main tributaries like Tujunga Wash suffered severe erosion, damaging bridges and buildings. The Los Angeles and Long Beach Harbors were impacted by silting. The flood prompted urging from the public for the Corps to start constriction of the Los Angeles River flood control channel. (Wormer, 1985).

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

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

The District partnered with the U.S. Forest Service in the 1960s and 1970s to construct numerous crib dams in the San Gabriel Mountains to stabilize streams and mitigate the effects of erosion on the communities below. During this period, the Los Angeles County Flood Control District also pioneered the use of freshwater injection wells in the County's coastal areas to form barriers to protect coastal aquifers from seawater intrusion resulting from groundwater pumping. Section 6 describes the recent flood events and bond measures that were used to implement flood management infrastructure following these events.

3.2 Physical Setting

3.2.1 Topography

Topography in Los Angeles County consists of a coastal plain extending in from the southern coast, hills in the central county across the north end of the urbanized area, the Santa Monica and Santa Susana Mountains to the west, the Sierra Pelona Mountains to the northwest, the San Gabriel Mountains crossing the north-central portion of the county, and a high, flat portion of the Mojave desert in the county's northeastern corner as seen in Figure 3-5. Offshore, the county also includes Santa Catalina Island, about 30 miles south of Long Beach.

Hills in Los Angeles County include the Baldwin Hills, Puente Hills, San Jose Hills, and Palos Verde Hills. Baldwin Hills was created through uplift caused by earthquakes along the Newport-Inglewood fault line and rises to approximately 420 feet (California State Parks, 2016). The Puente Hills were formed by uplift at the north edge of the Whittier-Elsinore fault caused by earthquakes. The elevation of the Puente Hills ranges from approximately 400 feet to more than 1,400 feet (Puente Hills Landfill). The Palos Verde Hills are bound to the north by Torrance, to the east by Los Angeles, and the west by the Pacific Ocean. The elevation of the Palos Verde Hills peaks at over 1,400 feet (USGS, 1981a). The San Jose Hills, located in the eastern part of the county, northwest of the Puente Hills, feature a diverse landscape shaped by geological forces, with elevations ranging from about 400 to 1300 feet (USGS, 1981b).

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

up to 2,000 feet deep with unique rock formations (Los Angeles County, 2009). The Santa Susana Mountains, in northwestern Los Angeles County, cover over 200 square miles and the peak of the range, Oat Mountain, has an elevation of over 3,750 feet. The mountain range is located between the Santa Clara River and Simi Valley (California Native Plant Society, 2018).

The Sierra Pelona Mountains are located in the northwest of Los Angeles County, farther north than the Santa Susana Mountains and the San Gabriel Mountains. The Sierra Pelona ridge extends for 18 miles and the peak elevation is over 5,000 feet (USGS, 1981c).

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

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

Santa Catalina Island, one of the Channel Islands, is located in the southern portion of Los Angeles County and is the closest of the Channel Islands to mainland California. The rugged island landscape has peaks reaching 2,000 feet (LA County Library, 2024).



Legend

- Incorporated Cities
- Unincorporated Los Angeles County

NORTH

8 4 0 8 Miles

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Los Angeles County Floodplain Management Plan

Figure 3-5: Topography of Los Angeles County

Source: County of Los Angeles, 2023

Issued: 7/23/2024

3.2.2 Geology and Soils

The USDA identifies five different soil hydrologic soil groups throughout Los Angeles County, as summarized in Table 3-1 (Soil Survey Staff, 2023).

Table 3-1: Soil Types in Los Angeles County

Hydrologic Soil Group	% of Total Area
A	12.39%
B	14.68%
C	35.68%
D	34.71%
C/D	2.54%

Soil Survey Staff, 2023

Group A soils make up approximately 12% of the total area in Los Angeles County. These soils have low runoff potential when wet. They are typically more than 90% sand or gravel and less than 10% clay. The depth to the water table for these soils is greater than two feet (USDA, 2009).

Group B soils make up approximately 15% of the total area in Los Angeles County and have relatively low runoff potential when wet. Water can transmit unimpeded through these soils. They are typically 10-20% clay and 50-90% sand. The depth to the water table for these soils is greater than two feet (USDA, 2009).

Group C soils make up the most total area in Los Angeles County, approximately 36%. These soils have a moderately high potential for runoff when wet. Transmission of water through the soil is somewhat restricted. These soils are typically 20-40% clay and less than 50% sand. The depth to the water table for these soils is greater than two feet (USDA, 2009).

Group D soils make up the second most total area in Los Angeles County, approximately 35%. These soils have high runoff potential when wet. Water movement through this soil is restricted. These soils are typically over 40% clay and less than 50% sand. They can also have a high shrink-swell potential. The depth to water table for these soils is less than two feet (USDA, 2009).

Group C/D is a dual hydrologic soil group. These soils make up approximately 3% of the total area in Los Angeles County. These soils are categorized in a dual hydrologic group as they have characteristics of both categories C and D. Namely, they have a depth to water table less than two feet as group D soils do but transmission of water through the soil is only somewhat restricted as with group C soils (USDA, 2009).

Figure 3-6 shows subsurface soil and mapped soil types of Los Angeles County.



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Los Angeles County
Floodplain Management Plan

Figure 3-6: Hydrologic Groups of Los Angeles County

Source: United States Department of Agriculture, 2023

Issued: 1/26/2024

3.2.3 Drainage and Watersheds

The Natural Resources Conservation Service (NRCS) designates major watersheds with an eight-digit hydrologic unit code (Hydrologic Unit Code (HUC)-8)) and subdivides them into smaller watersheds designated with a 10-digit hydrologic unit code (HUC-10). The major (HUC-8) and smaller sub-watersheds (HUC-10) that lie all or partly within Los Angeles County are listed in Table 3-2 and shown on Figure 3-7 and Figure 3-8. Analysis of the planning area for this floodplain management plan was performed at the sub-watershed scale.

Table 3-2: NRCS Watersheds in Unincorporated Los Angeles County

HUC-10 Code	Name
HUC-8 Watershed: Middle Kern/Upper Tehachapi/ Grapevine	
1803000307	Grapevine Creek
HUC-8 Watershed: Santa Clara River	
1807010201	Headwaters Santa Clara River
1807010202	Bouquet Canyon
1807010203	Castaic Creek
1807010204	Upper Santa Clara River
1807010205	Upper Piru Creek
1807010206	Lower Piru Creek
HUC-8 Watershed: Calleguas	
1807010301	Calleguas Creek
HUC-8 Watershed: Santa Monica Bay	
1807010401	Malibu Creek
1807010402	Big Sycamore Canyon-Frontal Santa Monica Bay
1807010403	Ballona Creek
1807010404	Garapito Creek-Frontal Santa Monica Bay
1807010405	Frontal Santa Monica Bay-San Pedro Bay
HUC-8 Watershed: Los Angeles River	
1807010501	Big Tujunga Creek
1807010502	Upper Los Angeles River
1807010503	Rio Hondo
1807010504	Lower Los Angeles River
HUC-8 Watershed: San Gabriel River	
1807010601	Dominguez Channel
1807010602	West Fork San Gabriel River
1807010603	Upper San Gabriel River

HUC-10 Code	Name
1807010604	Walnut Creek
1807010605	San Jose Creek
1807010606	Lower San Gabriel River
1807010607	Alamitos Bay-San Pedro Bay
HUC-8 Watershed: Santa Ana	
1807020307	Chino Creek
HUC-8 Watershed: San Pedro Channel Islands	
1807010700	San Nicholas Island/Santa Catalina Island
HUC-8 Watershed: Antelope-Fremont Valleys	
1809020609	Le Montaine Creek-Eller Slough
1809020610	Big Rock Creek-Big Rock Wash
1809020611	Little Rock Wash
1809020613	Sacatara Creek-Kings Canyon
1809020614	Amargosa Creek
1809020615	Lake Palmdale-Piute Ponds
1809020616	Town of Pearblossom
1809020618	Cottonwood Creek-Tylerhorse Canyon
1809020619	Mescal Creek-Rocky Buttes
1809020622	Rogers Lake
1809020623	Rock Creek-Buckhorn Lake
1809020624	Rosamond Lake
HUC-8 Watershed: Mojave	
1809020804	Sheep Creek-El Mirage Lake

Notes:

HUC-8 watershed names shown are those defined by the NRCS. Alternative names are established in the 2006 Los Angeles County Public Works Hydrology Manual, as described in Section 6.2.

HUC-8 Watershed San Pedro/Channel Islands and HUC-10 Watershed San Nicholas Island/Santa Cataline Island are not shown on Figure 3-7 and Figure 3-8 as they are outside the mapped extent of those figures

Of the 10 HUC-8 watersheds partly or completely within Los Angeles County, only five include significant area within the County (see Figure 3-7). Four of these drain to the ocean and the fifth drains to dry lakes in the desert. The watershed descriptions are excerpts from the Los Angeles County Public Works January 2006 Hydrology Manual. The descriptions use the watershed names from the Hydrology Manual which differ slightly from the NRCS HUC-8 naming as indicated. The smaller sub-watershed (HUC-10) are presented on Fiure 3-8.

3.2.3.1 Los Angeles River Watershed Description

The Los Angeles River Watershed covers over 830 square miles. It includes the western portion of the San Gabriel Mountains, the San Rafael Hills, the Verdugo Hills, the Santa Susana Mountains, and the northern slope of the Santa Monica Mountains. The river flows from the headwaters in the western San Fernando Valley to San

Pedro Bay near Long Beach. It crosses the San Fernando Valley and the central portion of the Los Angeles Basin. The watershed terrain consists of mountains, foothills, valleys, and the coastal plain.

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

Prior to development, the Los Angeles River system was typical of other streams in the southwest. Its channel was broad and often shifted location within the floodplain due to high sediment loads. The stream location within the coastal plain has varied greatly over the years. During a large flood in 1815, the river changed course completely. Breaking its banks in what is now downtown Los Angeles, the river followed the course of Ballona Creek. In 1825, another large flood changed the river's course from west to south toward Wilmington and the ocean (Guinn, 1890). Other major flood events occurred in 1938, 1969, 1978, 1983, 1998, 2005, 2023 and 2024 (see Section 6.5).

The Los Angeles River watershed has a diverse land use pattern. The upper portions of the watershed are covered by Angeles National Forest and other rural areas. The remainder of the watershed is highly developed. The watershed has large areas of commercial, residential, and industrial development. Few parks or natural areas exist in the watershed of the river that reaches below the Arroyo Seco confluence. The concrete sections of the Los Angeles River were constructed by the Corps between the late 1930s and the 1950s. Some reaches are maintained by the Corps; others are maintained by the District. Channel improvements and extensive watershed development decrease times of concentration and increase runoff flow rates and volumes. Much of the river's tributary network has been lined with concrete for flood control.

The parts of the San Gabriel Mountains tributary to the Los Angeles River contain some of the most prolific sediment-producing streams in the world. Intense rainfall, coupled with highly erodible sediment, produces damaging debris discharges. The watershed also contains major storm drain systems consisting of concrete pipes and box channels. The flood control system has prevented significant damage from large flood events. Numerous debris basins have been constructed along the foothills of the San Gabriel Mountains to de-bulk the debris-laden flows before they continue through the neighborhoods below. Crib dams have also been constructed in the mountains and foothills to stabilize streams and lessen erosion.There are also several spreading ground facilities in the San Fernando Valley. The Flood Control District established the Pacoima and Hansen Spreading Grounds in the 1930s and 1940s, followed by Lopez and Branford Spreading Grounds in the 1950s. The Tujunga Spreading Grounds, established by the City of Los Angeles Department of Water and Power in the 1960s, is owned by the City and operated by Los Angeles County Public Works. These facilities take stormwater runoff, floodwaters released from

upstream dams, and imported water diverted from Pacoima Wash and Tujunga Wash and infiltrate the water into the valley's aquifers.

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

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

3.2.3.2 San Gabriel River Watershed

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

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

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

Similar to the Los Angeles River, the San Gabriel River once occupied a wide floodplain and shifted course to accommodate large flows and sediment loads. Development of the floodplain changed the character of the river dramatically since periodic inundation of the floodplain was not compatible with the new land uses. Major flood events occurred in 1938, 1969, 1978, 1983, 1998,2005, 2023 and 2024 (see Section 6.5).

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

The San Gabriel River watershed contains most of the County's spreading ground facilities. San Gabriel Canyon Spreading Grounds in Azusa was originally operated by the San Gabriel River Water Committee (starting in 1917), and transferred to the Flood Control District in the 1970s. From the 1930s through the 1960s, the District established 13 other spreading grounds in the foothills, along the San Gabriel River, and along the river's tributaries on the floor of the eastern San Gabriel Valley. Storm runoff, dam releases, imported water and recycled water are diverted from the adjacent channels into the spreading facilities and allowed to recharge the aquifers of the eastern San Gabriel Valley and the central coastal plain.

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

3.2.3.3 Santa Clara River Watershed

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

The upper portion of the river within the County of Los Angeles has a watershed area of 644 square miles. 90 percent of this area is mountainous with steep canyons; the remaining 10 percent is alluvial valleys. Major tributaries in the County's portion of the Santa Clara River watershed include Aliso Canyon, Agua Dulce Canyon, Sand Canyon, Mint Canyon, Bouquet Canyon, San Francisquito Canyon, the South Fork of the Santa Clara River, Castaic Creek, Hasley Canyon, San Martinez Chiquito Canyon, and Potrero Canyon. The Santa Clara River and its tributaries are ephemeral streams characterized by alluvial soils. Discharge occurs quickly during rainfall events and diminishes quickly after rainfall has ceased. As in other watersheds in the County, the mountain and foothill areas are susceptible to debris-laden flows during intense rainfall, especially when the watershed is recovering from fire.

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

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

3.2.3.4 Coastal (HUC-8 Watershed Santa Monica Bay)

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

- The Malibu Creek Watershed covers 109 square miles at the western end of the County of Los Angeles and extends into Ventura County. Most of the watershed is undeveloped public land managed by the California Department of Parks and Recreation, the Mountains Recreation and Conservation Authority, and the National Park Service. There is sporadic but increasing development throughout the area. The most extensive development is along U.S. Highway 101. The northern portion is hilly and the southern portion, near the ocean, is rugged mountain terrain. The major tributaries to Malibu Creek include Triunfo Canyon, Medea Creek, Las Virgenes Creek, and Cold Creek. Malibu Creek drains into the Pacific Ocean near the Malibu Civic Center.
- Topanga Creek drains 18 square miles in the central Santa Monica Mountains. The watershed is primarily rural with widely scattered residential and commercial development. There are undeveloped lands managed by the California Department of Parks and Recreation, the Mountains Recreation and Conservation Authority, and the National Park Service. The creek flows unobstructed along its course and empties into the Santa Monica Bay in an unincorporated portion of the County east of Malibu.
- Ballona Creek is a flood control channel that drains the western Los Angeles Basin. The watershed area is bounded by the Santa Monica Mountains on the north and the Baldwin Hills on the south. It extends east nearly to Downtown Los Angeles. The total watershed area is roughly 130 square miles. The area is primarily developed but includes undeveloped areas on the south slope of the Santa Monica Mountains. The land use is 64 percent residential, 8 percent commercial, 4 percent industrial, and 17 percent open space. The major tributaries to Ballona Creek are Centinela Creek, Sepulveda Canyon Channel, and Benedict Canyon Channel. There are extensive county and local city storm drain systems and one county debris basin. The watershed drains into Santa Monica Bay at Marina del Rey.
- The Dominguez Watershed covers 133 square miles in the southern portion of the county. The watershed extends from near the Los Angeles International Airport to the Los Angeles Harbor. The area is almost completely developed, with regions of residential, commercial, and industrial land use. Storm drains and the flood control channel network define the watershed rather than natural drainage features.

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

3.2.3.5 Antelope Valley (HUC-8 Watershed Antelope-Fremont Valleys)

The Antelope Valley encompasses approximately 1,200 square miles in the northern portion of the County of Los Angeles. The valley is bounded on the north by the Tehachapi Mountains and on the south by the Sierra Pelona and the San Gabriel Mountains. Numerous streams from the mountains and foothills flow

across the valley floor. The valley lacks defined drainage channels outside of the foothills and is subject to unpredictable drainage patterns.

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

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

3.2.3.6 Other Systems

Dominguez Channel

The Dominguez Channel, in the Dominguez Channel HUC-10 watershed,was built by the Flood Control District, west of the Los Angeles River. Its watershed includes the unincorporated area of West Carson. Also within the watershed are the cities of Carson, Gardena, Hawthorne, Lawndale, Torrance, and Wilmington. The channel has earthen or clay-lined bottoms and stone-lined sides.

Los Cerritos Channel

Los Cerritos Channel, in the Alamitos Bay-San Pedro Bay HUC-10 watershed, was built by the Flood Control District, west of the San Gabriel River. Its watershed includes an unincorporated area in northeast Long Beach. Also within the watershed are the cities of Bellflower, Downey, Lakewood, Long Beach, and Signal Hill. The channel upstream of Atherton Street has concrete-lined sides and bottom; downstream, the channel has an earthen bottom and stone-lined sides.

Malibu Creek

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

Improved tributary channels in the watershed in communities along U.S. Highway 101 include Chesboro Canyon, Liberty Canyon, Medea Creek, Russel Creek, and Triunfo Creek. These channels are concrete-lined. Chesboro Channel and some reaches of Medea Creek were constructed by the Flood Control

District. The others were built by developers and transferred to the District for operation and maintenance. The watershed also contains over 20 debris basins that were built by developers and transferred to the District for operation and maintenance.

Other Major Santa Monica Mountain Watersheds

Most of the other drainages in the Big Sycamore Canyon-Frontal Santa Monica Bay and Garapito Creek-Frontal Santa Monica Bay HUC-10 watershed, do not contain major flood control facilities. There is a concrete-lined district flood control channel in Trancas Canyon in the City of Malibu, and district debris basins in Marie Canyon at Pepperdine University and in the unincorporated area of Parker Mesa.

Santa Clara River

Reaches of the Santa Clara River, Headwaters Santa Clara River HUC-10 watershed, in developed areas west of Agua Dulce have earthen bottoms and sides consisting of concrete, grouted rock, or riprap. Many reaches have levees maintained by the District or the City of Santa Clarita. Major improved channels tributary to the river include Bouquet Canyon, Dry Canyon, Hasley Canyon, Mint Canyon, Newhall Creek, Pico Canyon, Rye Canyon, San Martinez Chiquito Canyon, South Fork Santa Clara River, and Violin Canyon. The watershed contains 28 district debris basins, several of which are in unincorporated areas. The District's channels and debris basins were primarily built by developers and transferred to the District for operation and maintenance.

Wilmington Drain

Wilmington Drain was built by the Los Angeles County Flood Control District, west of Dominguez Channel in the Alamitos Bay-San Pedro Bay HUC-10 watershed. Its watershed includes the unincorporated area of West Carson and the cities of Carson, Lomita and Los Angeles. The channel is concrete-lined from its inlet at Sepulveda Boulevard to Interstate 110. From Interstate 110 to its outlet at State Route 1, the channel is a natural watercourse.

Antelope Valley

The unincorporated areas of Antelope Valley in the Antelope Valley HUC-8 Watershed do not contain flood control dams or extensive flood control systems. However, there are three Los Angeles County Flood Control District debris basins and two flood control channels in the City of Palmdale vicinity. Two of the debris basins and one channel are in unincorporated area. The channel in the City is concrete-lined. The channel in the unincorporated area is concrete-lined for some reaches, earthen with pipe and wire revetment for the others.

3.2.3.7 Los Angeles County Drainage Area Project

In 1915, the State Legislature created the Los Angeles County Flood Control District to control floods and conserve water. Early bond issues financed construction of 14 dams in the San Gabriel Mountains as well as flood channel modifications following major flood disasters. District funding financed construction of debris basins to trap sediment. The federal Emergency Relief Appropriations Act of 1935 financed the construction of Eaton Wash Dam. The federal Flood Control Act of 1936 made the Army Corps of Engineers

a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities.

The Army Corps' Los Angeles River, San Gabriel River, and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the LACDA study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel, and Ballona Creek. Flood control facilities in the LACDA system fall into four general categories, as described in the following sections. In total, the system has over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 15 flood control and stormwater capture dams, and five flood control dams. At the time of creation, the LACDA did not include Antelope Valley which has recently grown in population and new development.

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

Flood control reservoirs created by the LACDA ststem control and reduce stream flow so that downstream main channel capacities are not exceeded. The Army Corps operates one reservoir in Unincorported Los Angeles County- Whittier Narrows Dam. The County and a state conservancy have built and operate recreational facilities at Whittier Narrows Dam (sports fields, riding and hiking trails, picnic areas, etc.).

County-operated facilities include 15 flood control and stormwater capture reservoirs in the upper watershed areas of the LACDA system. Combined, these local reservoirs have a maximum combined capacity of 109,146 acre-feet.

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

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

Improved tributary channels speed the passage of flood flows through local communities and into the main stem river system. Table 3-3 lists the major such channels in the CountyThe following tributaries received improvements:

Table 3-3: Major Improved Tributary Channels

	Built by:	Affected Unincorporated Areas
Los Angeles River Tributaries		
Burbank Western System	Corps of Engineers	
Caballero Creek	Corps of Engineers	Dominguez Hills, Dominguez Junction and Rancho Dominguez
Compton Creek	Corps of Engineers	
A reach of Pacoima Wash	Corps of Engineers	
Rio Hondo	Corps of Engineers	
Sycamore Wash	Corps of Engineers	Big Tujunga, Little Tujunga, Kagel and Lopez Canyons
Tujunga Wash	Corps of Engineers	
Lower reaches of Verdugo Wash	County	
Aliso Creek	County	West Altadena
Arroyo Seco	County	Areas in Los Angeles' West Hills
Bell Creek	County	Browns Canyon
Browns Creek	County	
Bull Creek	County	
Calabasas Creek	County	Areas in Los Angeles' West Hills
Dayton Creek	County	
Several reaches of Pacoima Wash	County	La Crescenta, Montrose and Verdugo Woods
Rio Hondo Tributaries		
Arcadia Wash	Corps of Engineers	Areas south of Arcadia, Monrovia and Duarte
Alhambra Wash	Corps of Engineers	
Eaton Wash	Corps of Engineers	East Altadena, Chapman Woods and areas near San Gabriel and Temple City
Several reaches of Rubio Wash	Corps of Engineers	East Altadena, Chapman Woods and areas near San Gabriel and Temple City
Santa Anita Wash	Corps of Engineers	Areas south of Arcadia, Monrovia and Duarte
Sawpit Wash	Corps of Engineers	Areas south of Arcadia, Monrovia and Duarte

	Built by:	Affected Unincorporated Areas
San Gabriel River Tributaries		
Big Dalton Wash	Corps of Engineers	Areas near Azusa and Covina
Coyote Creek	Corps of Engineers	Areas near La Mirada, Santa Fe Springs and Whittier
Little Dalton Wash	Corps of Engineers	
San Dimas Wash	Corps of Engineers	Areas near Covina and Glendora
San Jose Creek	Corps of Engineers	Hacienda Heights, Rowland Heights, Sycamore Canyon and Turnbull Canyon
Walnut Creek	Corps of Engineers	Areas near Covina, San Dimas, Walnut and West Covina
Bassett Channel	County	Avocado Heights
Charter Oak Wash	County	
Leffingwell Creek	County	
Puente Creek	County	Areas near La Puente and West Covina
Ballona Creek Tributaries		
Benedict Canyon Channel	Corps of Engineers	
Centinela Creek	Corps of Engineers	
Sawtelle Channel	Corps of Engineers	



Los Angeles County Floodplain Management Plan

Figure 3-7: Major (HUC-8) Watersheds in Los Angeles County

Source: United States Geological Survey, 2023

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Figure 3-8: Smaller (HUC-10) Watersheds in Los Angeles County

Source: United States Geological Survey, 2023

Issued: 1/26/2024

3.2.4 Climate

In the areas along the California coast, climate is subject to wide variations within short distances as a result of the influence of topography on the circulation of marine air. The Los Angeles Basin offers many varieties of climate within a few miles. Santa Monica Pier, in the Los Angeles area, has a normal July maximum of around 75ºF, but the average increases to 95ºF at Canoga Park in the San Fernando Valley just 15 miles to the north (WRCC, 2024). Table 3-4 summarizes key climate data for the county at three locations: Los Angeles International Airport on the coast, downtown Los Angeles in the central county, and Lancaster in the Mojave Desert.

Although the basic air flow above the area is from the west or northwest during most of the year, mountain chains deflect these winds so that, except for the immediate coast, wind direction is more a product of local terrain than of the prevailing circulation. Strong and sometimes damaging winds from the northeast or southeast occur when there is a strong high-pressure area to the northeast and an intense low-pressure area approaching from the west as seen in Figure 3-9 (Duginski, 2022). In southern California these winds are called “Santa Ana Winds.” Their air is typically dry, and the winds are strong and gusty, sometimes exceeding 100 mph, particularly near the mouth of canyons oriented along the direction of airflow. These conditions occasionally lead to serious fire suppression problems and often result in the temporary closing of highways to campers, trucks, and light cars.

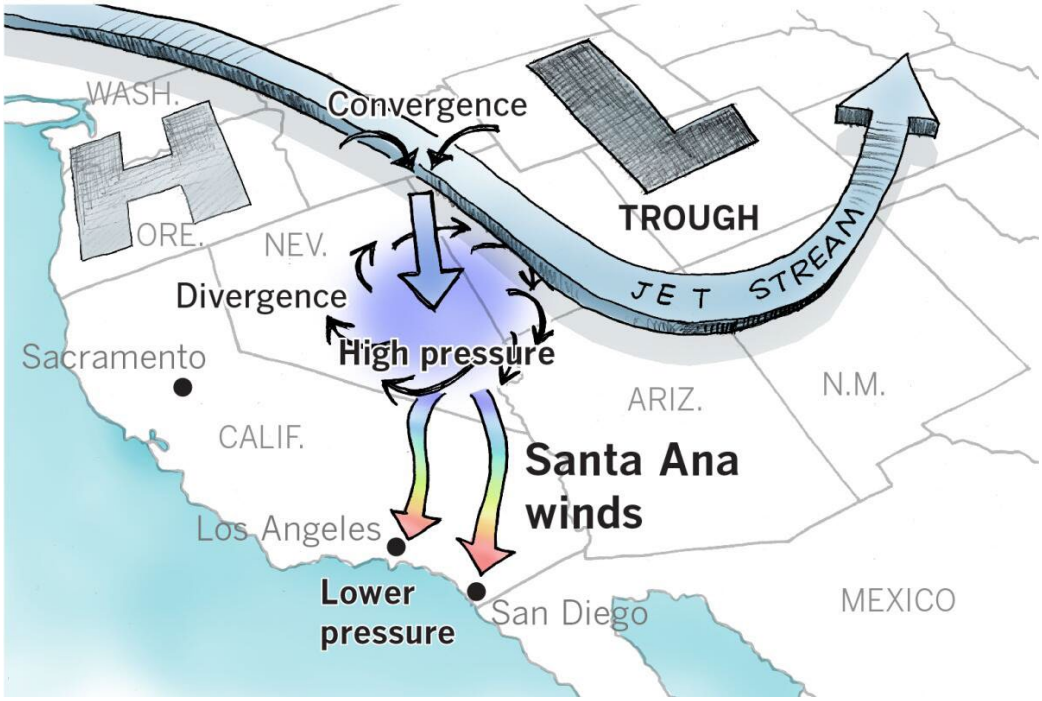


Figure 3-9: Santa Ana Winds

The Los Angeles Basin is almost completely enclosed by mountains in the north and east. A vertical temperature structure (inversion) in the air along most of coastal California tends to prevent vertical mixing of the air. The geographical configuration and southern location of the Los Angeles Basin permit a fairly regular daily reversal of wind direction—offshore at night and onshore during the day. (WRCC, 2024).

Table 3-4: Average Los Angeles County Climate Data

	Los Angeles International Airport	Downtown Los Angeles	Lancaster
Average Annual Minimum Temperature	55.3°F	55.9°F	46.9°F
Average Annual Maximum Temperature	70.1°F	74.2°F	75.8°F
Average Annual Mean Temperature	62.8°F	65.0°F	61.3°F
Average Annual precipitation	12.0in	14.75in	7.47in

Source: WRCC, 2024.

3.3 Development Features

3.3.1 Land Use

Los Angeles County is highly urbanized, but it includes large, sparsely developed areas in the Mojave Desert, the Angeles and Los Padres National Forests in the San Gabriel Mountains (which also contain the San Gabriel Mountains National Monument), and the Santa Monica Mountains (which contain the Santa Monica NRA and the Malibu Creek and Topanga State Parks). Over half of the unincorporated areas in the County are considered natural resources, and 39 percent are designated as rural. The County's land use patterns are greatly influenced and shaped by the surrounding natural features, which include valleys, waterways, coastland mountains, forestland, and desert (Los Angeles County Department of Regional Planning, 2022).

A network of high-capacity transportation systems traverses Los Angeles County as seen in Figure 3-1. In the unincorporated areas, these systems include California State Route (SR) 14, SR 138, Interstate 5, Interstate 110, and U.S. Route 2. Due to the accessibility that the transportation network provides, along with County unincorporated areas' proximity to major population centers in the cities of Los Angeles and Malibu, the County projects significant growth in population and employment for the unincorporated areas over the next 20 years (Los Angeles County Department of Regional Planning, 2022).

To help ensure that regionally unique characteristics are considered in long-term development, the County has specific plans for local unincorporated areas, including the Canyon Park, La Viña, Santa Catalina Island, Marina Del Ray, Northlake, Newhall Ranch, and Universal Studios areas. The County also regulates development in special management areas to prevent loss of life and property and to protect important resources, such as agricultural resources, airport areas, coastal zones, flood zones, historic resources, mineral resources, and military operations (Los Angeles County Department of Regional Planning, 2022).

The County promotes infill development, sustainable development, and transit-oriented development to preserve land and resources while reducing the costs of public infrastructure and other services. This focus reduces residential exposure to natural hazards, such as wildfires and flooding, through the siting and design of open spaces. The County has noted the locations of higher hazard areas near population centers and growth areas, and it plans to use this information to ensure planning and development processes continue to consider these factors (Los Angeles County Department of Regional Planning, 2022).

Land use distribution in unincorporated Los Angeles County is summarized in Table 3-5.

Table 3-5: Land Use Distribution in Unincorporated Los Angeles County

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

3.3.2 Critical Facilities and Infrastructure

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

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

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

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

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

- Safety and Security—Law enforcement/security, search and rescue, fire services, government service, responder safety, and imminent hazard mitigation
- Food, Water and Sheltering—Evacuations, schools, food/potable water, shelter, durable goods, water infrastructure and agriculture

- Health and Medical—Medical care (hospitals), patient movement, public health, fatality management, health care and supply chain
- Energy—Power (grid), temporary power and fuel
- Communications—Infrastructure, alerts, warnings, messages, 911 and dispatch, responder communications and financial services
- Transportation—Highway/roadway, mass transit, railway, aviation, maritime and pipeline
- Hazardous Materials—Facilities, hazardous debris, pollutants and contaminants

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

- Location management system Geographic Information System (GIS) data from Los Angeles County's GIS data portal
- GIS data downloaded from the U.S. Environmental Protection Agency's website for facilities in the EPA's Toxic Release Inventory (a listing of hazardous material facilities)
- Default entries contained in the Comprehensive Data Management System that is part of FEMA's Hazards United States-Muti Hazard (Hazus)software

Due to the sensitivity of this information, a detailed list is not provided in this plan; the list is on file with the County. Table 3-6 summarizes the general types of critical facilities and infrastructure in the planning area. General locations are shown on maps provided in Appendix D. The numbers of critical facilities and infrastructure located within mapped floodplains of the planning area are given in Section 7.3.

Table 3-6: County of Los Angeles Critical Facilities

Watershed	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	HazMat	Total
Alamitos Bay - San Pedro Bay	1	6	2	0	0	18	8	**35**
Amargosa Creek	3	28	0	0	2	38	0	**71**
Ballona Creek	3	18	2	1	1	21	0	**46**
Big Rock Creek - Big Rock Watershed	0	4	0	0	0	5	0	**9**
Big Sycamore Canyon - Frontal Santa Monica Bay Watershed	1	9	0	0	2	9	0	**21**
Big Tujunga Creek	1	3	0	0	0	18	0	**22**
Bouquet Canyon	0	2	0	0	0	1	0	**3**
Calleguas Creek	0	0	0	0	0	0	0	**0**
Castaic Creek	6	25	0	1	0	42	8	**82**
Chino Creek	0	0	0	0	4	4		**8**
Cottonwood Creek - Tylerhorse Canyon	0	0	0	0	0	0	0	**0**

Watershed	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	HazMat	Total
Dominguez Channel	5	63	1	2	2	84	46	**203**
Frontal Santa Monica Bay - San Pedro Bay	0	0	0	0	0	0	0	**0**
Garapito Creek - Frontal Santa Monica bay	4	25	0	0	1	19	0	**49**
Grapevine Creek	0	0	0	0	0	2	0	**2**
Headwaters Santa Clara River	2	24	0	0	6	64	2	**98**
Lake Palmdale - Piute Ponds	0	3	0	0	0	33	0	**36**
Le Montaine Creek - Eller Slough	0	0	0	0	0	4	0	**4**
Little Rock Wash	1	8	1	0	0	11	1	**22**
Lower LA River	12	164	12	1	0	176	34	**399**
Lower Piru Creek	0	1	0	0	0	4	0	**5**
Lower San Gabriel River	4	84	0	2	0	74	7	**171**
Malibu Creek	2	9	0	0	0	28	0	**39**
Mescal Creek - Rocky Buttes	1	14	1	0	1	13	0	**30**
Pearblossom	1	14	0	0	2	7	0	**24**
Rio Hondo	3	36	2	0	18	31	1	**91**
Rock Creek - Buckhorn Lake	0	0	0	0	0	0	0	**0**
Rogers Lake	0	0	0	0	0	0	0	**0**
Rosamond Lake	0	1	0	0	0	3	0	**4**
Sacatara Creek	0	1	0	1	2	8	1	**13**
San Jose Creek	2	90	0	0	0	35	7	**134**
San Nicholas Island-Santa Catalina Island	1	2	0	0	6	5	0	**14**
Sheep Creek -El Mirage Lake	0	1	0	0	2	0	0	**3**
Upper LA River	8	31	0	0	1	90	1	**131**
Upper Piru Creek	1	3	0	1	1	43	0	**49**
Upper San Gabriel River	0	0	0	0	0	5	0	**5**
Upper Santa Clara River	4	19	1	3	0	36	0	**63**
Walnut Creek	0	27	0	0	0	19	0	**46**
West Fork San Gabriel River	0	1	0	0	16	11	0	**28**
Total	**66**	**716**	**22**	**12**	**67**	**961**	**116**	**1,960**

3.4 Demographics

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

3.4.1 Population Characteristics

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. The California Department of Finance estimated Los Angeles County's population at 9,761,210 as of January 1, 2023: 997,999 in unincorporated areas and 8,763,211 in incorporated areas (California Department of Finance, 2023).

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. Figure 3-10 below shows annual population changes from 1991 to 2023 for unincorporated Los Angeles County, the County as a whole, and the State of California (California Department of Finance, , 2023).

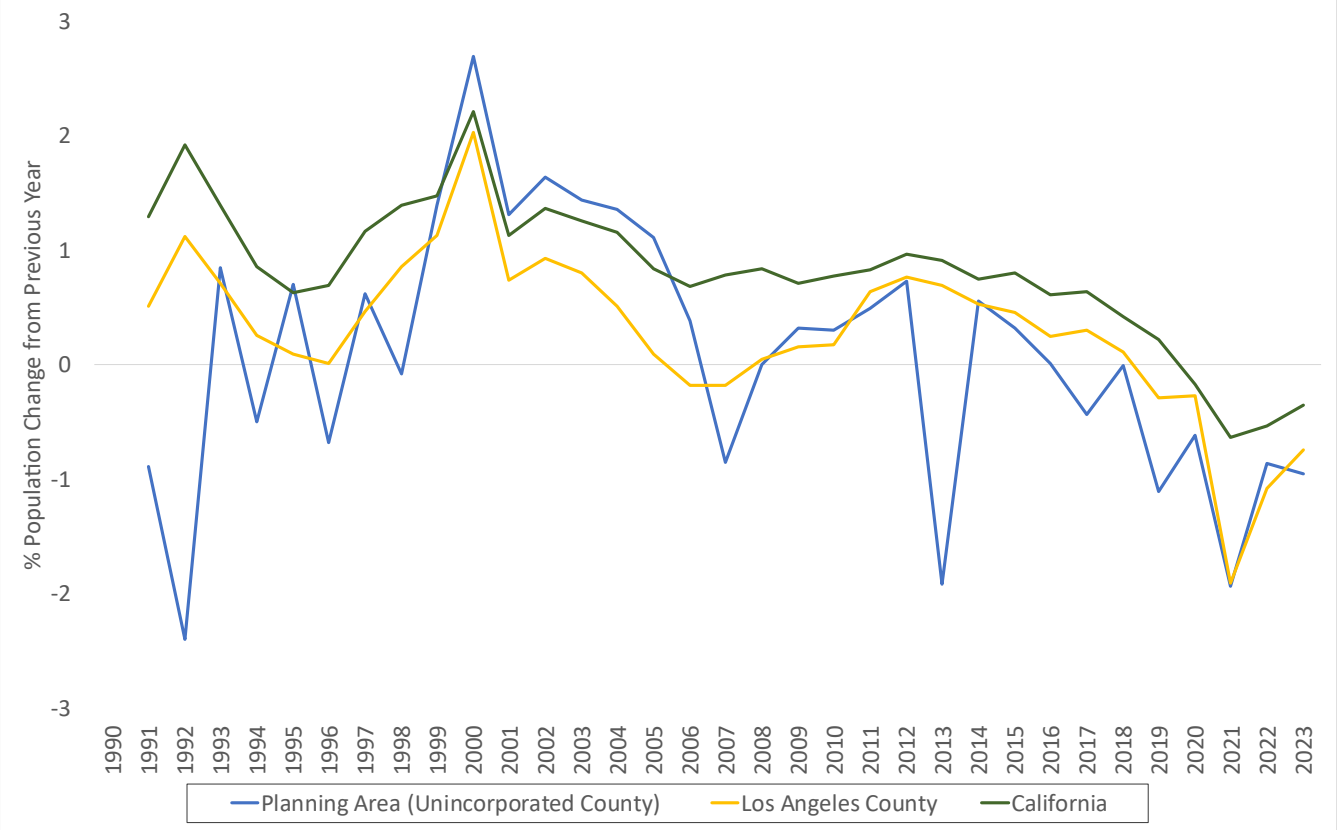


Figure 3-10: California and Los Angeles County Population Growth

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

The Los Angeles County General Plan (Los Angeles County Department of Regional Planning , 2022) forecasts that, by 2035, total County population will increase to 11,353,000 and unincorporated-area population will increase to 1,399,500—increases of 29 and 40 percent, respectively, over 2023.

3.4.2 Age Distribution

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

planning attention for older adults is an important consideration given the current aging of the American population.

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

The overall age distribution for incorporated and unincorporated Los Angeles County is illustrated in Figure 3-11. Based on the most recent 5-year estimates from the U.S. Census Bureau's American Community Survey, 13.7 percent of the County's population is 65 or older. According to the Census data, 34.4 percent of the over-65 population have disabilities of some kind and 13.5 percent have incomes below the poverty line. The county's population includes 17.9 percent who are 14 or younger. Among children under 18, 18.8 percent are below the poverty line. (U.S. Census, 2021a, 2021b and 2021c)

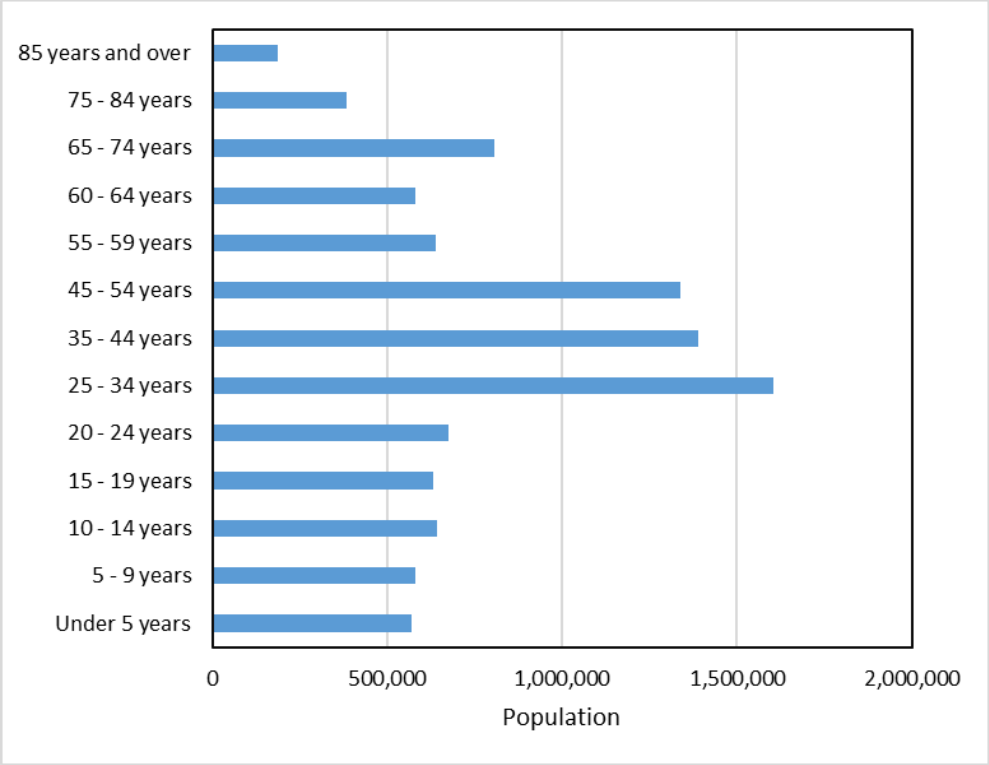


Figure 3-11: Los Angeles County Age Distribution

3.4.3 Race, Ethnicity and Language

The United States has a racially and ethnically diverse population. At the federal level, race and ethnicity are categorized separately. The most recent U.S. Census officially recognized six racial categories: White American, Black or African American, Native Americans and Alaska Native, Asian American, Native Hawaiian and Other Pacific Islander, and "two or more races." In completing the census form, each person

is asked to choose from among these racial categories, so all Americans are included in the numbers reported for those categories.

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

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

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

According to the most recent 5-year estimates from the U.S. Census Bureau’s American Community Survey, the racial composition of Los Angeles County is 39.6 percent white. The County’s next largest identified ethnic population is Asian at 14.8 percent. Other identified populations are Black or African American at 7.9 percent; 22.7 percent of the population identifies as “some other race.” Figure 3-12 shows the racial distribution in the County. (U.S. Census, 2022b).

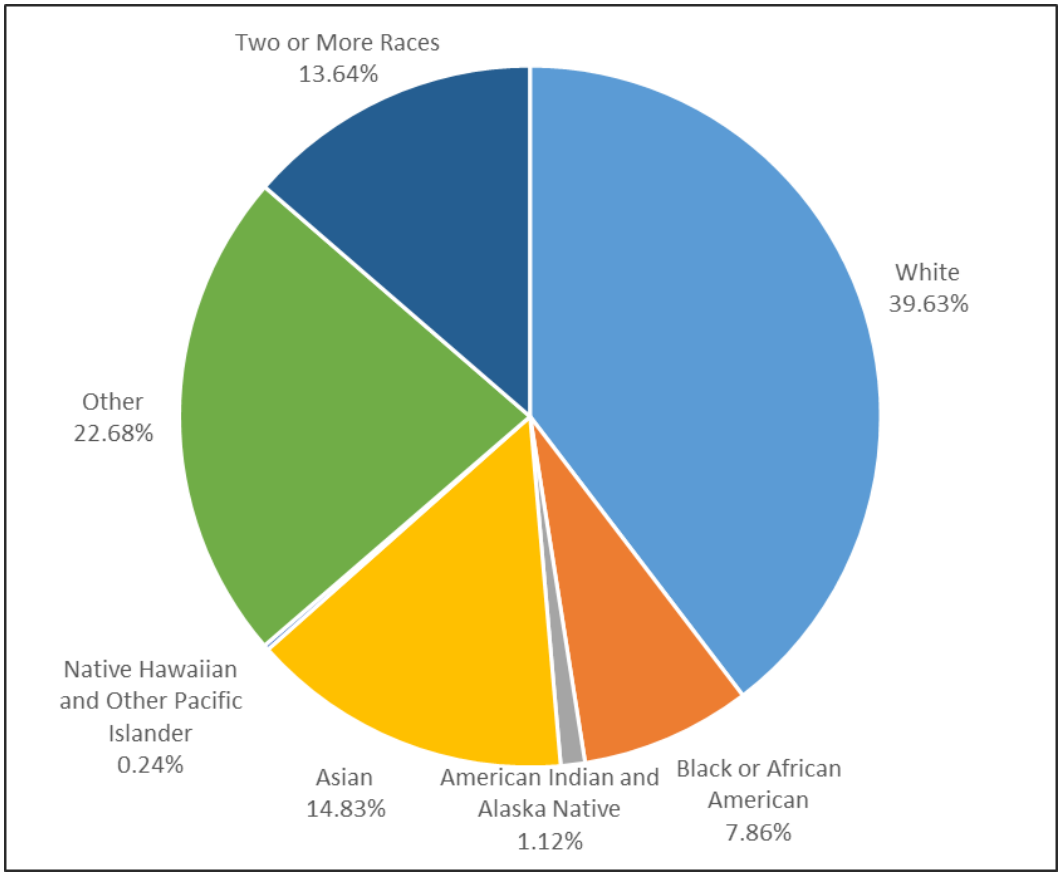


Figure 3-12: Los Angeles County Race Distribution

The census ethnicity breakdown shows that 48.7 percent of the Los Angeles County population is Hispanic or Latino ethnicity, compared to 19.1 percent nationwide (U.S. Census, 2022a, U.S. Census 2022b). Figure 3-13 shows the ethnic distribution in the County (U.S. Census, 2022b).

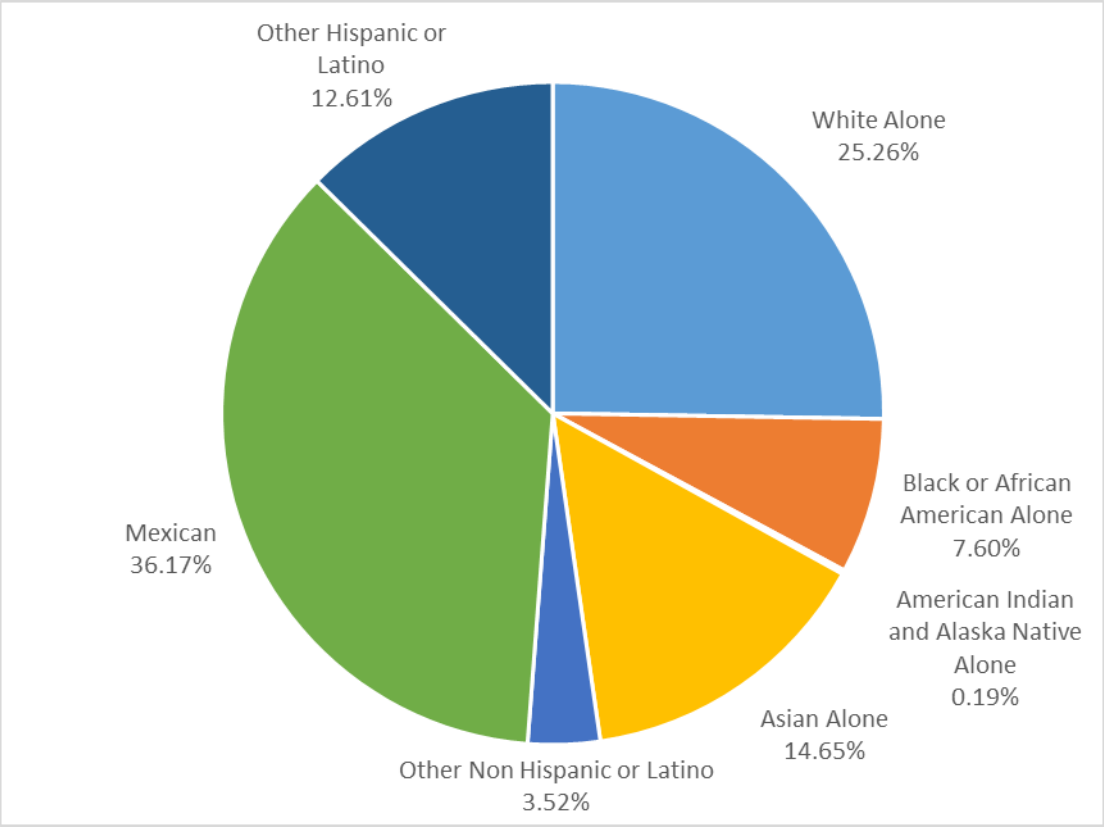


Figure 3-13: Los Angeles County Ethnicity Distribution

Los Angeles County has a 33.5-percent foreign-born population. Census data indicate that more than half of the population of unincorporated Los Angeles County—57.4 percent—speak a language other than English at home, including 43 percent of the total population who speak Spanish at home; another 12.5 percent speak an Asian or Pacific Islander language at home (Los Angeles County Public Works, 2024f). The census estimates that 26.8 percent of the Los Angeles County residents speak English "less than very well" (U.S. Census, 2021b). Figure 3-14 shows the distribution of languages spoken at home in the Los Angeles County (Census, 2021b).

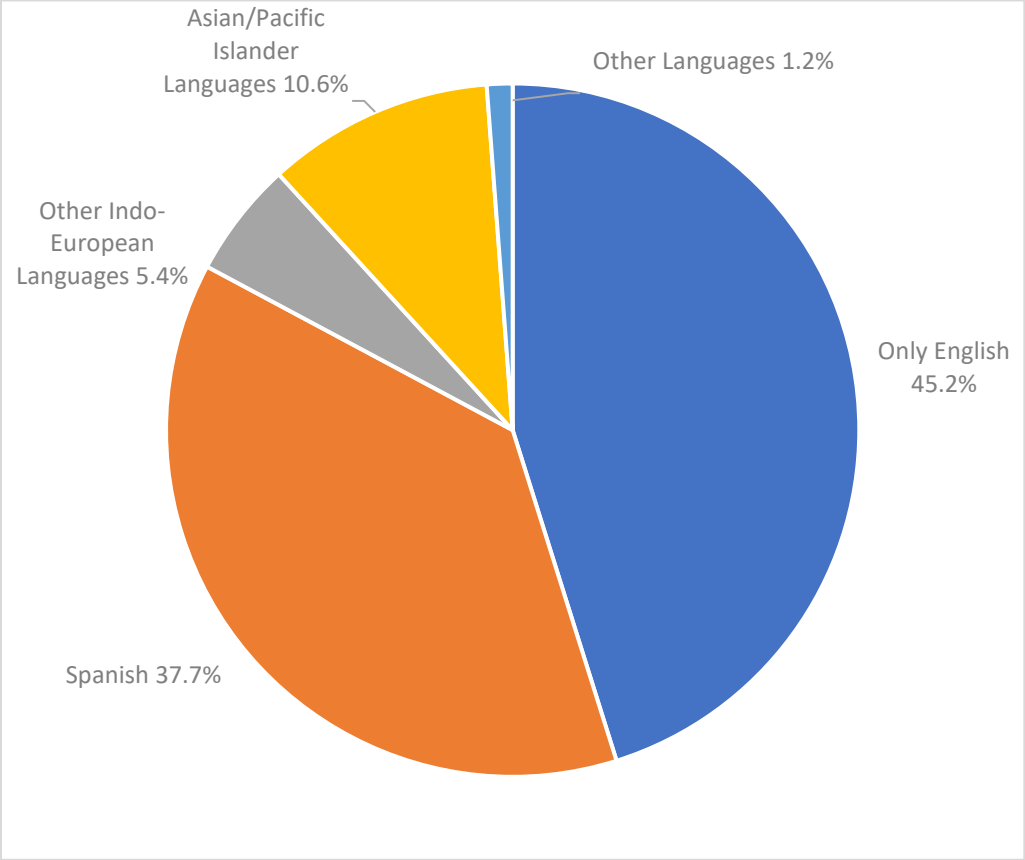


Figure 3-14: Los Angeles County Language Spoken at Home

3.5 Economy

3.5.1 Income

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

In the most recent 5-year estimates from the U.S. Census Bureau's American Community Survey, per capita income in Los Angeles County was $37,924 and the median household income was $76,367. It is estimated that 16.8 percent of households receive an income between $100,000 and $149,999 per year

and 21.5 percent of household incomes are above $150,000 annually. The Census Bureau estimates that 10.2 percent of the population in the County lives below the poverty level (U.S. Census, 2021c).

3.5.2 Industry, Business and Institutions

Los Angeles County's economy is strongly based in the education/health care/social service industry (21 percent of employment), followed by professional/scientific/management/administrative (13 percent) and retail trade (10 percent). Natural resource industries (<1 percent), and wholesale trade (3 percent) are the industries making up the smallest sources of the local economy. Figure 3-15 shows the breakdown of industry types in the County. (U.S. Census, 2021c).

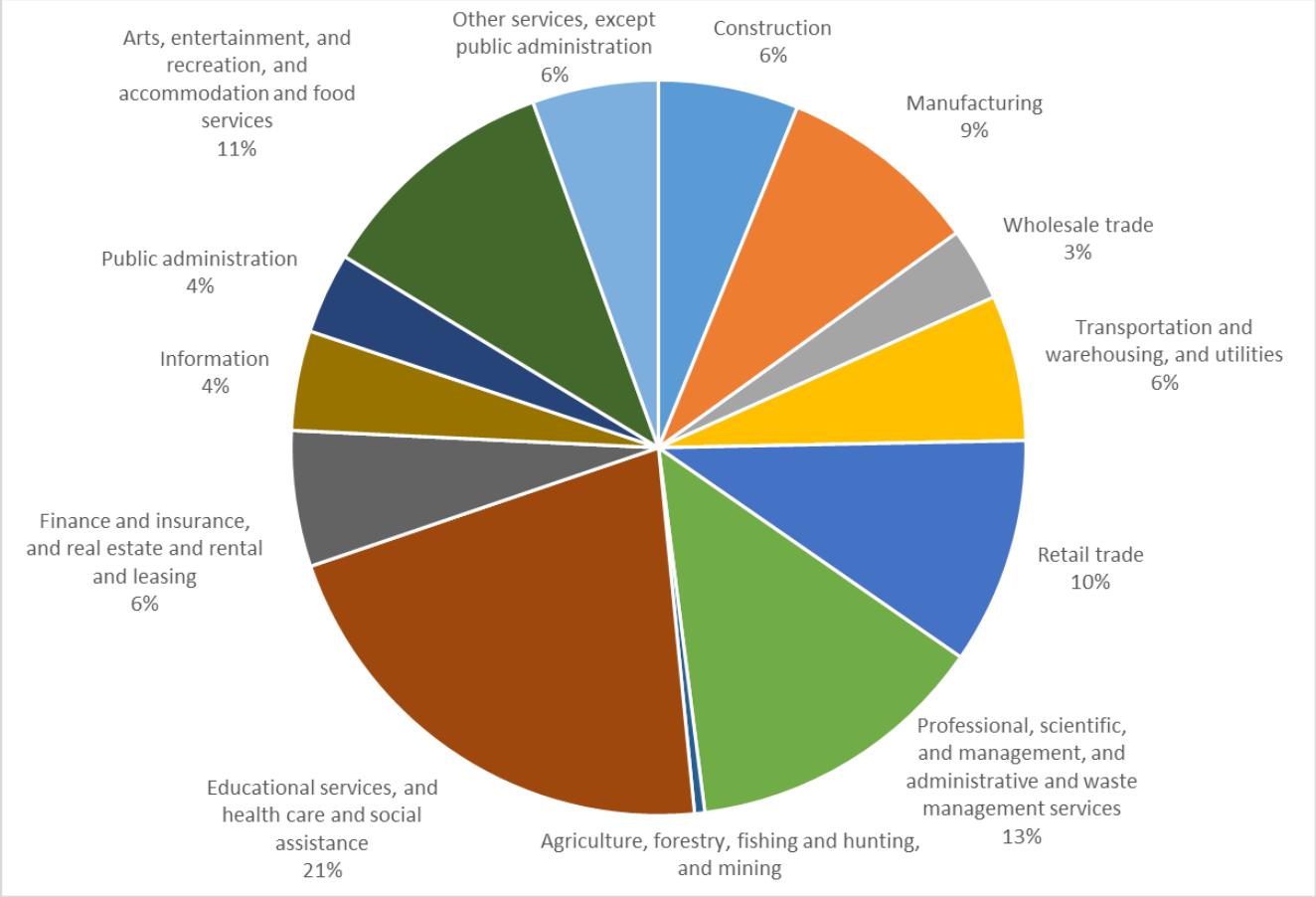


Figure 3-15: Industry in Los Angeles County

Available online data sources identify the following large employers in Los Angeles County (EDD, 2023a; Los Angeles Almanac, 2024):

- Government organizations are among the largest individual employers: Los Angeles County, Los Angeles Unified Schools, the City of Los Angeles, the federal government and the State of California.
- Several universities are major employers, including the University of California Los Angeles, the University of Southern California and the California Institute of Technology.

- Large health-care providers include Kaiser Permanente, Cedars-Sinai Medical Center, Providence Health and Services and Adventist Health.
- Large defense contractors with many employees in the County include Northrup Grumman Corporation, the Boeing Company, Raytheon Company and Lockheed Martin Corporation.
- Major employers in retail include Kroger, Home Depot, Vons and Costco.
- Banks with many employees in the County include Bank of America and Wells Fargo
- Walt Disney Company, Warner Bros. Entertainment Inc., Sony Pictures Entertainment, and NBC Universal are significant employers in the entertainment industry.

3.5.3 Employment Trends and Occupations

According to the 2021 American Community Survey 5-Year Estimates, 64.9 percent of Los Angeles County population 16 years old or older is in the labor force, including 58.9 percent of women in that age range (U.S. Census, 2021c).

Figure 3-16 compares California's and Los Angeles County's unemployment trends from 1990 through 2022, based on data from the U.S. Bureau of Labor Statistics (BLS, 2022) and the California Employment Development Department (EDD, 2023b). From a low of 4.8 percent in 2006, Los Angeles County's unemployment rate rose to a peak of 12.6 percent in 2010 and declined to a low of 4.3 percent in 2016. The unemployment rate rose to a peak of 12.3 percent in 2020 and has declined since then to a low of 4.9 percent in 2022.

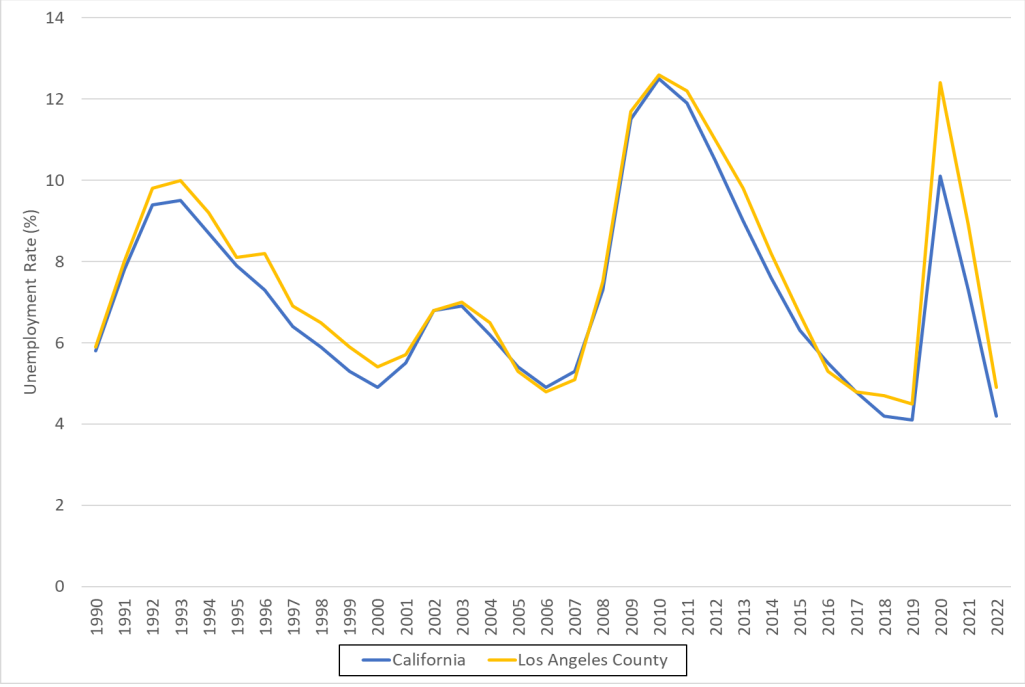


Figure 3-16: California and Los Angeles County Unemployment Rate

Figure 3-17 shows Census Bureau estimates of employment distribution by occupation category (U.S. Census, 2021c). Management, business, science and arts occupations make up 39.5 percent of the jobs in the County. Sales and office occupations make up 21.3 percent of the local working population. The U.S.

Census estimates that 70.0 percent of workers in the County commute alone (by car, truck or van) to work, and mean travel time to work is 31.4 minutes (U.S. Census, 2021c).

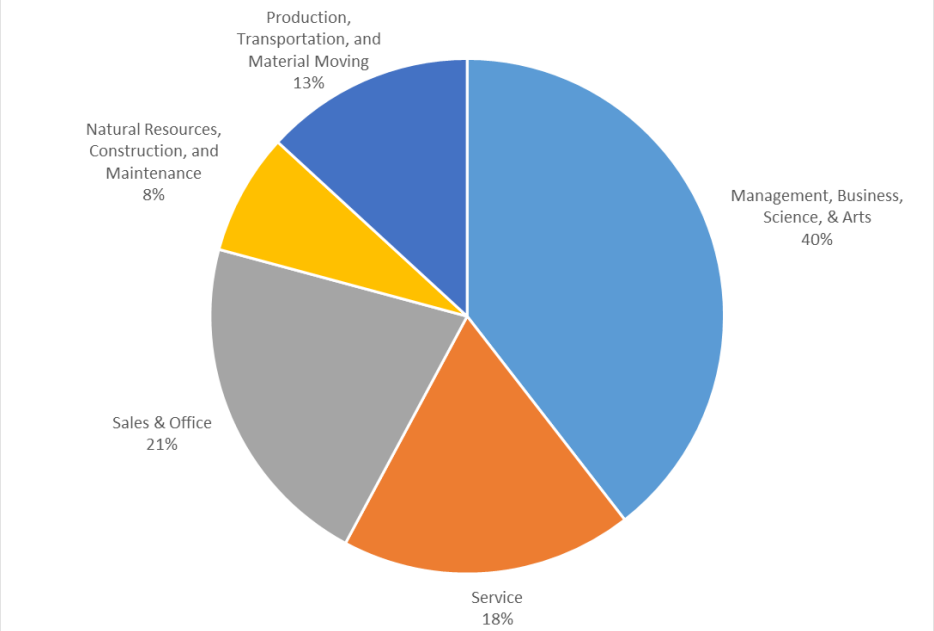


Figure 3-17: Occupations in Los Angeles County

4 Relevant Programs and Regulations

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

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

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

4.1 Federal and State

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

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

Agency, Program or Regulation	Local Relevance and Response
National Flood Insurance Program	The NFIP provides flood insurance against potential losses from flooding for participating property owners. Los Angeles County participates in the NFIP and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1980, and the first Los Angeles County Flood Insurance Rate Map (FIRM) was issued December 2, 1980. The index date for the current FIRMs is June 2, 2021. Los Angeles County is currently in good standing with the provisions of the NFIP as monitored by FEMA Region IX and the California Department of Water Resources. Table 4-7 (at the end of this chapter) summarizes the NFIP capability of Los Angeles County. NFIP regulations are detailed in 44 Code of Regulations (CFR). 44 CFR regulations provide policies and procedures for disaster assistance, flood insurance, and floodplain management criteria. In 2023, the NFIP pricing approach, Risk Rating 2.0, was fully implemented. Under this pricing approach, flood zones are no longer used for the determination of flood risk and the CRS discount is applied uniformly to all policies throughout the community regardless of whether the structure is located inside the SFHA. Additionally, the Risk Rating 2.0 method for calculating NFIP flood insurance premiums accounts for individual property's actual flood risk and cost to rebuild by considering additional flood risk variables such as flood frequency, river overflow, storm surcharge, coastal erosion, heavy rainfall, distance to a water source, property and structure attributes, and cost to reconstruct (Los Angeles County Public Works, 2024d).
Community Rating System	Los Angeles County has participated in the CRS program since 1990. The County has a Class 6 rating (out of 10 with 1 being the best rating). Under the updated Risk Rating 2.0 pricing approach NFIP policy holders in unincorporated areas of Los Angeles County can receive a 20 percent discount on their NFIP flood insurance premium for residential and nonresidential structures in all flood zones. This equates to average savings of $190 per policy, for a total countywide premium savings of almost $149,029 (FEMA, 2023a). To maintain or improve its rating, the County goes through an annual recertification and re-verification every five years. This plan is developed to help the County maintain or enhance its CRS classification.

Agency, Program or Regulation	Local Relevance and Response
Disaster Mitigation Act of 2000	Los Angeles County, in conjunction with its many emergency services partners, has prepared a local all-hazards mitigation plan that sets strategies for coping with the natural and man-made hazards. The scope of this plan is for the unincorporated County areas only. The plan correlates information from County departments with known and projected hazards that face Southern California. It was formally adopted by the Los Angeles County Board of Supervisors for use in the development of specific cost-effective hazard mitigation proposals. The plan complies with requirements of FEMA and the Governor's Office of Emergency Services and was first approved by both agencies in 2014. It had a 5-year performance period through 2019 and an updated All-Hazard Mitigation Plan was approved in 2020.
Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014	The Biggert-Waters Flood Insurance Reform Act of 2012 required flood insurance premiums to reflect real flood risk, leading to increased premiums for homeowners. The Homeowner Flood Insurance Affordability Act for 2014 delayed the increases in premiums.
Executive Order 11988: Floodplain Management	Executive Order 11988 requires Federal agencies to avoid long and short-term adverse impacts due to occupancy and modification of floodplains to the extent possible. They are also required to avoid direct or indirect support of floodplain development whenever a practicable alternative is feasible.
Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input	Executive Order 13690 establishes the Federal Flood Risk Management Standard which is a framework to increase resilience against flooding as well as preserve the floodplains' natural values. The Executive Order also sets a process for further consideration of public input.
Executive Order 14030: Climate-Related Financial Risk	This Executive Order requires the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President and National Climate Advisor, in coordination with the Secretary of the Treasury and the Director of the Office of Management and Budget, to develop a comprehensive Government-wide strategy to minimize climate-related financial risk.
Endangered Species Act (ESA)	FEMA suspended processing two types of flood map revision requests in Los Angeles County after July 1, 2023 which will affect requests for Letters of Map Revision Based on Fill (LOMR-F) and Conditional Letters of Map Revision Based on Fill (CLOMR-F). The suspension will last at least until FEMA formally consults with the National Marine Fisheries Service and U.S. Fish and Wildlife Service required by Section 7 of the ESA (FEMA, 2023b).

Agency, Program or Regulation	Local Relevance and Response
Clean Water Act	The Clean Water Act provides regulatory and nonregulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff in order to support propagation of wildlife and recreation in and on the water.
National Incident Management System	Los Angeles County adopted the County of Los Angeles Operational Area Emergency Response Plan in March 2012. The Governor's Office of Emergency Services approved it on August 31, 2011, as fully compliant with the National Incident Management System (NIMS). An update to the plan was completed and approved in November 2023 (Los Angeles County, 2023).
Americans with Disabilities Act	The Americans with Disabilities Act (ADA) intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may implement a special-needs registry to identify the home addresses, contact information and needs of residents who require more assistance for emergency management purposes.
Public Law 8499, Flood Control and Coastal Emergencies (33 U.S.C. 701n) (69 Stat. 186)	This law gives the Corps the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods. It authorizes the Chief of Engineers to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water in the event of drought or contaminated source.

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

Agency, Program or Regulation	Local Relevance and Response
California General Planning Law	The Los Angeles County 2035 General Plan provides a policy framework for how and where the unincorporated County will grow through 2035, while recognizing the County's diversity of cultures, abundant natural resources, and status as an international economic center. The Los Angeles County 2035 General Plan accommodates new housing and jobs in unincorporated areas in anticipation of population growth in the county and the region
California Environmental Quality Act	This updated floodplain management plan does not require California Environmental Quality Act (CEQA) environmental review. It constitutes a feasibility and planning study for possible future actions, which the County has not approved, adopted or funded, and therefore is exempt from CEQA under Section 15262 of the CEQA Guidelines. However, future mitigation actions implemented as recommended by this plan may be subject to CEQA review.
Porter-Cologne Act	The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality.
AB 162: Flood Planning, Chapter 369, Statutes of 2007	Compliance with this law constitutes inclusion of certain General Plan elements. Los Angeles County's compliance with Chapter 369, Statutes of 2007 is described in Section 4.2.1.
AB 2140: General Plans – Safety Element	This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans.
AB 747: General Plans—Safety Element	The safety elements of cities and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies.
Senate Bill (SB) 92 and New Standards for Submitting Dam Inundation Maps	This bill (SB 92, part of the 2017-18 budget package) makes significant legislative changes related to dam safety. It requires dam owners to prepare inundation maps and emergency action plans and provides for fees and enforcement.
SB 379: Land Use, General Plan, Safety Element	Los Angeles County's compliance with SB 379 is described in Section 4.2.1.

Agency, Program or Regulation	Local Relevance and Response
California State Building Code	Los Angeles County has adopted the State's Building Codes by reference, except where the County has made amendments or revisions to apply higher standards such as the NFIP minimum standards for building in floodplains and the ASCE-24 standards. The permitting process in Los Angeles County ensures compliance with the State Building Code.
Standardized Emergency Management System	Los Angeles County has adopted an emergency response plan that is fully NIMS compliant. The County adopted the County of Los Angeles Operational Area Emergency Response Plan in March 2012, then adopted the updated 2023 plan. The Governor's Office of Emergency Services approved Los Angeles County as NIMS compliant on August 31, 2011, and the County has maintained that compliance.
California State Hazard Mitigation Plan	The 2020 County of Los Angeles All Hazards Mitigation plan was determined to be consistent with the state plan by the Governor's Office of Emergency Services during its review and approval of the plan in 2019.
Governor's Executive Order S-13-08	This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects. Climate impact information developed under this executive order is used in the climate change evaluation of this comprehensive floodplain management plan.
Governor's Executive Order N-7-22	This order includes information and requirements on planning for impacts of the ongoing drought, enhancing groundwater management, and promoting water conservation across the state.
California Civil Code 1102	The flood hazard disclosure requirements established under this code apply to all real estate transactions in Los Angeles County.
Local Flood Protection Planning Act	This statute provides guidance on what a flood mitigation plan should include.
Water Code Division 5, Part 2, Chapter 4, Article 4	This code provides floodplain regulations for public agencies within a floodplain or the planning area of a floodplain management plan.
California Coastal Management Program	This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.

Agency, Program or Regulation	Local Relevance and Response
California Civil Code 1102 and California Government Code Section 8589.45	The flood hazard disclosure requirements established under this code applies to all real estate transactions in Los Angeles County. and In every lease or rental agreement for residential property entered into on or after July 1, 2018, the owner or person offering the property for rent must disclose to the tenant any known flood hazards.

4.2 Local

4.2.1 General Plan

The Los Angeles County 2035 General Plan, adopted in October 2015 and updated in July 2022, is the latest update to the County of Los Angeles General Plan. It provides a policy framework for how and where the unincorporated County will grow through 2035. It accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the broader region. The General Plan includes the following elements (Los Angeles County Department of Regional Planning, 2022):

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

General Plan elements that are particularly applicable to implementation of the floodplain management plan are: the Conservation and Natural Resources Element and the Safety Element. The Conservation and Natural Resources Element guide the long-term conservation of natural resources and preservation of available open space areas, and the Safety Element, which reduces the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards. By including these elements, the Los Angeles County General Plan is in compliance with the First Validating Act of 2023. This Act refers to California's SB-878 which plays a role in flood planning by validating the organization, boundaries, acts, proceedings, and bonds of public bodies, including flood control districts. This validation is crucial for flood control projects because it verifies the legal and administrative frameworks governing these districts are recognized and upheld.

Conservation and Natural Resources Element

Watershed Management

The Conservation and Natural Resources Element of the General Plan addresses watershed management, noting that it is an effective and comprehensive way to address water resource challenges. Watershed management integrates habitat enrichment and recreation availability with water supply, flood protection, and clean runoff (Los Angeles County Department of Regional Planning, 2022).

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

Significant Ecological Areas and Coastal Resource Areas

The Conservation and Natural Resources Element of the General Plan establishes the Significant Ecological Area (SEA) designation for land in unincorporated areas that contains irreplaceable biological resources (SEAs also have been identified in cities, but they function differently from those in unincorporated areas). Coastal Resource Areas (CRAs) are located within the state-designated coastal zone and include biological resources equal in significance to SEAs. The General Plan identifies 21 SEAs and eight CRAs. Two CRAs are linked to SEAs that are not entirely within CRAs (the Santa Monica Mountains Coastal Zone and Palos Verdes Coastline) (Los Angeles County Department of Regional Planning, 2022). Table 4-3 and Figure 4-1 present the SEAs and CRAs within unincorporated Los Angeles County.

Table 4-3: Significant Ecological Areas and Coastal Resource Areas in Unincorporated Los Angeles County

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

*A portion of the area is within the unincorporated area.

The objective of the SEA program is to conserve genetic and physical diversity by designating biological resource areas that are capable of sustaining themselves into the future. However, SEAs are not wilderness preserves. Much of the land in SEAs is privately held, used for public recreation, or abuts developed areas. The SEA program must therefore balance the overall objective of resource preservation against other critical public needs. The General Plan goals and policies are intended to ensure that privately held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs (Los Angeles County Department of Regional Planning, 2022).

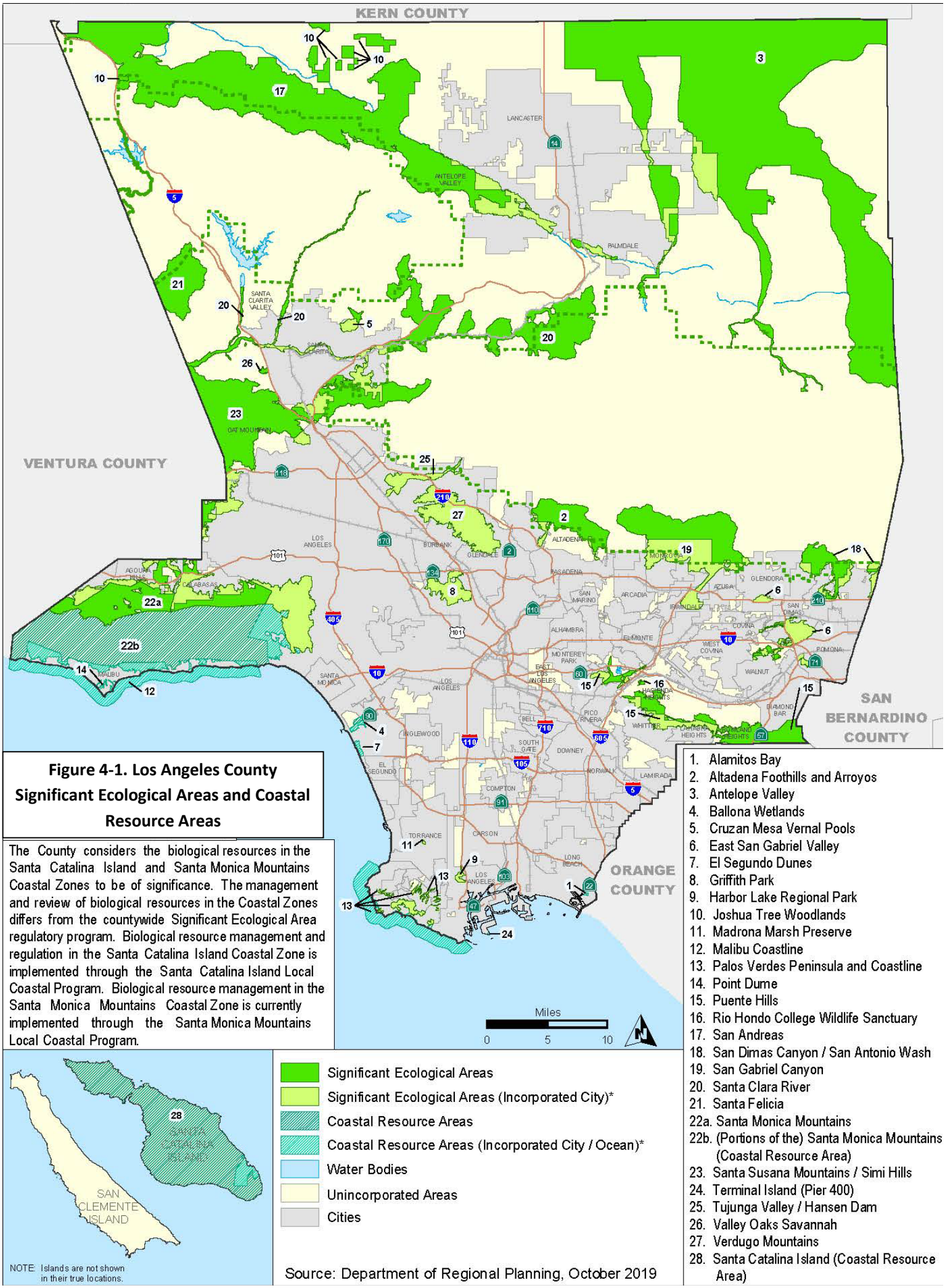


Figure 4-1. Los Angeles County Significant Ecological Areas and Coastal Resource Areas

The County considers the biological resources in the Santa Catalina Island and Santa Monica Mountains Coastal Zones to be of significance. The management and review of biological resources in the Coastal Zones differs from the countywide Significant Ecological Area regulatory program. Biological resource management and regulation in the Santa Catalina Island Coastal Zone is implemented through the Santa Catalina Island Local Coastal Program. Biological resource management in the Santa Monica Mountains Coastal Zone is currently implemented through the Santa Monica Mountains Local Coastal Program.

- Significant Ecological Areas
- Significant Ecological Areas (Incorporated City)*
- Coastal Resource Areas
- Coastal Resource Areas (Incorporated City / Ocean)*
- Water Bodies
- Unincorporated Areas
- Cities

1. Alamitos Bay
2. Altadena Foothills and Arroyos
3. Antelope Valley
4. Ballona Wetlands
5. Cruzan Mesa Vernal Pools
6. East San Gabriel Valley
7. El Segundo Dunes
8. Griffith Park
9. Harbor Lake Regional Park
10. Joshua Tree Woodlands
11. Madrona Marsh Preserve
12. Malibu Coastline
13. Palos Verdes Peninsula and Coastline
14. Point Dume
15. Puente Hills
16. Rio Hondo College Wildlife Sanctuary
17. San Andreas
18. San Dimas Canyon / San Antonio Wash
19. San Gabriel Canyon
20. Santa Clara River
21. Santa Felicia
22a. Santa Monica Mountains
22b. (Portions of the) Santa Monica Mountains (Coastal Resource Area)
23. Santa Susana Mountains / Simi Hills
24. Terminal Island (Pier 400)
25. Tujunga Valley / Hansen Dam
26. Valley Oaks Savannah
27. Verdugo Mountains
28. Santa Catalina Island (Coastal Resource Area)

Source: Department of Regional Planning, October 2019

Safety Element

Flooding is among the natural hazards addressed in the Safety Element of the General Plan. The element presents goals and policies for uses in flood hazard zones, as well as tsunami hazard areas and potential dam failure inundation areas. The Safety Element of the County's General Plan was updated July of 2022 and is in compliance with the provisions of California's SB 379.

4.2.2 Community-Based Plans

The Los Angeles County General Plan (2022) serves as the foundation for community-based plans, such as area plans, community plans, and coastal land use plans. Area plans focus on land use and policy issues that are specific to the planning area. Community plans cover smaller geographic areas within the planning area and address neighborhood and/or community-level policy issues. Coastal land use plans are components of local coastal programs; they regulate land use and establish policies to guide development in the state designated coastal zone. The following is a list of adopted and in-progress community-based plans in unincorporated Los Angeles County:

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

4.2.3 Watershed Management Program

Municipalities and community stakeholders throughout Los Angeles County developed a total of 31 collaborative Watershed Management Programs and Enhanced Watershed Management Programs for the county's six watersheds—Dominguez Channel, Los Angeles River, Los Cerritos Channel, San Gabriel River, Santa Monica Bay and Upper Santa Clara River which can be seen in Figure 3-7. Each Watershed Management Group meets regularly to implement its plan (California Water Boards, 2022a).

Each plan identifies programs and projects to improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve aesthetics, and support public education. Each includes water quality priorities, watershed control measures, the scheduling of projects, and

monitoring, assessment and adaptive management for projects. The plans rely heavily on three approaches:

- **Regional Multi-Benefit Projects**—Regional multi-benefit projects, such as the Alondra Park Multi-Benefit Stormwater Capture Project, retain, divert or treat stormwater and non-stormwater from sub watershed areas, while also providing water conservation, flood, recreation, habitat and other benefits. The Alondra Park Multi-Benefit Stormwater Capture Project, seen in Figure 4-2, is located in El Camino Village, Lawndale, CA and will capture and divert or treat stormwater from 4,495 acres of land (Los Angeles County Public Works, 2023a).



Figure 4-2: Alondra Park Multi-Benefit Stormwater Capture Project

- **Green Street Projects**—Green Street projects such as the 103rd Street Green Improvement Project, improve streets, sidewalks or other paved areas using permeable materials and drought-tolerant plants to capture, clean or infiltrate rainwater. Green infrastructure projects help to clean surface water bodies, recharge groundwater, beautify neighborhoods, and cool communities by increasing the amount of vegetation. The 103rd Street Green Improvement Project will construct a green street through 103rd street and portions of Ted Watkins Park to collect dry weather runoff and stormwater. The street will also be rehabilitated with improved sidewalks, curbs, and pavement (Los Angeles County Public Works, 2023b).
- **Low Impact Development**—Low impact development consists of site design approaches and best management practices that address runoff and pollution at the source. These practices can

effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.

4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan

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

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

4.2.5 Los Angeles County Flood Control District

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

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

The Flood Control District boundaries encompass more than 2,700 square miles, six major watersheds, 86 incorporated cities, and the unincorporated County areas. The boundary does not encompass communities north of Avenue S. It excludes communities in Antelope Valley. Information on Antelope Valley's Plan is found in the following sections. A map of the LACFCD can be found using the link above. The Flood Control District's municipal flood protection and water conservation system is one of the largest in the world. It includes 14 major dams and reservoirs, 491 miles of open channels, 27 spreading grounds, 189 debris basins, operates 61 pump stations, 3,400 miles of underground storm drains, and an estimated 97,466 catch basins. Planning efforts to rehabilitate flood control facilities also consider other potential beneficial uses of those facilities, such as environmental restoration, enhancement of water quality, and recreation (Los Angeles County Public Works, 2023c).

4.2.6 Antelope Valley Comprehensive Plan and Amendments

Los Angeles County prepared and adopted the Antelope Valley Areawide General Plan in 1986, a comprehensive plan for the unincorporated County area of Antelope Valley. The Plan was updated in June 2015, renamed the Antelope Valley Area Plan. The Antelope Valley differs from other parts of the County because it lacks an ocean drainage outlet. It also lacks defined natural channels below the foothills, as well as an adequate flood control system, resulting in unpredictable and varying flood risk across the valley floor. The Plan explores flood control and water conservation measures to reduce the negative effects of regional private development and to better address local flood hazard needs. It seeks to provide a cohesive approach to drainage, stormwater management, and flood risk mitigation. The Plan evaluates the fee structures available to finance drainage solutions (Los Angeles County Public Works, 1987). Two amendments to the original plan update costs and drainage fees to continue implementing recommended improvements (Los Angeles County Public Works, 1991 and 2006). The most recent update to the plan in 2015 provided for zone changes, including residential, agricultural, commercial, industrial, special purpose, C-RU (rural commercial) and MXD-RU (rural mixed use) zones (Los Angeles County Department of Regional Planning, 2015).

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

The Antelope Valley IRWM group developed a water resource management plan in 2007. The 2007 plan was updated in 2013 and again in 2019 to include new information as required by the California Department of Water Resources' 2016 IRWM Proposition 1 Guidelines as well as updates to information from the previous IRWM. The 2019 Antelope Valley IRWM Plan explores key issues, including uncertain and variable water supply, water demand exceeding supply, water quality and flood management, environmental resources, water management and land use, and climate change. It identifies and prioritizes a series of projects to address key concerns in the region, particularly those related to water supply (Antelope Valley Integrated Regional Water Management Group, 2019).

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

4.2.8 Upper Santa Clara River Watershed IRWM

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

4.2.9 Sediment Management Strategic Plan

The Los Angeles County Flood Control District developed a Sediment Management Strategic Plan in response to challenges in managing sediment. These challenges included wildfires occurring in 2007 and 2009 that led to an increased inflow of sediment and debris and increased pressure on the capacity of sediment placement sites. This plan provides an overview of sediment management issues and evaluates various projects. The plan, designed to be effective from 2012 to 2032, is guided by the following objectives (Los Angeles County Public Works, 2013):

- Maintaining flood risk management and water conservation
- Recognizing opportunities for increased environmental stewardship
- Reducing social impacts related to sediment management
- Identifying ways to use sediment as a resource
- Ensuring that the Flood Control District is fiscally responsible in its decision-making.

4.2.10 Local Coastal Programs

Los Angeles County local coastal programs (LCPs) comply with the 1976 Coastal Act, enacted by the California Legislature, which requires coastal cities and counties to establish coastal resource conservation and development programs. The LCPs consist of planning and regulatory measures that manage development in the coastal zone. Each LCP includes a land use plan and implementation program. LCPs must consider the unique factors of the coastal community, as well as regional and state concerns. There are five coastal areas within the unincorporated Los Angeles County jurisdiction: the Santa Monica Mountains, Marina Del Rey, Santa Catalina Island, San Clemente Island and Ballona Wetlands Area A. Of these five areas, three have certified LCPs: Marina del Rey, Santa Catalina Island, and the Santa Monica Mountains. Certified LCPs are not required for San Clemente Island or Ballona Wetlands Area A. (Los Angeles County Department of Regional Planning, 2023).

4.2.11 Los Angeles County Low Impact Development Ordinance

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

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

In 2014 Los Angeles County created the Low Impact Development Standards Manual to comply with requirements of the National Pollutant Discharge Elimination System MS4 Permit for discharges within

the coastal watersheds of Los Angeles County. The manual provides guidance in new development as well as redevelopments within unincorporated areas of Los Angeles County. Its intent is to improve water quality and mitigate potential water quality impacts from stormwater and non-stormwater discharges.

4.2.12 County of Los Angeles Operational Area Emergency Operations Plan

The County of Los Angeles Operational Area Emergency Operations Plan provides details for coordinated response to large-scale emergency situations in the County, whether natural, man-made, or technological. In 2023, the 2012 Operational Area Emergency Response Plan was updated and renamed the County of Los Angeles Operational Area Emergency Operations Plan. It focuses on potentially catastrophic disasters that require more than normal response measures. It reviews capabilities in prevention, protection, response, recovery, and mitigation. It describes continuity of government plans and provides guidance for specific situations, including tsunamis, oil spills, and terrorism (Los Angeles County, 2023).

4.2.13 Topanga Creek Watershed Management Plan

The Topanga Creek Watershed covers 18 square miles, has the greatest diversity of native plants and animals of all the watersheds in the Santa Monica Mountains, and is the third largest drainage into the Santa Monica Bay. In 2002, the Topanga Creek Watershed Committee updated its original 1996 Topanga Creek Watershed Management Study with new preventive planning strategies and best management practices. These projects and practices were developed to maintain and enhance the watershed's current physical, chemical, biological, economic, and social characteristics, including its diversity in land use (i.e., residential, business development, infrastructure, wilderness recreation, and biological habitat). The plan also seeks to protect life and property from vulnerability to natural hazards such as stormwater runoff, floods, earthquakes, and wildfires (Topanga Creek Watershed Committee, 2002).

4.2.14 Rio Hondo Watershed Management Plan

The 2018 Rio Hondo Watershed Management Plan provides goals and strategies to all affected municipalities and conservation organizations as a way to improve water quality, health, habitat and recreational opportunities for the Rio Hondo watershed. The Rio Hondo watershed is a sub-watershed of the Los Angeles River watershed and is linked to the San Gabriel River watershed as a result of both natural hydrologic processes and human intervention. The watershed contains both rural and urban areas, with the San Gabriel Mountains and Angeles National Forest defining the upper reaches and the more urban and developed San Gabriel Valley below the foothills. The watershed encompasses 22 cities and six unincorporated communities in Los Angeles County (California Water Boards, 2022b).

4.2.15 Gateway Watershed Management Program

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

4.2.16 Los Angeles River Master Plan and Corridor Highlights

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

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

In 2005, the County released the Master Plan and Corridor Highlights document, which provides information about Master Plan projects implemented since the Master Plan's adoption and those planned for future construction. Many of the projects are structural but highlights also include natural resource preservation and education and outreach projects. Where sufficient data was available, the report documents specific benefits as well as implementation and location information (Los Angeles County Public Works, 2005a). Los Angeles County updated the 1996 Los Angeles River Master Plan in 2022. The plan update was developed through four phases: analysis of existing plans and regional context, proposing changes for the future, drafting the update, and final plan update. Members of the public, a steering committee appointed by the Board of Supervisors made up of 41 organizations, and a Los Angeles County Public Works technical team were the three main groups that provided input during these phases. (Los Angeles County Public Works, 2022b)

4.2.17 Los Angeles County Annual Hydrologic Reports

Los Angeles County releases an annual report containing hydrologic data relevant to the County; the most recent report covers 2021 through 2022. The report is organized into eight major sections providing background and statistics on the following areas (Los Angeles County Public Works, 2024e):

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

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

4.2.18 Los Angeles County Flood Control District and Los Angeles County Drainage Area Systems

In 1915, the State Legislature created the Los Angeles County Flood Control District, shown in Figure 4-3, to control floods and conserve water. Early Flood Control District bond issues financed construction of 14 dams in the San Gabriel Mountains as well as flood channel modifications. The federal Emergency Relief Appropriations Act of 1935 financed the construction of Eaton Wash Dam and several of the County's first debris basins. The federal 1935 Act and Flood Control Act of 1936 made the Army Corps of Engineers a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities. The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the LACDA study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel and Ballona Creek. Flood control facilities in the Flood Control District and LACDA system fall into four general categories: debris basins, flood control reservoirs, improved tributary channels, and improved main channels. In total, the combined Flood Control District and LACDA systems consist of over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 14 flood control and stormwater capture dams, and five flood control dams.



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Los Angeles County Floodplain Management Plan

Figure 4-3: Los Angeles County Flood Control District Area

Source: Los Angeles County Department of Public Works, 2023

Issued: 4/19/2024

4.2.19 Trash Best Management Practices

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

4.2.20 Los Angeles County Response to ADA

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

- Maintaining independence
- Communication
- Transportation
- Supervision
- Medical care.

These populations may include any of the following:

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

Reasonable Accommodations Ordinance

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

Plan Action Implementation

The ADA protocol will be applied when implementing any actions in this plan that could impact individuals with disabilities and access and functional needs. This will involve measures such as review by the Los

Angeles County Inclusive Emergency Management Advisory Committee or whatever protocol has been established by the County at the time of project implementation.

4.2.21 Los Angeles County Repetitive Loss Area Analysis 2025

Los Angeles County prepared and adopted a repetitive loss areas analysis pursuant to Section 512.B of the CRS Coordinators Manual as part of the 2015 floodplain management planning effort. This document was developed as a companion document to the County's Floodplain Management Plan. A repetitive loss area analysis is a detailed mitigation plan for a repetitive loss area. It provides more specific guidance on how to reduce damage from repetitive flooding than a community-wide floodplain management or hazard mitigation plan. Before beginning the repetitive loss areas analysis process, the community must review its repetitive loss list to determine if any properties have been mitigated or incorrectly assigned to the community. As part of this 2025 update to the Los Angeles County Floodplain Management Plan, the repetitive loss areas analysis was reviewed and fully updated pursuant to CRS requirements and has been fully integrated into this plan as a functional appendix. The two plans were updated through one process and both plans' implementation and maintenance are merged for oversight by Los Angeles County Public Works.

4.3 Capability Assessment

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

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

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

Table 4-4: Los Angeles County Legal and Regulatory Capability

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Codes, Ordinances & Requirements				
Building Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code: Title 26 – Building Code Title 30 – Residential Code				
Zoning Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning				
Subdivisions	Yes	Yes	No	No
Comment: County of Los Angeles County Code, Title 21 – Subdivision Code. The California State Subdivision Map Act sets out how long a map approval can be valid, and the County cannot grant time longer than that.				
Post-Disaster Recovery	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 2 – Administration, Division 3 – Departments and Other Administrative Bodies, Chapter 2.68 – Emergency Services, Part 6 – Director of Recovery Operations				
Flood Damage Prevention Ordinance	Yes	No	No	No
Comment: County of Los Angeles County Code: Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation Title 20, Division 5, Chapter 20.94 – Channels Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control				
Low-Impact Development Standards	Yes	No	No	Yes
Comment: County of Los Angeles Code, Title 12 – Environmental Protection, Chapter 12.84 Low Impact Development Standards				
Real Estate Disclosure	Yes	No	No	Yes
Comment: State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1103.2)				
Growth Management	No	No	Yes	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning, Chapter 22.46 – Specific Plans. Specific Plans are available for Santa Catalina Island, Marina Del Rey, Universal Studios, and East Los Angeles Third Street. Chapter 22.44- Land Use Plan for Santa Monica Mountains Coastal Zone				
Site Plan Review	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 22 and Title 26 – Building Code, Chapter 1 – Administration, Inspections				
Special Purpose (flood management, critical areas)	–	–	–	–

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
County of Los Angeles County Code, Title 11 – Health and Safety, Division 2 – General Hazards, Chapter 11.52 – Water Hazards. County of Los Angeles County Code, Title 11 – Health and Safety, Division 3 – Miscellaneous Regulations, Chapter 11.60 – Floodways and Water Surface Elevations. County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.80 – Stormwater and Runoff Pollution Control. County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.20 – Depositing Petroleum Products on Beaches or into Pacific Ocean. County of Los Angeles County Code, Title 20 – Utilities, Division 5 – Flood Control District Property and Facilities. County of Los Angeles County Code, Title 31 – County Green Building Standards Code. County of Los Angeles County Code, Flood Control District Code, Chapter 21 – Stormwater and Runoff Pollution Control.				
Planning Documents				
General Plan	Yes	No	No	Yes
The *Los Angeles County 2035 General Plan*, adopted by the Los Angeles County Board of Supervisors on October 6, 2015, provides a policy framework for how and where the unincorporated County will grow through 2035. Comprising 2,650 square miles, unincorporated Los Angeles County is home to over one million people. The General Plan accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the region.				
Capital Improvement Plan	Yes	No	No	No
Los Angeles County Public Works develops and implements capital projects, and manages projects implemented by consultants. The 2035 General Plan Implementation Program identifies a goal project of Public Works and the Department of Regional Planning jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas. Some current community plans have capital improvements listed, but level of detail varies based on community and plan age.				
Economic Development Plan	Yes	No	No	No
Los Angeles County Strategic Plan for Economic Development, 2016 2035 General Plan, Chapter 14 – Economic Development Element. Available online.				
Floodplain or Basin Plan	Yes	No	No	No
Los Angeles County Floodplain Management Plan, 2020. Available online.				
Stormwater Plan	Yes	No	Yes	Yes
Low Impact Development Standards Manual, February 2014.				
Watershed Management Plan	Yes	No	Yes	No
Enhanced Watershed Management Programs submitted and approved by the Los Angeles Regional Water Quality Control Board include: Alamitos Bay/Los Cerritos Channel, Ballona Creek, Dominguez Channel, Marina Del Ray, Palos Verdes, Rio Hondo, Santa Monica Bay, and Upper Los Angeles River. All available online.				
Habitat Conservation Plan	Yes	No	Yes	No
2035 General Plan, Chapter 9 – Conservation and Natural Resources Element, Significant Ecological Areas. Available online. The General Plan has policies related to habitat and resource conservation, but the Conservation and Natural Resources Element is not the equivalent of a habitat conservation plan. Other regulatory authority lies with the California Department of Fish & Wildlife or the U.S. Fish & Wildlife Service, depending upon the species.				
Shoreline Management Plan	Yes	No	No	Yes
Los Angeles County Stormwater Monitoring Reports, Section 1.1.1.4 – Shoreline Monitoring (released annually and with most recent report of 2014-2015) Local Coastal Program (LCP) • Santa Monica Mountains LCP, adopted on August 26, 2014, and certified on October 10, 2014 • Marina Del Rey LCP, adopted in 1996, and amended and certified in 2012 • Santa Catalina Island LCP, adopted on March 15, 1983, and certified on November 17, 1983 All available online.				
Emergency Response Plan	Yes	No	No	Yes
County of Los Angeles Operational Area Emergency Operations Plan (ERP), 2023. Available online.				

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Post-Disaster Recovery Plan	Yes	No	No	No
Recovery Annex to the Emergency Response Plan Emergency Response Plan, Section 2.7: Recovery Considerations also reviews County Recovery Procedures.				
Sediment Management Plan	Yes	No	No	No
Sediment Management Strategic Plan, 2012-2032. Available online.				
Continuity of Operations Plan	Yes	No	No	Yes
All Los Angeles County departments and/or divisions must develop, exercise, and maintain plans for business continuity functions and processing resources. Each department and/or division must develop a plan for its business operations that can sufficiently support the service requirements of other operations and functions involved in the incident. Plans must address the full range of resources including data processing, data communications links, personnel, personal computers, terminals, workspace, voice communication, and documents. Additionally, Chapter 3 of the Emergency Response Plan includes Continuity of Government information.				
Water Resource Management Plan	Yes	No	Yes	Yes
Greater Los Angeles County Region Integrated Regional Water Management Plan, 2017, Antelope Valley Integrated Regional Water Management Plan, 2019, Upper Santa Clara River Watershed Integrated Regional Water Management Plan, 2018.				
Best Management Practices	–	–	–	–
Technical Report of Trash Best Management Practices, 2004 These best management practices were identified and evaluated to provide effective alternatives to meet the goals of the trash total maximum daily load for Los Angeles River and Ballona Creek.				

Table 4-5 summarizes the administrative and technical capability of Los Angeles County. This table inventories the staff resources available to Los Angeles County to help with flood hazard mitigation planning and the implementation of specific mitigation actions.

Table 4-5: Administrative and Technical Capability

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Los Angeles County Public Works (Public Works) Land Development Division; Los Angeles County Department of Regional Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works Geotechnical and Materials Engineering Division; Public Works Building and Safety Division
Planners or engineers with an understanding of flooding hazards	Yes	Public Works Geotechnical and Materials Engineering Division; Public Works Stormwater Engineering Division and associated subdivisions
Staff with training in benefit/cost analysis	Yes	Public Works multiple divisions, including the Stormwater Planning Division
Floodplain manager	Yes	Public Works Stormwater Engineering Division

Staff/Personnel Resources	Available?	Department/Agency/Position
Surveyors	Yes	Public Works Survey/Mapping and Property Management (Land Records) Division
Personnel skilled or trained in GIS applications	Yes	Public Works Survey/Mapping and Property Management (Land Records) Division; Public Works Stormwater Engineering Division; Public Works GIS Managers; and Los Angeles County Department of Regional Planning
Scientists familiar with flooding hazards in local area	Yes	Public Works Stormwater Engineering Division and associated subdivisions
Emergency manager	Yes	Public Works Emergency Management Group; Los Angeles County Office of Emergency Management
Grant writers	Yes	Public Works Stormwater Planning Division, Stormwater Engineering Division, Community Services and Government Relations Group, and Transportation Planning and Programs Division; Los Angeles County Office of Emergency Management

Table 4-6 summarizes fiscal capabilities of Los Angeles County. It identifies what financial resources (other than grants) are available to the County to support the implementation of floodplain management actions.

Table 4-6: Fiscal Capability

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding (Flood Control District)	Yes
Authority to Levy Taxes for Specific Purposes	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
State and Federal Sponsored Grant programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Measure W (Safe Clean Water Program)	Yes

Table 4-7 summarizes community-based classification programs that rate facets of a community's floodplain management capability. The Community Rating System is described in Section 1.4 and Appendix A. The Building Code Effectiveness Grading Schedule assesses the building codes in effect in a community and how the community enforces them, with emphasis on mitigation of losses from natural

hazards. The National Oceanic and Atmospheric Administration administers the StormReady and TsunamiReady programs. StormReady helps arm communities with communication and safety skills needed to save lives and property before, during and after an event. It helps community leaders and emergency managers strengthen local safety programs.

Table 4-7: Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	6	4/01/2022
Building Code Effectiveness Grading Schedule	Yes	2/2	2015
StormReady	No	N/A	N/A
TsunamiReady	No	N/A	N/A

Table 4-8 summarizes the County's participation in national flood-related programs. These programs rank the County's capabilities to implement flood hazard reduction programs such as building code enforcement and flood warning and response activities.

Table 4-8: National Flood Insurance Program Compliance

NFIP Criteria	County Information
Department Responsible for Floodplain Management	Los Angeles County Public Works Stormwater Engineering Division
Community's Floodplain Administrator	Los Angeles County Public Works Stormwater Engineering Division
Number of Certified Staff Floodplain Managers	N/A

NFIP Criteria	County Information
Date of Adoption of Flood Damage Prevention Ordinance	County of Los Angeles County Code: • Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites, last amended by ordinance 2013-0048 § 2, effective 2013 • Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations, last amended by ordinance 2016-0062 § 2, effective 2016 • Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard, last amended by ordinance 11665 § 38, effective 1978 • Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation, last amended by ordinance 11665 § 39, effective 1978 • Title 20, Division 5, Chapter 20.94 – Channels, last amended by ordinance 86-0032 § 1, effective 1986 • Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control, last amended by ordinance 1494 Ch. 7 Art. 5 § 705.1, effective 1926
Most Recent Community Assistance Visit or Community Assistance Contact	Last Community Assistance Visit: December 19, 2019 Community Assistance Visit Report: July 13, 2020 Community Assistance Visit Closed: January 19, 2021 Issues: None
NFIP Compliance Violations	No issues that would render Los Angeles County out of full compliance with the provisions of the NFIP were identified during the last Community Assistance Visit.
Flood Hazard Mapping	Flood hazard mapping has been identified as an issue that needs to be addressed by this planning process. See Section 6.14 lists mapping issues, which are addressed by Mitigation #33 (Chapter 11).
Floodplain Management Staff Training	Los Angeles County Public Works Stormwater Engineering Division staff actively participate in programs of the Floodplain Management Association as well as other trainings offered by the state and FEMA where feasible. County staff welcomes opportunities for training on floodplain management programs and principles.

NFIP Criteria	County Information
CRS Participation and Classification	Los Angeles County has participated in the CRS since 10/1/1991 and is currently rated a CRS Class 6

Part 2 – Risk Assessment

5 Risk Assessment Methodology

5.1 Purpose of Risk Assessment

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

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

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

- Identify and profile the flooding hazard (CRS Step 4); the following information is given:
  - Principal sources of flooding in the planning area
  - Major past flood events
  - Geographic areas most affected by floods
  - Estimated flood event frequency
  - Estimates of flood severity
  - Warning time likely to be available for response
  - Existing flood protection programs and projects
  - Secondary hazards associated with the flood hazard
  - Potential impacts of climate change on flooding
  - Expected future trends that could affect the flood hazard
  - Scenario of potential worst-case flood event
  - Key issues related to floodplain management in the planning area.
- Determine exposure to the flood hazard—Exposure was determined by overlaying flood maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to flood events.
- Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each flood event and assessing structures, facilities, and systems that are exposed.
- Evaluate repetitive loss properties—The County prepared a separate Repetitive Loss Area Analysis in accordance with Section 512. b of the 2017 CRS Coordinators Manual. This

document is provided as a functional appendix to this Comprehensive Floodplain Management Plan.

5.2 Risk Assessment Approach

5.2.1 FEMA's Hazus Software

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

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

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

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

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

- Level 1—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the modeled area.
- Level 2—More accurate estimates of losses require more detailed information about the modeled area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.

- Level 3—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the modeled area. Level 3 involves establishing new damage curves, which is not necessary for flood hazard analyses, because those damage functions are well established

To assess the flood hazard for this plan, a Level 2, user-defined analysis was performed for both general building stock and critical facilities. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. The Hazus default data are enhanced with building and structural data provided to FEMA through the County's Assessor's Office.

5.2.2 Sources of Data Used in Hazus Modeling

Replacement cost values and detailed structure information Available within the Hazus dataset in cooridnation wioth the County Assessor's Office were used to generate the results.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in RS Means Square Foot Costs (RS Means, 2019). This is used by Hazus in determining the structure replacement cost.

The effective Digital Flood Insurance Rate Map for Los Angeles County was used to delineate flood hazard areas and estimate potential losses from the 10-, 50-, 100- and 500-year floods. Table 5-1 lists the Hazus model data available within the current model.

Table 5-1: Hazus Model Data Documentation

Data	Date
Building information such as use code, year built, square footage, and number of stories	2022
Population data	2020
County Floodway	2024
USGS Digital Elevation Model (DEM), 1 acre-sec	2023
U.S. Census	2020
Nationwide Structure Inventory (NSI)	2022
American Community Survey (ACS)	2020
NFIP, Map Production Pro (MPP)	2022
FEMA Flood Maps	2019

5.2.3 Flood Depth Grid Generation

An important input to Hazus for modeling flood damage is a flood depth grid, which defines the depth of floodwater at points covering the flooded area for any given flood event. For this plan, depth grids were prepared for multiple FEMA-mapped flood scenarios (10-, 50-, 100- and 500-year flood events). The following method was used to create the flood depth grid.

The flood depth grids were produced using the Hazus flood model, which utilized a DEM to capture topographic features crucial for understanding flood dynamics. Initially, the study region was defined, focusing on Los Angeles County. Within this area, DEM was generated using Hazus with data sourced from the National Elevation Dataset (NED), ensuring a surface layer resolution of 1 Arc-second.

Using the DEM, Hazus initially develops a stream network based on a defined drainage area threshold, which in this study is set at 10 square miles. Hazus conducts flow path analysis using the DEM to simulate the movement of water across the terrain. This analysis involves calculating the direction of flow from each point on the DEM grid to its neighboring points, utilizing elevation and slope to determine the path for water flow.

After the formation of the stream network, specific reaches within Unincorporated Los Angeles County were manually selected for detailed analysis. Once the desired reaches are selected, the next step involves conducting hydraulic analysis by running hydrological simulations to delineate the floodplain. In this plan, hydraulic analysis was performed considering return periods of 10, 50, 100, and 500 years. Hazus integrates data from flow paths derived from the DEM to define floodplain boundaries. This process maps out the geographic extent where floods are anticipated to propagate under different scenarios.

Following the hydraulic analysis, Hazus provides outputs including flood boundaries and depths for the selected reaches. By integrating hydraulic results with DEM-derived elevation data, Hazus calculates flood depths across the affected area. Hydraulic models within Hazus estimate the elevation of the water surface at multiple points throughout the flooded region. This estimation process involves comparing the water surface elevation against ground elevations from the DEM. The resulting difference determines the depth of floodwaters at various locations within the floodplain.

5.2.4 Mapping

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

5.2.5 Limitations

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

- Incomplete scientific knowledge about flood hazards and their effects on the built environment
- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent and severity of the flood hazard
- Mitigation actions already employed
- The amount of advance notice residents have to prepare for a flood event

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

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

The Hazus model uses FEMA generated flood mapping and available population, structure and flood loss data. This planning tool may over-estimate the extent of flood impacts in some cases. Therefore, the results from the model regarding potential impacts to population, structures, and critical facilities are provided as relative comparisons accounting for the possible conservative nature of the results.

The results of the Hazus model were also post-processed to distinguish results within only the unicorporated area and within delineated watersheds. This was performed using census blocks that are provided in the Hazus output data and are geospatially referenced.

6 Los Angeles County Flood Hazard Profile

Step 4 in the planning process of the Floodplain Management Plan is identifying the sources, frequency, extent and causes of flooding. This section is followed by the assessment of the impact of flooding on people, property, infrastructure, the local economy and natural floodplain functions (Step 5). The following Flood Hazard profile presents a discussion of the location, types, sources and causes of flooding in the County and within the unincorporated area. Also discussed is the flood management infrastructure that has been implemented to protect people and property including dams, levees, debris basins, and channelization. More recently, through ordinances, codes and funding initiatives, green infrastructure is reducing local flooding by restoring natural hydrology.

6.1 General Concepts

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

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

6.1.1 Measuring Floods and Floodplains

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

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

6.1.2 Effects of Human Activities

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

6.1.3 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in biological quantity and diversity. Wetting of the floodplain soil releases a surge of nutrients: nutrients left over from the last flood, and nutrients accumulating from the rapid decomposition of organic matter. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders—particularly birds—move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains particularly valuable for agriculture. For instance, riparian zone species have significant differences from those that grow outside of floodplains. Riparian trees tend to be very tolerant of root disturbance and tend to be very quick-growing compared to non-riparian trees.

6.2 Flooding Types in Los Angeles County

In Southern California, flooding can be the result of heavy precipitation over periods of one or two days. The short streams and steep watersheds emptying onto lowlands that may be heavily populated produce large volumes of water within short periods and damage is often severe. The problem is sometimes compounded by the denuding of large areas of watershed by fire during the previous season (WRCC, 2024). However, there is no single type of flood in Los Angeles County or single area most susceptible to the flood risk. Many types of flooding occur and many areas of the County are affected, for a range of reasons. For example, much of the flooding in the Antelope Valley has resulted from very intense, short-term thunderstorms. These cause high water, severe erosion, damages, mudflow and dangerous flash flooding conditions. The following sections describe the primary flood types and flood hazard areas in the County.

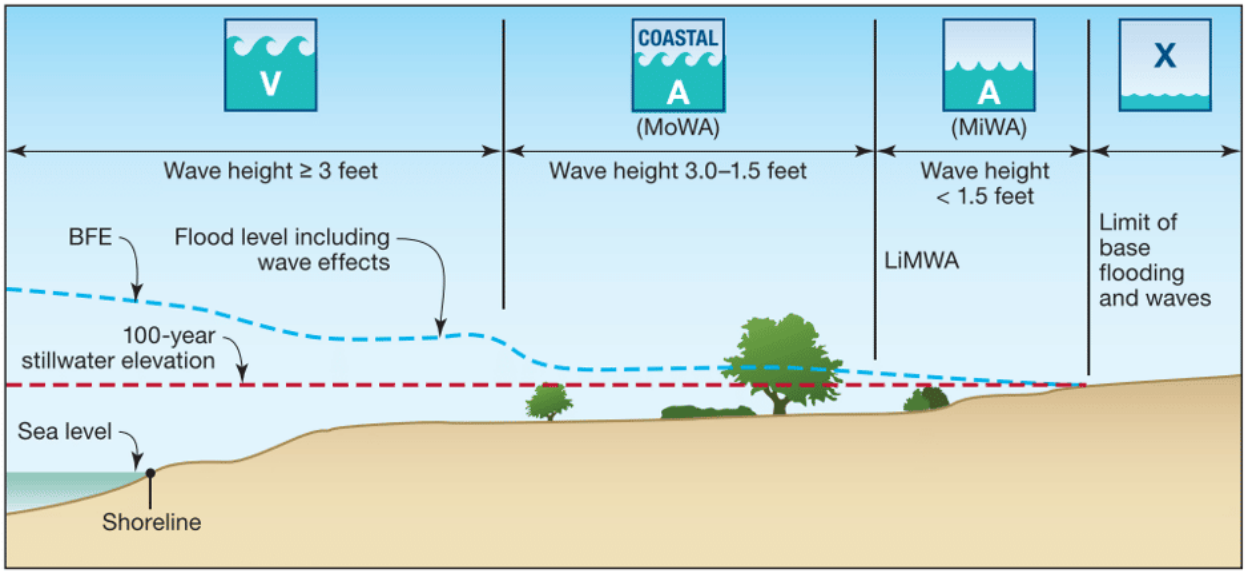
6.2.1 FEMA Special Flood Hazard Areas

SFHAs were digitized in 2008 and Physical Map Revisions of the Digital FIRMs for Los Angeles County were completed in 2018 and 2021 (FEMA, 2024b). These areas include the following:

- Areas of Shallow Flooding (Zone AH)—Shallow flooding occurs in flat areas when there are depressions in the ground that collect ponds of water, areas of sloping land and areas of sheet flow where flood depths range from 1 to 3 feet. Zone AH is found in several unincoroprated Los Angeles County areas.

- Areas of river and stream flood hazard areas (Zone AO)— 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. Zone AO is found in many unincoroprated Los Angeles County areas.
- Riverine Flooding (Zones A, AE, AR, A99)—Flooding that occurs in a river (including tributaries), stream, or brook with a 1% annual chance flood event. These are the most prevalent special flood hazard areas found in unincorporated Los Angeles County areas.
- Regulated Floodways—The regulated floodway consists of a stream channel within the riverine SFHA plus the portion of the overbanks that must be kept free from encroachment in order to convey the 100-year (base flood) event without increasing base flood levels/elevations. Sometimes the flow amount and topography will result in a regulated floodway encompassing the entire width of the floodplain. Many riverine SFHAs in unincorporated Los Angeles County areas have regulatory floodways.
- Coastal Areas (Zones V, VE)—SFHAs along coasts are subject to inundation by the 100-year flood with the additional hazards associated with storm waves. FEMA's Coastal Construction Manual (FEMA, 2011) designates hazard areas along coasts as follows:
    - The coastal high hazard area is Zone V (including Zones VE, V1-30, and V). This zone extends from offshore to the inland limit of a primary frontal dune along an open coast and includes any other area that is subject to high-velocity wave action from storms or seismic sources. The boundary of Zone V is generally based on wave heights (3 feet or greater) or wave run-up depths (3 feet or greater). Zone V can also be mapped based on the wave overtopping rate (when waves run up and over a dune or barrier).
    - Zone A or AE consists of portions of the SFHA that are not within the coastal high hazard area. These zones include both coastal and non-coastal SFHAs. Regulatory requirements of the NFIP for buildings in Zone A are the same for both coastal and riverine flooding hazards. Zone AE in coastal areas is divided by the limit of moderate wave action (LiMWA), which is the landward limit of a 1.5-foot wave (FEMA, 2011).
    - The area between the LiMWA and the Zone V limit is the Coastal A-Zone or the Moderate Wave Action Area. This area is subject to wave heights between 1.5 and 3 feet during the base flood. The area between the LiMWA and the landward limit of Zone A is the Minimal Wave Action Area, and is subject to wave heights less than 1.5 feet during the base flood.

Figure 6-1 shows coastal hazard zones and the effects of energy dissipation and regeneration of a wave as it moves inland. Wave elevations are decreased by obstructions such as vegetation and rising ground elevation (FEMA, 2011). Most of the high coastal hazard SFHAs in unincorporated Los Angeles County areas consist of public beaches.



(FEMA, 2011)

Figure 6-1: Coastal Hazard Zones

6.2.2 Flash Flooding

A flash flood is a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a defined flood level. Flash floods typically begin within 6 hours of the precipitation event that causes them (NWS, 2009). Flash flooding is characterized by a quick rise and fall of water level. Flash floods generally result from intense storms dropping large amounts of rain within a short period of time onto watersheds that cannot absorb or slow the flow. Natural terrain and vegetation help to reduce the potential for flash floods, but flash flooding can occur when vegetation is lost due to wildfires and the ground becomes impervious due to the fire's extreme heat. Such events usually include deposition of large amounts of sediment transported from the denuded hillsides. Flooding in Los Angeles County during large storm events is flashy, and the mountains and foothills of Los Angeles County are subject to wildfires.

6.2.3 Non-SFHA Urban Drainage Flooding

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

Heavy precipitation can produce local flooding in areas outside delineated floodplains or recognizable channels if local conditions cannot accommodate the precipitation through a combination of infiltration and surface runoff. Such flooding generally occurs in areas with flat gradients. Impervious areas associated with urbanization increase the accumulation of floodwaters. Shallow street flooding can occur unless channels have been improved to account for increased flows (Water Science School, 2019).

High groundwater levels can cause problems even where there is no surface flooding. Basements are susceptible to high groundwater levels. High groundwater is seasonal in some areas; elsewhere, it occurs only after a long periods of above-average precipitation (Water Science School, 2019).

Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent flooding on streets and other urban areas. They make use of pipes, roadside ditches, channels, and roadways to convey water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than prior to development in that area (Water Science School, 2019).

The use of LID/ green infrastructure techniques in new and re-development has accelerated through the adoption of new codes and ordinances. The Los Angeles County Low Impact Development Standards Manual provides guidance on the LIDs and relevant codes and ordinances. These techniques restore natural hydrology through replacement of impervious surfaces with porous materials that promote infiltration. These methods also redirect runoff from impervious surfaces to bioswales, rain gardens, and biorentention areas. These techniques reduce both the volume and peak flow of urban runoff and thereby reduces local flooding from more frequent storm events. LID also improves water quality and recharges groundwater aquifers.

6.2.4 Non-SFHA Coastal Flooding

Coastal floods are the submersion of land areas along the ocean coast and other inland waters caused by seawater over and above normal tide action. Coastal flooding occurs along the coasts of oceans, bays, estuaries, coastal rivers, and large lakes, regardless of whether they are within an SFHA. The only coastal areas in unincorporated Los Angeles County are coastal Leo Carrillo State Park, parts of South Topanga State Beach, and Marina del Rey, which include about five miles of the 75 miles of coast in Los Angeles County. There is one private property adjacent to South Topanga State Beach that is at risk for coastal flooding. Coastal flooding can result in weakened or destroyed coastal structures. Several forces are associated with coastal flooding:

- Hydrostatic forces against a structure are created by standing or slowly moving water. Flooding can cause vertical hydrostatic forces, or flotation. These types of forces are one of the main causes of flood damage.
- Hydrodynamic forces on buildings are created when coastal floodwaters move at high velocities. These high-velocity flows can destroy solid walls and dislodge buildings with inadequate foundations. High-velocity flows can also move large quantities of sediment and debris that can cause additional damage. In coastal areas, high-velocity flows are typically associated with one or more of the following:
    - Storm surge and wave run-up flowing landward through breaks in sand dunes or across low-lying areas
    - Tsunamis
    - Outflow of floodwaters driven into bay or upland areas
    - Strong currents parallel to the shoreline, driven by waves produced from a storm

- High-velocity flows can be created or exacerbated by the presence of manmade or natural obstructions along the shoreline and by weak points formed by roads and access paths that cross dunes, bridges or canals, channels, or drainage features.
- Waves can affect coastal buildings in the form of breaking waves, wave run-up, wave reflection and deflection, or wave uplift. The most severe damage is caused by breaking waves. The force created by these types of waves breaking against a vertical surface is often at least 10 times higher than the force created by high winds during a coastal storm.
- Flood-borne debris produced by coastal flooding events and storms typically includes decks, steps, ramps, breakaway wall panels, portions of or entire houses, heating oil and propane tanks, cars, boats, decks and pilings from piers, fences, erosion control structures, and many other types of smaller objects. Debris from floods can destroy unreinforced masonry walls, light wood-frame construction, and small-diameter posts and piles (FEMA, 2011).

Most coastal flooding in California is due to a combination of winter storms, severe storms, rising sea levels, tidal action, currents and waves, and high winds (NOAA, 2024). Coastal flooding has many of the same problems identified for riverine flooding, as well as additional problems such as storm surge, beach erosion, loss or submergence of wetlands and other coastal ecosystems, saltwater intrusion, high water tables, loss of coastal structures (sea walls, piers, bulkheads, bridges, or buildings), and loss of coastal recreation areas, beaches, sand dunes, parks, and open space (FEMA, 2011).

Storm Surge Areas

Storm surges inundate coastal floodplains by dune overwash, tidal rise in inland bays and harbors, and backwater flooding through coastal river mouths. Strong winds can increase tide levels and water-surface elevations. Storm systems generate large waves that run up and flood coastal beaches. The combined effects are storm surges that affect the beach, dunes, and adjacent low-lying floodplains. Shallow, offshore depths can cause storm-driven waves and tides to pile up against the shoreline and inside bays. Based on an area's topography, a storm surge may inundate only a small area or coastal lands extending a mile or more inland from the shoreline.

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

Coastal Erosion Areas

Coastal erosion is one of the primary hazards leading to loss of lives or damage to property in coastal areas. Coastal shorelines change constantly in response to wind, waves, tides, sea-level fluctuation, seasonal and climatic variations, human alteration, and other factors that influence the movement of sand and material within a shoreline system. Coastal erosion resulting from flooding is typically seen when extreme rainfall scours and erodes dunes and when inland floodwaters return through the dunes and

beach face into the ocean (FEMA, 1996). Such erosion can result in significant economic loss through the destruction of buildings, roads, infrastructure, natural resources, and wildlife habitat.

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

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

Tsunami Hazard Areas

Earthquakes, landslides on the ocean floor, and volcanic activity all have the potential to create large sea waves that can inundate coastal areas. The California coast has experienced more than 150 tsunamis since 1800. In recent years, California has experienced several damaging tsunamis. One notable event was triggered by the 2011 Japan earthquake, which caused approximately $100 million in damage to California's ports and harbors. More recently, in January 2022, a volcanic eruption in Tonga resulted in roughly $10 million of damage, primarily affecting harbors in Santa Cruz and Ventura counties. The most devastating tsunami in California's history occurred on March 28, 1964. Following a magnitude 9.2 earthquake in Alaska, several surges measuring 21 feet high fell onto Crescent City, located in Del Norte County in the northwestern corner of the state. This event claimed 12 lives and caused extensive destruction to the town. (CGS, 2022). The travel time for a locally generated tsunami can arrive and impact coastal communities within minutes and last hours (Los Angeles County, 2023).

The likelihood of catastrophic inundation of low-lying coastal areas as a result of a tsunami is low. However, the risk of losing vital commerce associated with the Ports of Los Angeles and Long Beach warrants adequate risk reduction measures from tsunamis. The Ports of Los Angeles and Long Beach have completed a tsunami hazard assessment to guide disaster planning and mitigate damage from a potential tsunami at their facilities. In addition, the Los Angeles County All-Hazard Mitigation Plan includes risk reduction measures for the coastal areas (Los Angeles County, 2023).

6.2.5 Dam Failure

A dam is an artificial barrier that can store water, wastewater, or liquid-borne materials for many reasons, such as flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, pollution control, or combinations of these purposes. Man-made dams can be classified according to the type of construction material used, the methods used in

construction, the slope or cross-section of the dam, the way the dam resists the forces of water pressure behind it, or the means used for controlling seepage. Materials used to build dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, or combinations of these (Association of State Dam Safety Officials, 2024).

Of the almost 92,000 dams in the county inventoried by the U.S. Army Corps of Engineers, the average age is 63 years (USACE, 2024). Generally, expensive repairs become more common after 50 years. Many of these dams no longer serve their original purpose and are not maintained, increasing the likelihood of failure, particularly during increasingly severe storm events due to climate change. In the last few years, dam failures or near failures, none of which were located in Los Angeles County, have relocated hundreds of thousands of people and caused millions of dollars of property damage nationwide (American Rivers, 2022). Dam failures can occur as a result of structural failures, such as progressive erosion of an embankment or overtopping and breaching by a severe flood. Failure of a dam can cause severe downstream flooding, depending on the magnitude of the failure. Floods caused by dam failures have caused loss of life and property damage (FEMA, 2019a).

Dam failures can result from one or a combination of the following reasons (FEMA, 2019a):

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

Dam failures typically occur when spillway capacity is inadequate and excess flow overtops the dam or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled waters that rush downstream, damaging or destroying anything in its path (FEMA, 2019a). According to the 2023 California State Hazard Mitigation Plan, there have been three federal disaster declarations for dam failure-related events between 1953 and 2022. This is about one event every 23 years. Only one, the 1963 Baldwin Hills Dam disaster, occurred in Los Angeles County. Dam safety incidents, which are less severe than actual dam failures, occur multiple times a year. The frequency and severity of dam failure events is anticipated to increase over the next 50 years due to impacts from climate change (Cal OES, 2023).

In Los Angeles County, dams hold billions of gallons of water in reservoirs. Seismic activity can compromise these dams, resulting in catastrophic flooding. Inundation caused by a catastrophic dam or aqueduct failure can devastate large areas and threaten residences and businesses (Los Angeles County OEM, 2020). In Los Angeles County, there are 90 dams owned by numerous entities and are under the regulatory

jurisdiction of the California Department of Water Resources' Division of Safety of Dams (DSOD). Los Angeles County area has the largest numberof DSOD-regulated dams of any California county (Cal OES, 2023).

Numerous dams were constructed in Los Angeles River watershed during the early 20th century, as development began to take place on this wide floodplain: In the 1920s and 1930s, the Los Angeles County Flood Control District constructed three major dams in the upper Los Angeles River watershed (Big Tujunga, Devils Gate, and Pacoima Dams), and three dams in the Rio Hondo watershed (Santa Anita, Sawpit, and Sierra Madre Dams). The U.S. Army Corps of Engineers built another dam (Eaton Wash Dam) in the Rio Hondo watershed in the mid-1930s, and transferred the facility to the District. The Corps constructed Hansen and Sepulveda Dams in the late 1930s/early 1940s. The Corps still operates and maintains these dams for flood control.

Additionally, several major dams and debris basins impound floodwaters and de-bulk debris flows originating in the San Gabriel Mountains. In the 1920s and 1930s, the Los Angeles County Flood Control District constructed the Cogswell Dam, San Gabriel Dam, Big Dalton Dam, San Dimas Dam, Puddingstone Diversion Dam, Live Oak Dam, and Thompson Creek Dam. In the 1940s and 1950s, the U.S. Army Corps of Engineers constructed Santa Fe Dam and Whittier Narrows Dam in the floor of the San Gabriel Valley. The Corps operates the facilities for flood control. Whittier Narrows Dam is also operated for stormwater capture.

The City of Pasadena constructed Morris Dam in the 1930s as a water supply facility. The dam was quickly transferred to the Metropolitan Water District of Southern California, which operated the dam until its transfer to the Los Angeles County Flood Control District in 1995. The facility, located below Cogswell and San Gabriel Dams, is still operated primarily for stormwater capture.

Table 6-1 lists dams identified as significant and high hazard by the State's Division of Safety of Dams. The high hazard classification does not mean that a dam has a high probability of failure; it is based on the downstream impacts on people, property, economy, and environment if the dam were to fail. The significant hazard dams indicate that a failure would likely cause economic loss, environmental damage, and impacts to critical facilities while a high hazard dam has the potential to cause a loss of human life, along with the other listed losses. The listed dams in Table 6-1 have inundation areas within the unincorporated areas of the County, although some of them are located outside of the County. The California Legislature passed a law in 2017 (California Water Code section 6161) requiring all State jurisdictional dams—except low hazard dams—to develop inundation maps and emergency action plans (EAPs) (Cal OES, 2023). These maps are shown in Figure 6-2 and can be found online at the Department of Water Resources Web Map Viewer.

Table 6-1: Significant and High Hazard Dams with Flood Hazard for Unincorporated Los Angeles County

Name[1]	Water Course	Owner	Year Built	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
Amargosa Creek	Amargosa Creek	City of Palmdale	1998	480	65	1,187	23.6
Big Dalton	Big Dalton Wash	Los Angeles County Public Works	1929	480	153	1,290	4.3
Big Santa Anita[2]	Trib. To Rio Hondo	Los Angeles County Public Works	1927	612	225	858	10.8
Big Tujunga No. 1[2]	Big Tujunga Creek	Los Angeles County Public Works	1931	505	220	5,750	81.7
Bouquet Canyon[2]	Bouquet Creek	City of Los Angeles Department of Water and Power	1934	1,180	190	36,505	13.6
Castaic	Castaic Creek	California Department of Water Resources	1973	5,200	340	323,700	153.7
Century	Malibu Creek	California Dept. of Parks & Recreation	1913	149	44	70	68.1
Chino Ranch #1	Tonner Canyon Creek	Tres Hermanos Conservation Authority	1918	460	22	137	--
Cogswell[2]	W Fork San Gabriel River	Los Angeles County Public Works	1935	585	266	8,969	38.4
Drinkwater	Off-stream	City of Los Angeles Department of Water and Power	1923	448	105	92	0.03
Dry Canyon	Dry Canyon Creek	City of Los Angeles Department of Water and Power	1912	780	66	1,140	4.5
Eaton Wash Debris Basin	Eaton Wash	Los Angeles County Public Works	1936	1,545	63	721	9.47
Fairmont[2]	Antelope Valley	City of Los Angeles Department of Water and Power	1912	4,300	121	7,507	2.64
Garvey Reservoir	Trib. To Rio Hondo	Metropolitan Water District	1954	5,164	160	1,610	--
Harold Reservoir	Trib. To Antelope Valley	Palmdale Water District	1891	2,800	30	3,870	4.63
Lake Sherwood	Potrero Valley Cr	Sherwood Valley Homeowners Association	1904	350	45	2,600	165.1

Name[1]	Water Course	Owner	Year Built	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
Lindero	Lindero Creek	Lake Lindero Homeowners Association	1966	170	19	90	5
Little Dalton Debris Basin	Little Dalton Canyon	Los Angeles County Public Works	1960	543	71	234	3.3
Littlerock	Littlerock Cr	Littlerock Creek Irrigation District	1924	576	124	4,600	63.7
Live Oak	Live Oak Creek	Los Angeles County Public Works	1922	303	76	239	2.3
Live Oak Reservoir	Tr Marshall Creek	Metropolitan Water District of Southern California	1975	3,000	105	2,500	0.17
Malibu Lake Club	Malibu Creek	Private Entity	1923	190	44	500	64
Morris[2]	San Gabriel River	Los Angeles County Public Works	1935	750	245	27,500	210
Morris S. Jones	Unnamed (Tr Eaton Wash)	Pasadena Dept. of Water and Power	1952	1,470	49	153.3	--
Pacoima	Pacoima Creek	Los Angeles County Public Works	1929	640	365	3,777	27.8
Potrero	Triunfo Canyon Creek	Private Entity	1967	730	40	1,600	28.9
Puddingstone	Walnut Creek	Los Angeles County Public Works	1928	2,698	147	16,342	33.6
Pyramid[2]	Piru Creek	California Department of Water Resources	1974	1,090	422	171,000	432
Rocky Oaks Dam[3]	Zuma Canyon Creek	National Park Service	1997	270	22	36	--
Rubio Debris Basin	Rubio Creek	Los Angeles County Public Works	1944	780	64	44	1.71
San Dimas	San Dimas Creek	Los Angeles County Public Works	1922	340	131	1,534	15.9
San Gabriel #1[2]	San Gabriel River	Los Angeles County Flood Control District	1937	1,500	381	45,832	203
Sawpit	Sawpit Creek	Los Angeles County Public Works	1927	527	150	406	3.27
Sierra Madre Villa	Sierra Madre Canyon	Los Angeles County Public Works	1958	906	50	109	1.5
Stevenson Ranch	Pico Canyon Creek	Los Angeles County Public Works	2004	280	54	105	5.1
Stone Canyon	Stone Canyon Creek	City of Los Angeles Water and Power	1924	1,150	188	10,372	1.4

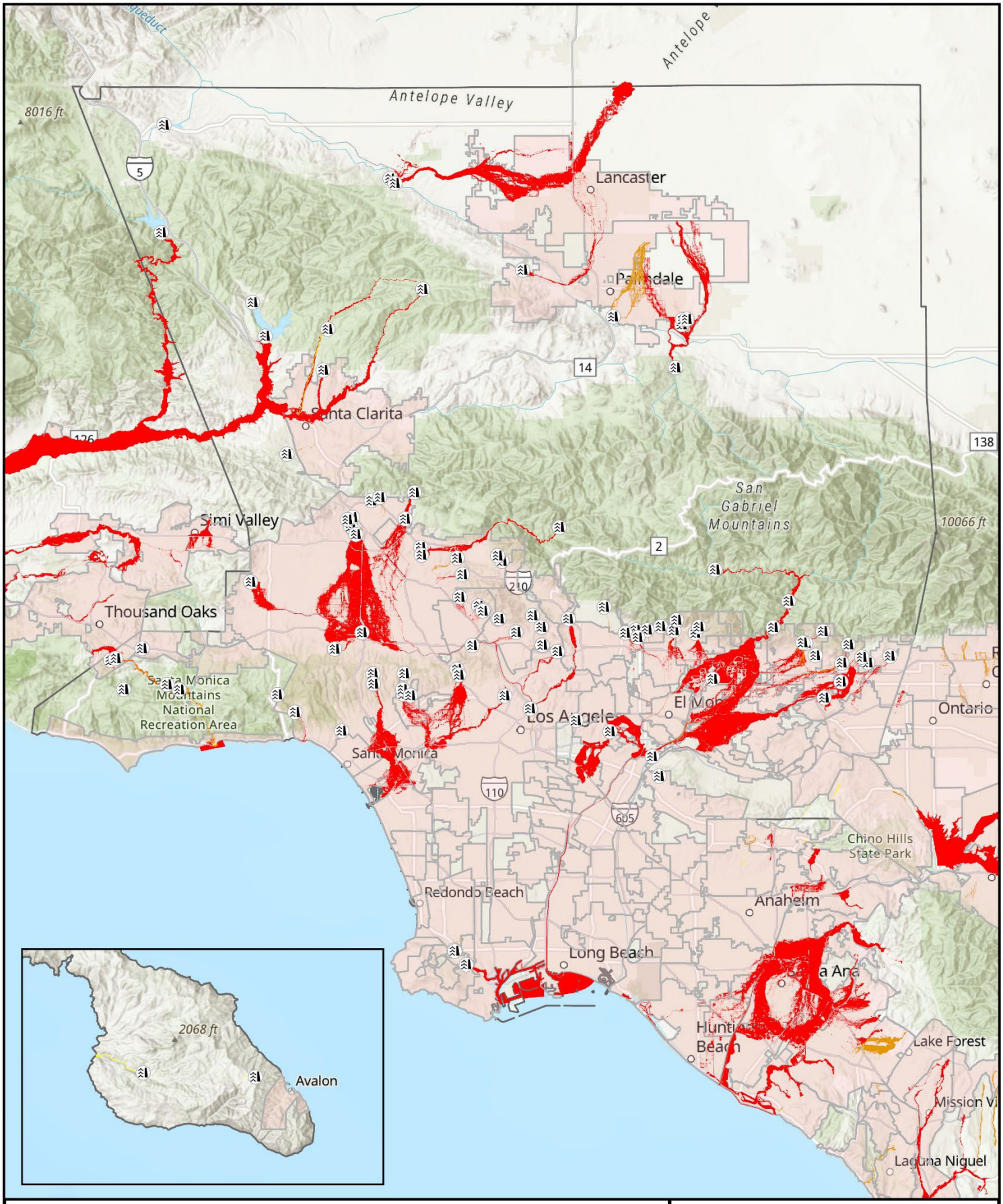
Name[1]	Water Course	Owner	Year Built	Crest Length (feet)	Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)
Thompson	Middle Canyon	Private Entity	1925	445	114	1,010	8.6
Thompson Creek	Thompson Creek	Los Angeles County Public Works	1928	1,500	66	543	3.46
Westlake Reservoir	Tree Springs Creek	Las Virgenes Municipal Water District	1972	1,400	158	9,200	0.9
Weymouth Memorial Reservoir	Off stream	Metropolitan Water District of Southern California	1966	2,400	18	151	--
Whittier Narrows Dam	San Gabriel River	U.S Army Corps of Engineers (USACE)-Los Angeles District	1957	16,960	56	66,702	554
Wilson Debris Basin	Wilson Canyon	Los Angeles County Public Works	1961	666	50	84	2.6
Wrigley Reservoir	Haypress Creek	Private Entity	1930	190	42	62	--

1. Dams listed are only those:
- Listed by California Department of Water Resources in 2023 as jurisdictional for the State of California (except, Note 3.)
- Rated as significant, high or extremely high hazard
- Located in unincorporated Los Angeles County or having an inundation area that includes areas of unincorporated county.

2. Dam location or part of its inundation area is in U.S. Nation Forest Area

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

Source: California Department of Water Resources, 2023; U.S. Army Corps of Engineers, 2024



Legend

Inundation Boundaries Hazard Class

- Extremely High
- High
- Significant
- Low

Dam

Incorporated Areas

NORTH

5 2.5 0 5

Scale in Miles

Approved Dam Inundation Boundaries Figure 6-2

BURNS McDONNELL

Source: Estri World Topographic Map, USACE National Levee Database 2024, FEMA NFHL 2024

Issued: 6/13/2024

The Division of Safety of Dams of the California Department of Water Resources has jurisdiction over large dams throughout the state and enforces safety requirements and annual inspections. Dam owners submit inundation maps to California's Office of Emergency Services that represent the best estimate of where water would flow if a dam failed completely and suddenly with a full reservoir (Los Angeles County OEM, 2020). At the time of the drafting of this plan update, the dams listed in Table 6-1, have approved dam breach inundation maps, which are mapped in Figure 6-2, with the exception of Rocky Oaks Dam (DSOD, 2024).

The 2020 County of Los Angeles All-Hazards Mitigation Plan includes a profile and assessment of the Dam Failure Hazard as well as mitigation actions that address the risk associated with this hazard.

6.2.6 Levee Failure

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

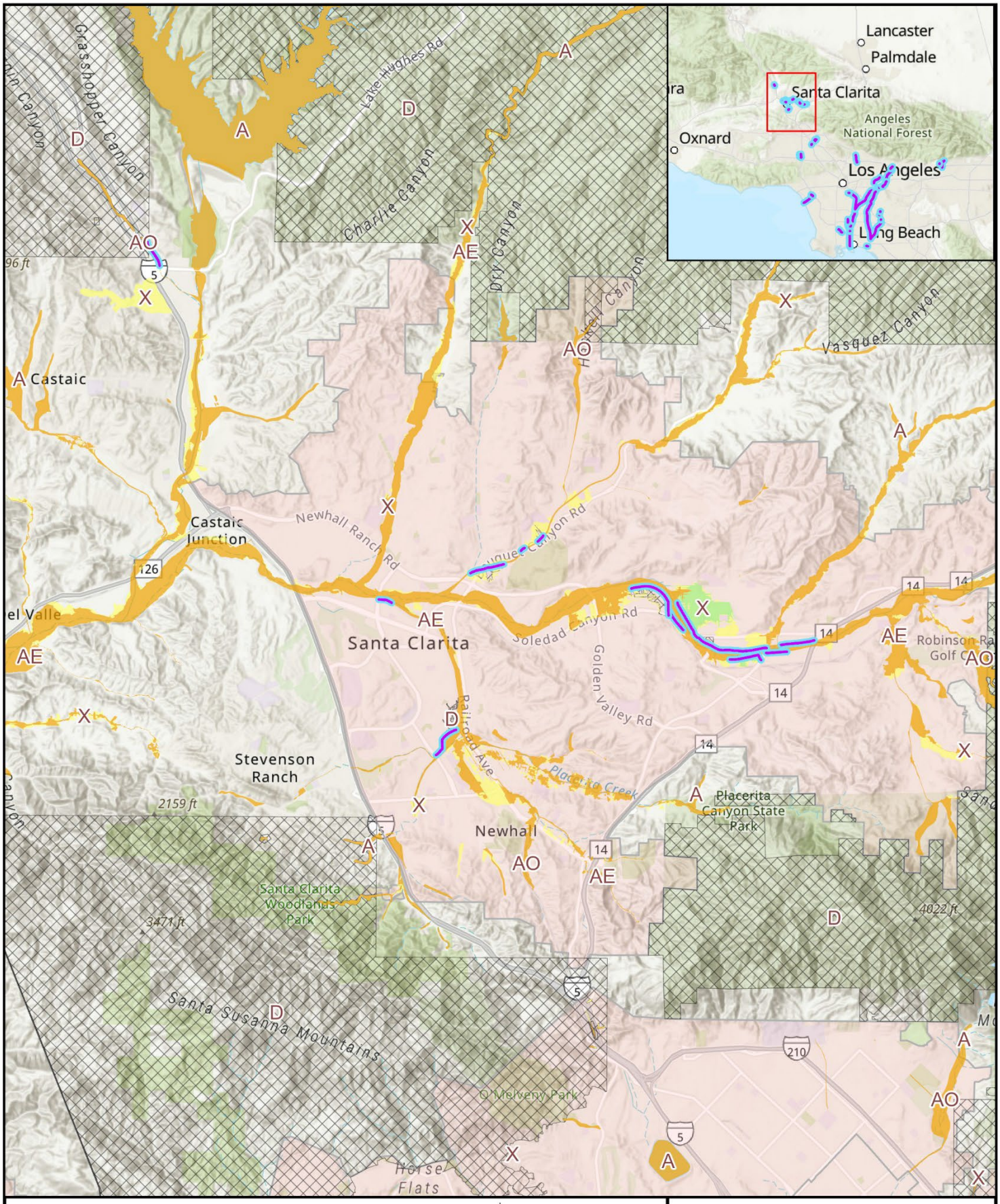
The causes of levee failures are structural failures, foundation failures of underlying soils, and overtopping by flood flows, tides, and waves. Contributing factors include poor construction materials, erosion by current and wave action, seepage through or under the levee, burrowing rodents, and improper repairs. Lack of adequate and regular maintenance to correct these problems also contributes to levee failure. Most failures are composites of several of these factors. Over the past 120 years, 124 levee failure events have occurred in California, all of which occurred outside Los Angeles County,have usually occurred with heavy rainfall, storm surge, or earthquakes (Cal OES, 2023).

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

An area protected by an accredited levee is shown as a moderate-risk area and labeled Zone X-Shadedon a Flood Insurance Rate Map. This accreditation affects flood insurance premiums and building requirements. The NFIP does not require flood insurance for structures with federally backed mortgages in areas protected by accredited levees. However, FEMA recommends the purchase of flood insurance in these areas due to the risk of flooding from levee failure or overtopping. If a levee is not accredited, the area it protects will still be mapped as a high-risk area (a Special Flood Hazard Area), and the federal mandatory purchase of flood insurance applies (FEMA, 2021a). However, the area behind the levee may be mapped as a Zone D (possible but unknown flood risk) if there are engineering analyses to support that the levee provides some level of risk reduction from a 1% annual chance flood (FEMA 2020)

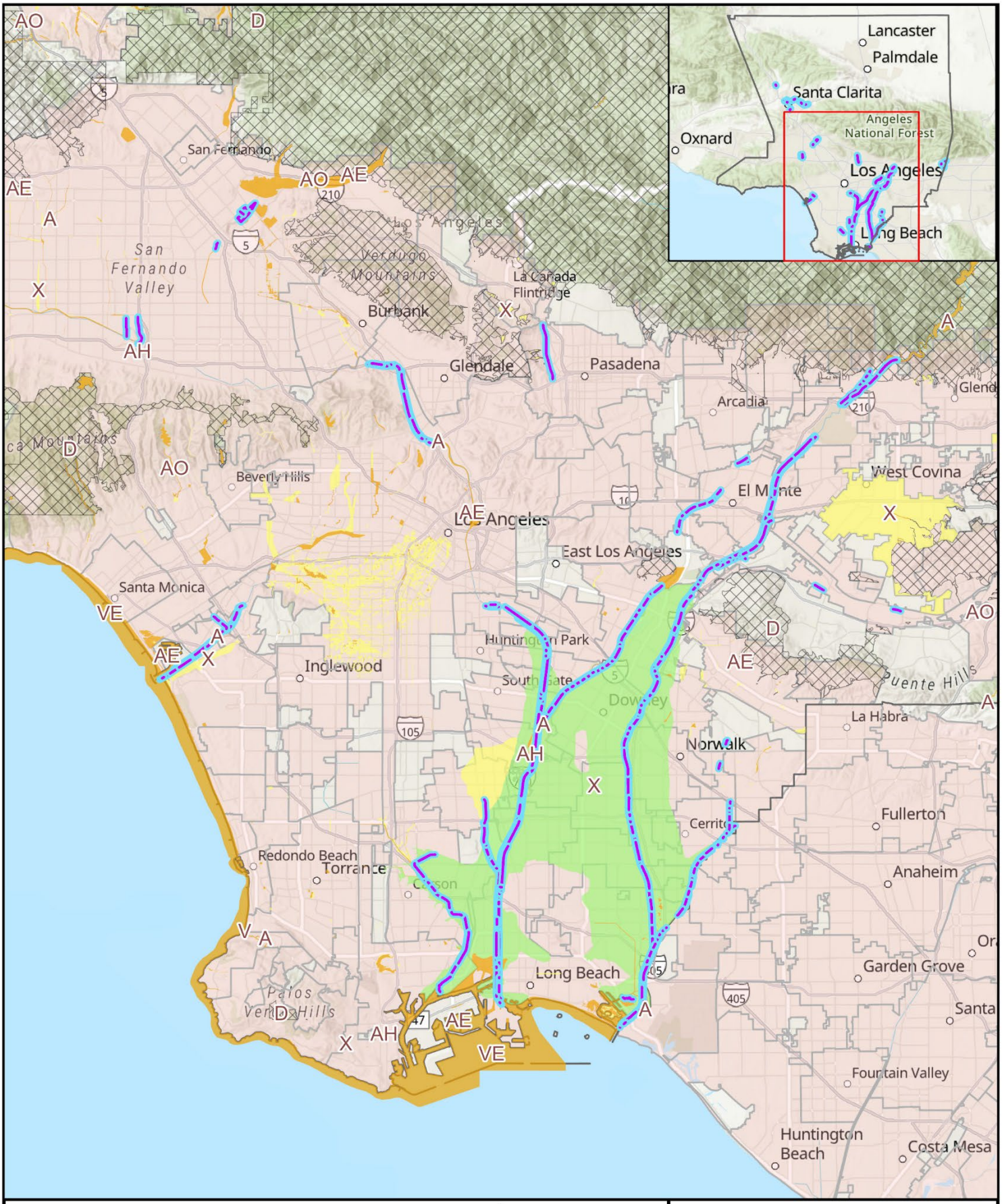
Even with levee certification and FEMA accreditation, there is a flood risk associated with levees. While levees are designed to reduce risk, even properly maintained levees can fail or be overtopped by large flood events. Levees reduce risk, but they do not eliminate it.

According to the USACE National Levee Database, Los Angeles County contains over 200 miles of levees that provide protection against floods of 25-year or greater magnitude. Most of these levees are in cities; fewer than 10 percent are in the unincorporated county. Figure 6-3 and Figure 6-4 show the levees that would flood developed areas of the County should they be overtopped during a flood. These maps indicate areas where levees have been accredited by FEMA, and therefore reduce flood risk hazard (green areas on figures). The County has received accreditation on 89 percent of the levees for which FEMA certification was required. The Compton Creek Levee is the only county levee in unincorporated areas not accredited by FEMA.



Source: Esri World Topographic Map, USACE National Levee Database 2024, FEMA NFHL 2024

Issued: 8/5/2024



Legend

- Levees
- FEMA 100 yr Flood Zone
- FEMA 500 yr Flood Zone
- Area with Reduced Flood risk Due to Levee
- Area of Undetermined Flood Hazard
- Incorporated Areas

NORTH

5 2.5 0 5

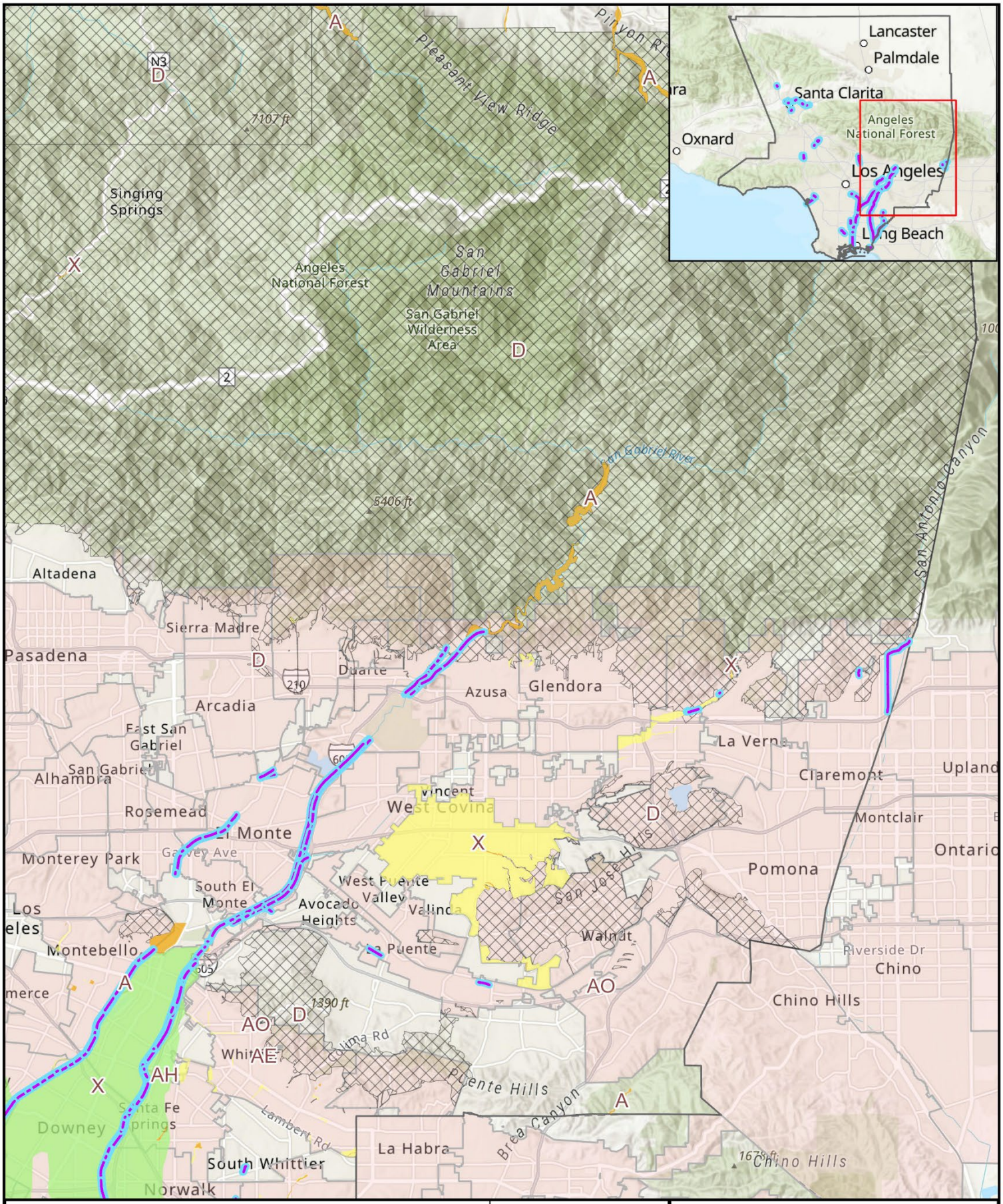
Scale in Miles

Flood Control Levees
Los Angeles Area
Figure 6-4

BURNS McDONNELL

Source: Esri World Topographic Map, USACE National Levee Database 2024, FEMA NFHL 2024

Issued: 9/3/2024



Legend

- Levees
- FEMA 100 yr Flood Zone
- FEMA 500 yr Flood Zone
- Area with Reduced Flood risk Due to Levee
- Area of Undetermined Flood Hazard
- Incorporated Areas

NORTH

5 2.5 0 5

Scale in Miles

Flood Control Levees
East Los Angeles Area
Figure 6-5

BURNS McDONNELL

Source: Esri World Topographic Map, USACE National Levee Database 2024, FEMA NFHL 2024

Issued: 9/3/2024

6.2.7 Geologic Hazard Areas

Flooding is associated with geologic hazards in two ways:

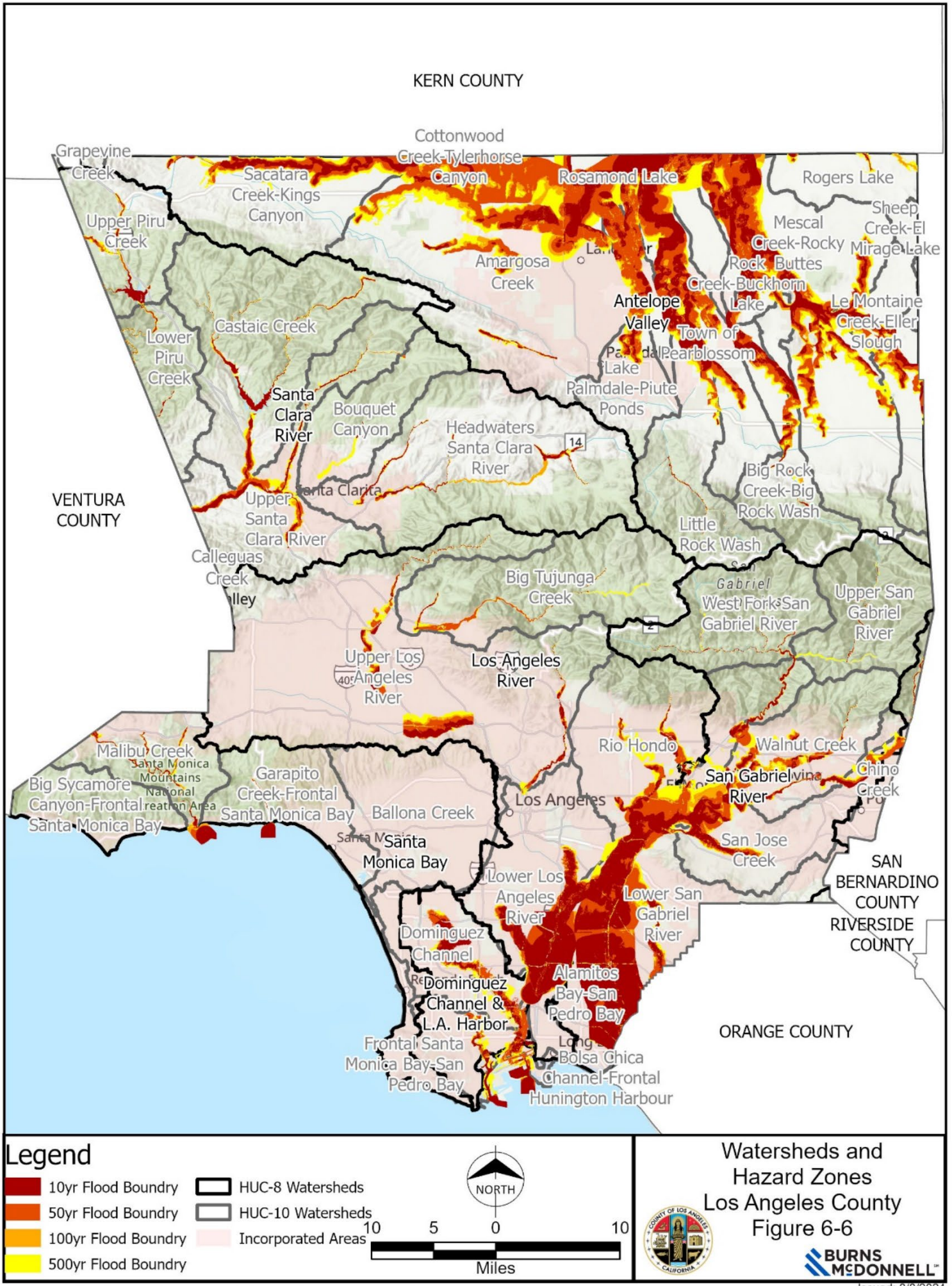
- **Subsidence Areas**—Human activities such as underground mining, groundwater or oil withdrawal, or soil drainage can cause the ground to subside. This may occur gradually, resulting in greater flood potential due to lower land elevation, or suddenly, resulting in sinkholes and collapses that may damage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

6.3 Principal Flooding Sources in Los Angeles County

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

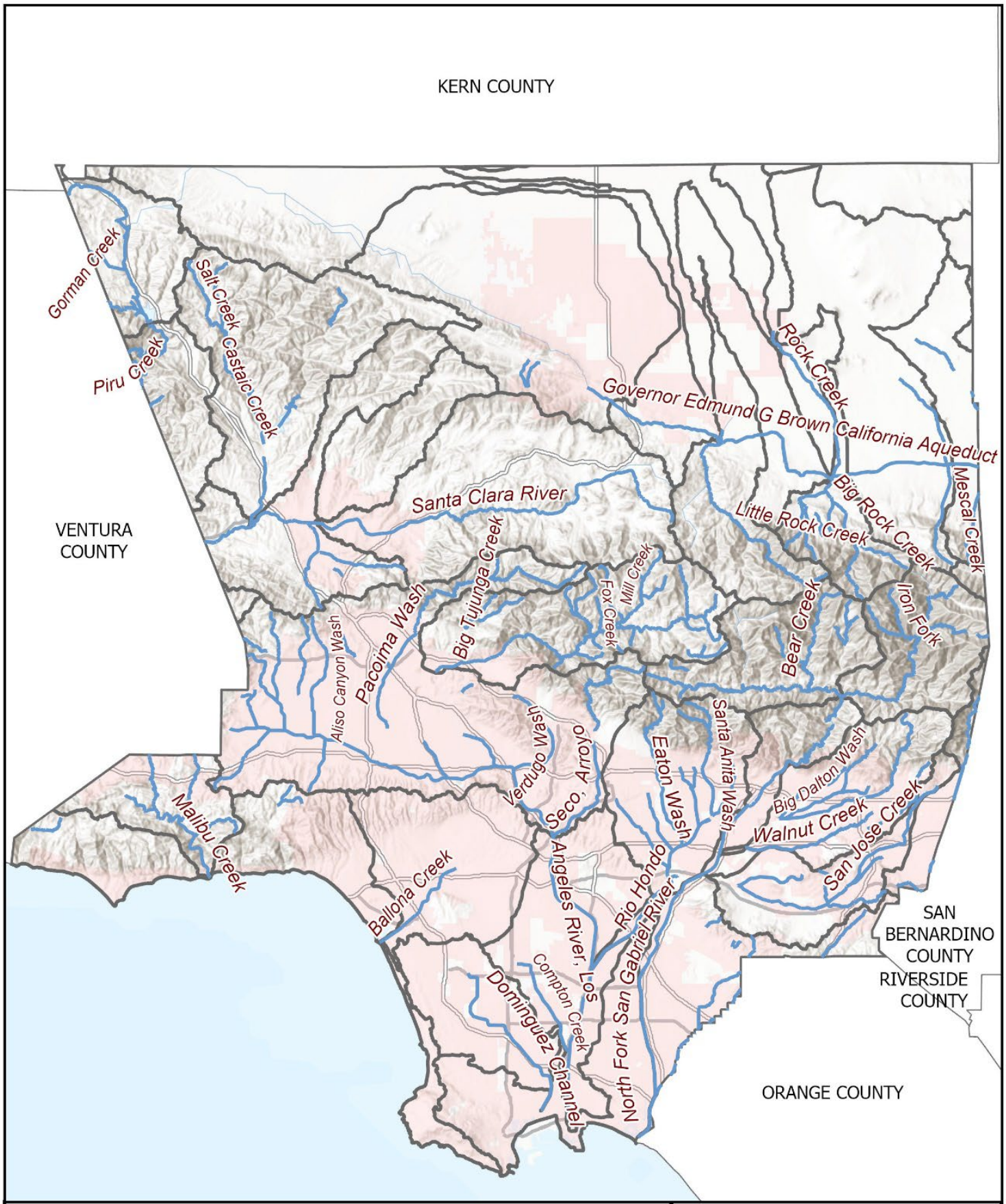
6.3.1 Watersheds

Figure 6-6 depicts the HUC 8 watersheds and their divisions into the HUC 10 watersheds. Each of these drainages is associated with a tributary or tributary system. These watersheds each contain tributaries which are depicted in Figure 6-7. The creeks and rivers in depicted are some of the main sources of flooding which include: Ballona Creek, Los Angeles River, Malibu Creek, Rio Hondo River, San Gabriel River, Santa Clara River and Topanga Canyon. The Hazus model uses these tributaries as well as elevation data and ephemeral streams to generate flood hazard zones.



Source: Estri World Topographic Map, USGS NHD, Los Angeles County Database

Issued: 8/8/2024



Source: Estri World Topographic Map, USGS NHD, Los Angeles County Database

Issued: 7/31/2024

6.3.2 Climate Variations

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

- In the coastal and mountain areas, precipitation is mainly the result of winter rains associated with North-Pacific extra-tropical cyclones. Major storms approach from the west or northwest, and they often consist of one or more frontal systems that can last four days or longer.
- The mountain ranges greatly intensify the amount of precipitation. Seasonal normal rainfall for the County ranges from 22.21 inches in the San Gabriel Mountains to 5.07 inches in the desert.
- Warm rains from southerly spring storms can increase snowmelt and flood runoff.
- In mountainous regions, steep canyons and channel gradients encourage stormwater runoff.
- In the County's desert regions, the most serious flooding usually results from summer convective storms. This rainfall is most frequent in the upper San Gabriel Mountains and Mojave Desert regions (Los Angeles County Public Works, 2022c).

6.3.3 Development Effects

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

6.4 Major Flood Events

Federal disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A federal disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. There are two types of disaster declarations that authorize the President to provide supplemental federal disaster assistance: major disaster declarations (DR) and emergency management (EM). The President can declare a major disaster for any natural event that the President determines has caused damage of such severity that is beyond the capabilities of state and local governments to respond, while EM are for any occasion or instance the President determines federal assistance is needed. Los Angeles County has experienced 23 flooding events since 1954 for which federal disaster declarations were issued, as summarized in Table 6-2. Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future.

Table 6-2: History of Los Angeles County Flood Events with Federal Disaster Declarations

Event Dates	Declaration #	Type of event
2/5/1954	DR-15	Flooding and Erosion
12/23/1955	DR-47	Flooding
4/4/1958	DR-82	Heavy Rainstorms, Flooding
3/6/1962	DR-122	Floods
10/24/1962	DR-138	Severe Storms, Flooding
2/25/1963	DR-145	California Severe Storms, Heavy Rains, Flooding
1/26/1969	DR-253	Severe storms and flooding
2/15/1978	DR-547	Coastal storms, mudslides and flooding
1/8/1980	DR-615	Severe storms, mudslides and flooding
1/21 – 3/30/1983	DR-677	Coastal storms, floods, slides, and tornadoes
1/17 – 1/22/1988	DR-812	Severe storms, high tides and flooding
2/10 – 2/18/1992	DR-935	Snowstorm, heavy rain, high winds, flooding, and mudslide
1/5 – 3/20/1993	DR-979	Severe storms, winter storms, mud and landslides, and flooding
1/3 – 2/10/1995	DR-1044	Severe winter storms, flooding, landslides, and mudflows
2/13 – 4/19/1995	DR-1046	Severe winter storms, flooding, landslides, and mudflow
2/2 – 4/30/1998	DR-1203	Severe winter storms and flooding
12/27/2004 – 1/11/2005	DR-1577	Severe storms, flooding, debris flows, and mudslides
2/16 – 2/23/2005	DR-1585	Severe storms, flooding, landslides, and mud and debris flows
8/29 – 10/1/2005	EM-3248	California Hurricane Katrina Evacuation
1/17 – 2/6/2010	DR-1884	Severe winter storms, flooding, and debris and mud flows
1/18 – 1/23/2017	DR-4305	Severe winter storms, flooding, and mudslides
12/27/2022 – 1/31/2023	DR-4683	Severe winter storms, flooding, landslides, and mudslides
1/8 – 1/31/2023	EM-3591	Severe winter storms, flooding, and mudslides
2/21–7/10/2023	DR-4699	Severe winter storms, straight-line winds, flooding, landslides, and mudslides
3/9 – 7/10/2023	EM-3592	Severe winter storms, flooding, landslides, and mudslides
1/31 – 2/9/2024	DR-4769	Severe winter storms, tornadoes, flooding, landslides, and mudslides

Source: OEM, 2020 and FEMA, 2024a

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

6.4.1 March 2024 Storm Event

A portion of Topanga Boulevard was indefinitely shut down due to unstable conditions caused by rainstorms and further expected rain (NBC Los Angeles, 2024). A flood advisory was issued for Central and Southern Los Angeles County March 30th, 2024, due to an atmospheric river. Total rainfall across the area ranged from 0.7 to 2.6 inches (Los Angeles County Public Works, 2024a).

The combination of the 2022-23 and 2023-24 Storm Seasons delivered to Los Angeles County Flood Control District's Cogswell and San Gabriel Reservoirs a total of over 2.8 million cubic yards of debris from the watersheds burned by the 116,000-acre Bobcat Fire in fall 2020. (The 2020-21 and 2021-22 Storm Seasons were low rainfall years, so debris delivery to the two reservoirs during those two years would have been comparatively small.) In anticipation of the five-year debris volume potential from the Bobcat Fire area, combined with debris delivered to the reservoir after the 2009 Station Fire, removal of 4.9 million cubic yards of debris at San Gabriel Dam commenced in May 2021. The debris volume delivered to Cogswell Reservoir after the Bobcat Fire (over 825,000 cubic yards) was in addition to the over 1.3 million cubic yards delivered to the facility during the 2009-10, and 2010-11 Storm Seasons from the areas burned by the 2009 Station Fire. The five-year debris volume potential that was being estimated for Cogswell Reservoir after the Bobcat Fire finally ended the State and federal regulatory gridlock that had been delaying capacity restoration of the facility. Removal of 2 million cubic yards of debris at Cogswell Reservoir commenced in April 2021.

6.4.2 February 2024 Storm Events

From February 3rd to February 5th, 2024, an atmospheric river impacted California. On February 4th, 2024, Los Angeles County proclaimed a Local Emergency. Total rainfall accumulation in the area ranged from 4.2 to 13.7 inches (Los Angeles County Public Works, 2024b). Another storm event occurred on February 18th, 2024, with rainfall totaling from 1.1 to 7.9 inches (Los Angeles County Public Works, 2024c).

6.4.3 August 2023 Storm Event

On August 18th, 2023, the first-ever tropical storm watch for Southern California was issued due to record precipitation and flooding from remnants of Hurricane Hilary (NOAA, 2023a). 2.48 inches of rain fell over a 24-hour period on August 20th and a total of 2.99 inches of rain fell from August 20th to 21st (FEMA, 2024a).

6.4.4 Winter Storms 2023

The winter of 2023 was a record year for precipitation. The County experienced three federal declaration flooding events within the span of three months. The first disaster was declared January 9th, 2023, and the second on January 14th. The incident period for these two events covered December 27th, 2022, to January 31st, 2023 (FEMA, 2024a). More than 1.5 inches of rain fell over a 24-hour period on January 14th, 2023, and 7.3 inches fell over the incident period (NOAA, 2023b). The third disaster declaration was

declared on March 10th, 2023; the incident period for this declaration covered March 9th, 2023, to July 10th, 2023 (FEMA, 2024a). 1.97 inches of rain fell on March 14th, 2023, and a total of 7.65 inches of rain fell over the entirety of the incident period (NOAA, 2023b).

6.4.5 Tropical Storm Kay, September 2022

At this time the population of Los Angeles County as a whole was about 10 million people (Los Angeles Almanac 2020). On September 9th, 2022, Tropical Storm Kay impacted California (NHC, 2022). By September 13th, rainfall totaled up to 0.30 inches along the coast and in valleys and rainfall totals ranged from 0.10 to 1.30 inches in foothills and mountains (Los Angeles County Public Works, 2022a). A mudslide event in the Lake Hughes area stranded more than 50 people (ABC7, 2022).

6.4.6 Summer 2017 Storm Event

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

6.4.7 2016-17 Storm Season

Shortly before the 2016-17 Storm Season, two major wildfires occurred. One of them was the July 2016 Sand Fire burned approximately 41,400 acres in the Angeles National Forest. The County provided postfire engineering advice to over 150 properties in the unincorporated neighborhoods of Little Tujunga Canyon, Pacoima Canyon, Placerita Canyon, Oak Springs Canyon and the Santa Clara River west of Acton, and in the City of Santa Clarita neighborhoods of Sand Canyon, Iron Canyon and Live Oak Springs Canyon. The County also installed a temporary debris barrier above the neighborhood in Iron Canyon.

A powerful winter storm in January 2017 moved across Southern California, bringing heavy rain, flash flooding and strong winds to the area. The 110 Freeway in Carson and the 710 Freeway in Long Beach were shut down due to extreme flooding that left cars stranded. Across the region, several people were rescued from their cars and thousands lost power. Rockslides closed roads in Malibu and other coastal mountain areas. Flash flooding as well as mud and debris flows were reported in and around the recent burn areas. In the mountains, strong and gusty southerly winds were reported.

The 2016-17 Storm Season delivered to Los Angeles County Flood Control District's Pacoima Reservoir over 330,000 cubic yards of debris resulting from half of its watershed being burned by the 2016 Sand Fire. This volume was in addition to the 385,000-cubic yard volume delivered to the reservoirs during the 2009-10 and 2010-11 Storm Seasons from the areas burned by fires in 2008 and 2009.

6.4.8 2015-16 Storm Season

The 2015-16 storm season also posed a debris flow potential to an unincororated area mobile home park and the Santa Clarita neighborhood of Wildwood Canyon located below the over 400 acres burned by the

June 2015 Calgrove Fire. Debris mitigation measures were installed by the County above and at the mobile home park in fall 2015.

A storm in January 2016 delivered debis to the mobile home park. Residents in 10 mobile home units were evacuated as a precaution (Goldenstein et al., 2016). However, the postfire debris mitigation measures prevented damages to the mobile home units.

6.4.9 October 2015 Antelope Valley Flood

An intense thunderstorm in October 2015 brought flooding and debris flows to the Antelope Valley areas of Lake Hughes, Elizabeth Lake, Leona Valley and Quartz Hill. About three inches of rain fell in Leona Valley in just 30 minutes— greater than 500-year rainfall event. In the vicinity were bunred slopes that were stilll recovering from the 2013 Powerhouse Fire. Los Angeles County Public Works crews estimated 300,000 cubic yards of debris was removed from the region. Five structures were heavily damaged; three structures were flooded; and one modular home was destroyed. One of the damaged houses belonged to an older disabled couple. Debris closed a 40-mile stretch of Interstate 5 at the Grapevine. Along State Route 58, stretches were covered in mud and debris up to six feet deep, stranding 200 vehicles. The County of Los Angeles Board of Supervisors declared a local state of emergency (KTLA, 2015; Sklar, 2015)

6.4.10 2014 Hurricane Marie

Hurricane Marie in August 2014 is the seventh-most intense Pacific hurricane on record. Although Hurricane Marie's center remained well away from land throughout its existence, its large size brought increased surf to areas from southwestern Mexico to Southern California. Marie brought one of the largest hurricane-related surf events to Southern California in decades. Swells of 10 to 15 feet battered coastal areas, with structural damage occurring on Santa Catalina Island and in the Greater Los Angeles Area (Los Angeles Times 2014). Hundreds of ocean rescues were performed due to the storm, and overall losses reached $20 million (Rocha 2014; Zerkel 2014).

6.4.11 2013-14 Storm Season

In January 2014, the Colby Fire burned almost 2,000 acres in the mountain slopes above the Cities of Azusa and Glendora, and adjacent pockets of unincorporated neighborhoods. In a coordinated effort, Los Angeles County Public Works, the Natural Resources Conservation Service, and the cities raced to provide postfire engineering advice to dozens of residents and install debris mitigation measures along the streets below the burn areas in time to meet the arrival of large storms in February.

Storms in February resulted in mudflows along the streets (Lah and Brumfield 2014). However, due to the presence of several Los Angeles County Flood Control District debris basins and the postfire concrete debris barriers installed along the streets, no injuries or fatalities were reported, and only one house in Azusa experienced damage (Nelson 2014).

6.4.12 2009-2010 Storm Season

At this time the population of Los Angeles County as a whole was about 9.8 million people (Los Angeles Almanac 2020).

Shortly before the 2009-2010 Storm Season, the Station Fire burned almost 161,000 acres in the San Gabriel Mountains above foothill neighborhoods in the cities of La Canada Flintridge, Glendale, and Los Angeles (Tujunga), and the unincorporated area of La Crescenta. The fire also reached the north facing foothills in the unincorporated areas of Acton, Juniper Hills and Littlerock. Less than one year before, the 2008 Sayre and Sesnon Fires burned 26,000 acres above foothill neighborhoods in the city of Los Angeles (Sylmar, Porter Ranch). The south-facing foothills from Pasadena west to the Ventura County line were in a freshly burned condition. The watersheds of the Los Angeles County Flood Control District's Big Tujunga, Cogswell, Devils Gate, Pacoima and San Gabriel Reservoirs, and the watersheds of over 40 of the District's debris basins were impacted by the fires.

After the Station Fire was contained in September, the County immediately worked around the clock to perform pre-storm cleanouts of the debris basins. Additionally, the County provided post-fire engineering advice to hundreds of residents in the communities below the burned areas; and worked with the Natural Resources Conservation Service (formerly the Soil Conservation Service) to implement in La Crescenta and La Canada Flintridge post-fire debris mitigation measures in the form of concrete barriers along streets and capacity enhancement of several debris basin dams.

The concrete street barriers were completed by the end of October. In mid-November, a thunderstorm cell quickly formed and dumped intense rain over La Crescenta. Mud flowed into the back yards of several properties, and impacted the air conditioning unit of one house. However, the concrete barriers along the streets in La Crescenta prevented numerous houses from being damaged. The County completed the debris basin cleanouts shortly after the New Year.

In mid-January 2010, a series of powerful Pacific winter storms fueled by El Nino conditions pounded Los Angeles County and unleashed mud and debris flows that prompted evacuations, flooded businesses, and downed trees and power lines. There was little damage reported. On February 7, 2010, a rainstorm system triggered severe debris flows. The recently cleaned out debris basins were once again filled. The concrete street barriers in La Crescenta withstood the onslaught.

The debris basins below the burn areas were again cleaned out during the subsequent months. The total volume of debris removed from the fire area debris basins during the 2009-10 Storm Season was approximately 1.2 million cubic yards. Several debris basins in La Canada Flintridge, La Crescenta, and Glendale underwent interim capacity enhancements. Within the following two years, these debris basins underwent permanent capacity enhancements, and a new drain in La Crescenta was installed by Los Angeles County Public Works.

The huge volumes of debris removed from the burn area debris basins created a debris management quandary for the County— the noise, emissions and traffic associated with the debris basin cleanouts, and the noise, traffic, emissions and aesthetic impacts from the transport to sites where the debris was being placed. Many of the Flood Control District's original debris disposal areas (later renamed sediment placement sites) in the area were established in the 1950s, in the vicinity of the debris basins being built to protect neighborhoods located downstream. Residential development over the subsequent decades crept up to the boundaries of the debris basins and the sediment placement site properties. Several of the debris basins and sediment placement sites were located in areas that were originally unincorporated but were subsequently annexed or incorporated into different cities. By the 2000s, residents of the

neighborhoods adjacent to the sediment placement sites began to voice objections to being inconvenienced by the hauling of debris basin material to the sediment placement sites, the placement activities within the sites, and the impacts of the placed material to their viewshed. Residents also objected to any hauling and placement of material from debris basins located "outside" their neighborhoods in "other" cities. Use of landfills and gravel pits as an alternative were found to have their own limitations. The pits and the landfills were many miles from the debris basins, thus significantly lengthening haul routes, which extended the traffic and noise impacts to the neighborhoods along the way, prompting objections from the residents therein. The gravel pit operators refused to accept the debris basin material, citing its incompatibility with the operators' commercial objectives. The landfills were subjected to regulatory daily caps on the volumes of material they could accept. Adjacent residents, already seeking to shut the landfills down, also objected to the delivery of the debris basin material. The County eventually maximized the use of its sediment placement sites to place the debris basin material. However, the logistical complications of future debris basin cleanouts would remain.

The 2009-10 Storm Season, and the 2010-11 Storm Season, delivered approximately 5 million cubic yards of debris to Big Tujunga, Cogswell, Devils Gate, Pacoima and San Gabriel Reservoirs. Objections from the public similar to those of the debris basin cleanout operations, and State and federal environmental regulatory complexities, delayed capacity restoration at Devils Gate and Cogswell Reservoirs for almost a decade, and continues to delay capacity restoration at Big Tujunga and Pacoima Reservoirs (Los Angeles County 2012b).

6.4.13 2004/5 Storm Season

The 2004-05 rainfall season brought a total of 37.25 inches of rain to the downtown area of Los Angeles, making it at the time the second wettest season since records began in 1877, and the wettest in 121 years. Many areas of the County experienced 240 percent or more of normal rainfall for the season.

The first series of unusually heavy storms in January 2005 caused severe damage to private and public property in the County. The January 2005 storms dropped 16.47 inches of rain on downtown Los Angeles. The amount of roadway damage sustained in the County due to the January 2005 storms exceeded the roadway damage sustained during the 1994 Northridge Earthquake. A total of 138 roadway section closures resulted from these storms. Los Angeles County was confronted with about $45 million (over $72 million in 2024 dollars) in repairs to its infrastructure, with about $36 million (over $57 million in 2024 dollars) for roads and about $9 million (over $14 million in 2024 dollars) for damage to the county's flood-control and water-supply systems. Mudflows from the hillsides burned in the 2004 Foothill Fire impacted a mobile home park in a tributary of the Santa Clara River. These storms requests for the District to provide engineering advice to numerous residents in the 2004 Crown Fire and Pine Fire areas (Val Verde, Castaic, Lake Hughes) as well as the Altadena, La Canada Flintridge and Montrose areas. Property losses were at the time estimated at $30 million (about $48 million in 2024 dollars). The storm spurred all of the major insurance companies to declare a "catastrophe" for the first time since the 1997-98 season (Hayasaki et al. 2005). On February 4, 2005, in response to emergency proclamations by the County and the State of California, President George W. Bush declared a Major Disaster for damages resulting from these severe storms.

A second major series of storms in February 2005 brought unusually heavy rains that also caused damage to public roads and infrastructure, as well as damage and destruction to homes and businesses. These successive storms exacerbated the damage caused by the earlier storms. In April 2005, the President declared another Major Disaster to cover the damage to public property. An additional 113 roadway section closures resulted from this series of storms.

Most of the Los Angeles County Flood Control District's reservoirs were filled to capacity, with flows going over the dams' spillways.

Costs to repair damage to public infrastructure resulting from both storms were at the time estimated at $77 million (over $123 million in 2024 dollars) to unincorporated County roads, $17.5 million (about $28 million in 2024 dollars) to County flood control facilities, and $3.5 million (over $5.5 million in 2024 dollars) to County waterworks facilities.

Roads that were hit hardest include Angeles Forest Highway, Sierra Highway, Lake Hughes Road, Bouquet Canyon Road, and San Francisquito Canyon Road. The damage ranged from landslides (one measuring 40,000 cubic yards) to major washouts. Crews worked quickly and for many hours to restore the roads as quickly as possible.

An emergency repair contract was administered for repair of a collapsed wall at Lindero Canyon Channel. Work was also undertaken to fix pipes, broken water lines, pump stations, and other connections to homes in the Malibu/Topanga areas to restore water supply.

Roads and flood control channels were not the only concern during the storms. The County responded to more than 300 requests from unincorporated area residents to determine if their structures were safe to occupy. Fourteen structures were tagged as unsafe for occupancy, and 26 structures were tagged for limited access. Among the County-owned buildings damaged were the La Crescenta Sheriff's Station and the Sheriff's Pitchess Detention Center in Castaic.

Overall, even with the tremendous amount of rain, and many of the Flood Control District's reservoirs at overflow, the flood control system in Los Angeles County was well able to handle this rainy season. Although there was much localized flooding and many road closures throughout the County, no major flooding occurred.

Mudflows from the hillsides burned in the 2004 Foothill Fire impacted a mobile home park in a tributary of the Santa Clara River. These storms requests for the District to provide engineering advice to numerous residents in the recent fire areas (Val Verde, Castaic, Lake Hughes) as well as the Altadena, La Canada Flintridge and Montrose areas.

In the aftermath of the storm season, which included flooding in the Antelope Valley outside the Los Angeles County Flood Control District, two advisory vote proposals were offered during the November 2005 General Election to the residents in that area of the Antelope Valley. One proposal was to annex the area into the Los Angeles County Flood Control District. The other proposal was to create a separate flood control district for the area. The voters in the area rejected both proposals by over 70 percent (Los Angeles County Public Works 2005b, Los Angeles Registrar 2005).

6.4.14 1997-1998 El Niño

At this time, the population of Los Angeles County as a whole was about 9.5 million people (Los Angeles Almanac 2020).

The 1997-98 El Nino season began with hits in October and November 1997 to Mexico and the counties south of Los Angeles. Los Angeles County was struck starting in January 1998. February 1998 was the worst for most localities. The region received in February four major storms and two smaller storms. None of the storms were historically big, but a together delivered almost a year's worth of rain in only one month (Lin II and Mai-Duc 2015). February dumped 16.58" of rain on the Santa Clarita Valley, the wettest February on record. Readings showed the wettest month ever at the time at UCLA (20.51"), and the wettest February at the Los Angeles Civic Center (13.79") (Thornhill 1998).

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

- October 1997—Hurricane Nora caused three deaths and caused damage due to mudslides throughout the Los Angeles area.
- On February 6, 1998—Mud crashed into an apartment building in the Westlake area; more than 100 residents were evacuated.
- On February 8, 1998—An ocean-eroded cliff in Malibu buckled, causing one home to collapse and threatening two others.
- On February 13, 1998—A rain-soaked hillside collapsed in the Canoga Park area, forcing the evacuation of five homes and threatening several others.

(City of Los Angeles 2019)

6.4.15 March 1995 Storm

The March 1995 storm brought significant rainfall to the Los Angeles region.

In Malibu, where over 18,000 acres in the mountains had been burned in fall 1993, an estimated 100 houses on Pacific Coast Highway were impacted debris flows. The debris washed across the highway when Tuna, Pena and Big Rock creeks overflowed. Several residents had to flee. The highway was littered with vehicles that washed away from properties. Waist-deep mud inundated at least 10 houses. A 25-foot mountain of rock, sand and dirt covered the highway at Pena Canyon and it appeared that the highway would remain closed through Monday (Arax et al. 1995).

The storm resulted in the need for repairs at numerous Los Angeles County Flood Control District facilities and cleanouts of several of the District's debris basins, especially those in Altadena in the vicinity of the 5,000-acre 1993 Kinneloa Fire burn area. Among the major repairs had to be undertaken at a waterline and the access road at Pacoima Dam; at the Compton, El Dorado, and Paramount Pumping Stations; levees on Dominguez Channel; and channel stabilizers in the Santa Clara River-South Fork. The total cost for major flood control facility repairs and cleanouts resulting from the storm disaster was approximately $3 million (over $6 million in 2024 dollars).

6.4.16 1993 Storms

The storms of January and February 1993 coincided with "El Nino" conditions (USGS 1993).

During the February storm, at least four people were killed. Four people were rescued from floodwaters and hundreds more residents were stranded or forced to use circuitous detours when roads washed out early Friday in parts of the Santa Clarita and Antelope Valleys. Most damage was along a 10-mile stretch of Sierra Highway between Canyon Country and Agua Dulce. The entire stretch was closed Friday and residents of as many as 300 homes were cut off. Three men were rescued after their truck mired in a flooded area north of Canyon Country. In Palmdale, a motorist ignoring barricades and warning signs was stranded for three hours when the car stalled in deep runoff. Several homes in Palmdale were threatened by floodwaters. Firefighters helped with sandbagging around submerged intersections in Lancaster and Quartz Hill.

The 1993 Storms were declared State and Federal Disasters.

The 1993 storms washed large volumes of debris into the Los Angeles County Flood Control District's reservoirs adding to the volumes delivered to these facilities by the 1992 storms. In summer and fall 1993, the County undertook sediment removal projects at Big Dalton, Eaton, Puddingstone Diversion, San Dimas and Santa Anita Reservoirs. At this time federal and State environmental regulations were making sediment removal projects more difficult and complex. Regulatory complexity, especially the presence or potential presence of sensitive or endangered species, led to delays that postponed cleanouts of the District's Big Tujunga, Cogswell and Devil's Gate Reservoirs (a total of over 4.5 million cubic yards) to the mid-1990s.

6.4.17 1992 Storms

At this time the population of Los Angeles County as a whole was about 8.8 million people (Los Angeles Almanac, 2020).

The storm of February 10-13 1992, brought significant rain to to Los Angeles County, which had seen little of it for over six years. According to LACFCD rainfall gage data, the Los Angeles Civic Center saw a total of 5.76 inches (greatest 24-hour total was 1.93 inches), Woodland Hills 11.6 inches (greatest 24-hour total was 6.3 inches), Northridge 10.24 inches (greatest 24-hour total was 5.49 inches), Saugus 8,41 inches (greatest 24-hour total was 3.77 inches), and Quartz Hill 4.9 inches (greatest 24-hour total was 2.5 inches).

In the Santa Monica Mountains, Topanga Canyon Boulevard was shut down because of rockslides. In Malibu, a motorist narrowly escaped disaster when the car stalled while crossing a rain-swollen creek. The creek, which fed into the Pacific Ocean at the mouth of Bonsall Canyon, flooded several houses. Malibu Canyon Road and Las Virgenes Road were closed by mudslides. Sudden flooding forced national park rangers to close a film production set at Paramount Ranch in Agoura Hills. Rock slides shut down six miles of the Pacific Coast highway from Santa Monica to Malibu (Cannon, 1992). A sewage overflow caused by swollen flood channels that prompted health officials to close all Los Angeles County beaches from the Ventura County line to Long Beach.

Elsewhere, power outages occurred to more than 100,000 homes in Los Angeles County. A flash flood swept away a car in the Pasadena Glen neighborhood in Altadena, causing authorities to recommend residents consider evacuating if the rain continued. In the Santa Clarita Valley, County firefighters rescued stranded motorists whose vehicles were nearly submerged by water on Sand Canyon Road. More than six miles of streets, including parts of Sand Canyon, Placerita Canyon and Newhall Ranch roads in Santa

Clarita were closed due to flooding. The heavy rains also caused a flood basin collapse that contributed to much damage in the Quartz Hill area in the Antelope Valley (Chandler, 1992).

The February 1992 Storms were declared State and Federal Disasters.

The 1992 storms washed large amounts of sediment into the Los Angeles County Flood Control District's reservoirs. In summer and fall 1992, the County engaged in an emergency project to sluice 2 million cubic yards of sediment out of San Gabriel Reservoir.

In the aftermath of the 1992 storms, Antelope Valley voters were presented with an advisory measure in June 1992 asking them whether they want to join the Los Angeles County Flood Control District, form a new flood control district, or reject both options. County officials at the time estimated that building a flood system for the Los Angeles County portion of the Antelope Valley would cost $800 million (almost $1.8 billion in 2024 dollars), meaning significant assessments for residents regardless of whether the county or a local district has jurisdiction over the work. Proponents of forming a new district said it would give local residents more control over the cost and scope of flood control projects and could extend into Kern County to include the entire drainage basin for the area (Chandler, 1992). The voters rejected annexation into the Los Angeles County Flood Control District; 44.5 percent voted their preference for the creation of their own flood control district, and 30.5 percent voted their preference for no flood control district.

6.4.18 1980 Storm

At this time the population of Los Angeles County as a whole was about 7.5 million people (Los Angeles Almanac 2020).

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

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

Los Angeles County was declared a disaster area. However, the U.S. Army Corps of Engineers estimated at the time that the facilities it constructed in Los Angeles County prevented over $1.9 billion (over $7 billion in 2024 dollars) in damage (Evelyn, 1980).

6.4.19 1977-1978 Winter Storms

Significant coastal flooding resulted from a combination of high astronomical tides, strong onshore winds, and high storm waves in the winter of 1977-1978. This flooding caused significant damage, including an estimated $1 million to $8 million ($4.8 million to $38.6 million in 2024 dollars) in property damage for private residences along the Malibu coastline, $150,000 (over $700,000 in 2024 dollars) in damage to Long Beach Harbor, $80,000 (over $380,000 in 2024 dollars) in damage to the Santa Monica Pier, and $140,000 (over $675,000 in 2024 dollars) in damage to a bicycle path in El Segundo.

After several brush fires that had scorched the mountain terrains, the La Crescenta area received 9 inches of heavy rain (Los Angeles County 2012b). A debris basin overflowed, inundating several homes with mud and water. Localized flooding damaged other homes in the area. Virtually all of the Flood Control District debris basins in this area were filled to capacity. According to eyewitness accounts, the mudslide picked up 13 cars and traveled down the streets. The water and mud eventually ended up on Foothill Boulevard and Esko Avenue. There were damaged cars that were located on Dominica Avenue in Lake View Terrace. There were widespread flooding, flash flooding and mudslides. Numerous homes were washed away (Los Angeles County 2012b). In the Hidden Springs area in the Big Tujunga Canyon watershed in the San Gabriel Mountains, mud and water flowing down Mill Creek took 10 lives and destroyed numerous structures (FEMA, 2016).

6.4.20 Summer Storm 1969

At this time, the population of Los Angeles County as a whole was about 7 million people (Los Angeles Almanac 2020).

On June 15, 1969, strong thunderstorms hit the San Gabriel Mountains. Flash floods washed out and closed several highways on the north slopes and floor of the Antelope Valley, including Highway 138.

In November 1970, voters in the Los Angeles County Flood Control District approved a $252 million Bond Issue (over $2 billion in 2024 dollars). The funds were used to extend the existing storm drain system and provide relief drains for the storm drains built under the previously approved 1952, 1958, and 1964 bond issues (Los Angeles County 2012b).

6.4.21 February 1969 Storm

The February 1969 storm produced nearly 20 inches of rain in the mountains in three days. Additional debris deposited in the Flood Control District's reservoirs and debris basins (LACFCD, 1969). In the Santa Clara River watershed communities (at the time unincorporated), bridges and channel improvements were damaged. More than 20 feet of approach roadway fell out of the Soledad Canyon Road bridge over the Santa Clara River. The State Route 14 bridge over the river was also closed. Another bridge over Bouquet Canyon Creek was destroyed. Several homes in a new housing development the east side of the Santa Clara River had been inundated when portions of concrete embankment gave way. On several main roads, including Bouquet, Sand and Soledad Canyon Roads, the runoff from the rains eroded large portions of the roads' pavement and thickly covered the roads with tons of mud and rock. Several homes in a new housing development the east side of the Santa Clara River at the Soledad Canyon bridge were inundated when portions of concrete embankment gave way. One motorist died in the floodwaters (scvhistory.com, 2020). There was considerable damage to railroad tracks, bridges and agriculture in the

Antelope Valley; three people lost their lives; damage at the time was estimated at over $2.2 million (over $18 million in 2024 dollars) (USACE, 1973).

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

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

6.4.22 January 1969 Storm

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

The nine-day January 1969 storm produced heavy rainfall: over 45 inches at Opids Camp in the Angeles National Forest and over 13 inches in Downtown Los Angeles (California Department of Water Resources, 2023). The result was heavy runoff and severe erosion. Eleven of the Los Angeles County Flood Control District's dams became so full that water went over their spillways. The District's reservoirs received 8.4 million cubic yards of debris. Its debris basins received almost 2 million cubic yards of debris. Properties below burned watersheds and without the protection of debris basins suffered considerable damage, especially those below small frontal slope canyons in the Azusa-Glendora area. Significant debris flows also occurred in the unincorporated area of Pasadena Glen, and Mandeville and Rustic Canyons in the City of Los Angeles (LACFCD, 1969). Record peak flood flows occurred in the unincorporated area of Topanga Canyon, causing considerable damage and leaving 500 people homeless or isolated. Flood damage also occurred in the San Fernando Valley, the Santa Clara River area, the Antelope Valley, Glendale, and Mt. Baldy Village (near the border between the Los Angeles and San Bernardino Counties). A total of 53 people lost their lives. Damage was estimated at the time to be $82 million (LACFCD, 1969).

Although the storm damage was considerable, the extensive flood control system built by the Flood Control District and the U.S. Army Corps of Engineers allowed many areas of Los Angeles and its major suburbs to endure the storm without significant damage. The amount of damage prevented by the flood control system was estimated at the time to be $900 million (about $7.7 billion in 2024 dollars) (Rantz, 1970; LACFCD, 1969).

6.4.23 Summer Storms, 1968

Summer storms in 1968 caused damage in unincorporated County areas downstream of brush fires that occurred earlier in the summer. In the Malibu area, damage occurred along Malibu Creek and Topanga Canyon, where flows damaged homes, swept away bridges, and washed out roads. Approximately 500 people were left homeless or isolated. In the Santa Clarita Valley, most damage was caused by erosion and sedimentation of natural watercourses. In the Antelope Valley, at least one home was completely destroyed. Railroads, public utilities, and agriculture also sustained damage (FEMA , 2008).

6.4.24 November 1967 Storm

On November 21st, 1967, a total of 7.93 inches had fallen in a three-day span. At the time, it was the worst siege of wet weather to hit the Los Angeles area in nearly 30 years, and Flood waters from runoff quickly swamped the storm drains and backed up into many homes and businesses, and turned many streets into rapid-flowing rivers. Trapped motorists had to quickly climb on top of their vehicles and await for someone to rescue them. Mudslides in the hills were caused by the immense amount of the rainfall. In one hour in Los Angeles, 1.87 inches fell, setting the record for the greatest one hour rainfall on record. In the mountains just above Los Angeles, over 14 inches of rain fell during the 3-day storm event, stranding over 400 people in the mountains due to closed highways. This was the biggest storm to hit the Los Angeles area since the March 1938 storm (Martin 2017; NWS 2024).

6.4.25 1966 Storm

On December 2-7, 1966, debris and mud flows and flooding damaged homes and roads in Wrightwood.

6.4.26 1965 November-December Storms

The first significant rainfall of the 1965-66 season occurred in November 13-19 and 21-26, 1965. Total precipitation for November of more than 30 inches was reported by the U.S. Weather Bureau at several stations in the San Gabriel Mountains, with a maximum of 37.92 inches reported at Opids Camp. New record totals for the month were reported at Los Angeles Civic Center (9.68 inches), and Long Beach (7.69 inches). Residents in some localities in Simi Valley and San Fernando Valley were evacuated as heavy runoff caused overflow of storm drains. Residents witnessed rivers of mud flowing into yards and streets. Surging floodwaters closed streets at many locations, paralyzing traffic. The Los Angeles River at Sepulveda Dam reached peak discharges of 11,250 cubic feet per second on November 17. Arroyo Seco near Pasadena had a peak discharge of 3,160 cubic feet per second on November 22, the second highest since March 1938. The peak discharge in the Santa Clara River at the Los Angeles-Ventura County line was 12,200 cubic feet per second on November 24. In the Antelope Valley, peak discharges occurred on November 22, with 1,270 cubic feet per second in Big Rock Creek near Valyermo and 2,900 cubic feet per second in Little Rock Creek near Littlerock.

Rainfall was again above normal in December 1965. The first period of rain, light and well distributed in the region, occurred December 8-17. Substantial rain occurred during December 28-31. At Burbank the month was the wettest December since 1943. The station at Burbank reported 5.30 inches of rain on December 29, a new record 1-day rainfall in December at that station. Los Angeles and Long Beach experienced the wettest December since 1951. The Los Angeles River at Sepulveda Dam reached peak discharges of 12,800 cubic feet per second on December 29. The December peak was the highest of record at the time, greater than the March 1938 peak discharge of 12,000 cubic feet per second. Arroyo

Seco had a peak discharge of 3,050 cubic feet per second on December 29, which was almost as great and at the time was the third highest since March 1938. A peak discharge of 20,600 cubic feet per second, a record at the time, occurred December 29 in Malibu Creek at Crater Camp near Calabasas. Flooding at Las Virgines Road in Calabasas isolated the Malibu Canyon tract and marooned 400 families. The peak discharge in the Santa Clara River at the Los Angeles-Ventura County line was 34,100 cubic feet per second on December 29. The December peak is the highest of record at the time, 40 percent greater than that in March 1938, the previous highest. Two Ventura County hydrographers were drowned while attempting to measure the discharge during this record peak. In the Antelope Valley, peak discharges occurred on December 29, with 2,100 cubic feet per second in Big Rock Creek near Valyermo and 5, 730 cubic feet per second in Little Rock Creek near Littlerock; the flows did not reach the magnitudes recorded in the March 1938 storm (8,300 cubic feet per second and 17,000 cubic feet per second, respectively).

Reservoir storage effected substantial reduction in the magnitude of peak flows on many streams. These benefits were obtained from reservoirs constructed for flood-control , as well as from others constructed primarily for water-conservation purposes (Hedman and Pearson 1966).

6.4.27 1965 August Storm

On August 13, 1965, thunderstorms hit the mountain and desert areas of Southern California. A flash flood four feet deep damaged Highway 138 near Wrightwood.

6.4.28 1961-62 Storm Season

At this time, the population of Los Angeles County as a whole was about 6 million people (Los Angeles Almanac 2020).

The November 20, 1961 storm brought heavy rains that fell over areas freshly burned by wildfires, resulting in mudslides and debris flows that caused causing severe damage to homes and several roadways (NWS 2024).

The storm of February 7-12, 1962, brought the area its wettest February in ten years. The storm dumped 5.77 inches of rain in Long Beach, about 9.4 inches in downtown Los Angeles, over 10 inches in Van Nuys, about 19 inches in Topanga Canyon, over 4.1 inches in Acton, and about 20.2 inches at Hoegee's Camp near Mount Wilson in the Angeles National Forest (Blanchard, 1964)., Flows swelled in the Los Angeles River and Santa Clara River. The storm accounted for 20 deaths in the Los Angeles basin. In Palmdale, sides of a well crumbled, plunging a caretaker to his death (Blanchard, 1962).

In 1964, Los Angeles County Flood Control District voters passed a $275 million bond issue (over $2.7 billion in 2024 dollars) for 275 storm drains.

6.4.29 1958 February Storm

The storm of February 19-20, 1958, flooded many streets in the Los Angeles region. Families were evacuated from homes in pockets of Gardena, Torrance, Hawthorne & Lawndale, Redondo, Hermosa and Manhattan Beach, and Bellflower. Voters subsequently passed a $225 million bond issue (over $2.4 billion in 2024 dollars) for 315 storm drains.

6.4.30 December 1951-January 1952 Storms

These storms caused widespread street flooding, mud and landslides, numerous school closures, and flooding of homes and businesses. There was only minor damage to Los Angeles County Flood Control District facilities, but there was extensive damage in newly developed natural watercourses without flood control systems or proper setbacks. Nine people died. The District's voters subsequently approved a $179 million bond issue in 1952 (about $2.1 billion in 2024 dollars) for 140 storm drains, the first major trunk lines for the District's storm drain systems.

6.4.31 1943 Storm

January 1943 storm produced the most intense rainfall recorded in the San Gabriel Mountains (26.12 inches in 24 hours, 37.3 inches storm total, at Hoegee's Camp near Mount Wilson in the Angeles National Forest). The storm was heaviest in the San Gabriel Mountain watershed, and was greater than the 1938 Flood. Damage wasn't as severe as it could have been because the water level in the dams and reservoirs were low, and the watershed was dry. Downstream, the lower San Gabriel River levee south of Spring Street failed causing widespread flooding in east Long Beach. Channel linings, roads, and bridges were also damaged, along with some houses. Nine debris basins were filled with about 270,000 cubic yards of debris and required clean-out. There was about 968,000 cubic yards of sediment deposited behind the District's dams. There was damage to agricultural lands. Streets were blocked by flooding and debris at many locations, causing traffic delays, and requiring cleanup. The storm was not as intense or widespread over the rest of the Los Angeles region and did not produce significant flood damage on the Los Angeles River. Rainfall at the Downtown Los Angeles was 7.6 inches and peak flow on the Los Angeles River at State Street was 38,000 cubic feet per second (about two thirds the amount of rainfall and about one-third of the peak flow of the 1938 Flood). The U.S. Army Corps of Engineers selected the 1943 Storm as its design event for the Los Angeles River flood control channel.

6.4.32 1938 Storm

At this time, the population of Los Angeles County as a whole was about 2.7 million people (Los Angeles Almanac 2020).

Two closely spaced storms hit the region in late February/early March 1938. The five day combined storm event produced over 11 inches of rainfall in Downtown Los Angeles and over 32 inches in the San Gabriel Mountains. When the event was over, about 115 people had died, 6,000 homes had been flooded, and nearly 169 square miles (about one-third) of Los Angeles was flooded. The damage was estimated at the time to be over $78.6 million (over $1.7 billion in 2024 dollars). The areas hardest hit were Compton, Long Beach, the San Fernando Valley, and Venice (KCET, 2012; Troxell, 1942).

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

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

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

6.4.33 1934 La Crescenta Mudflows

In January 1934, 11 inches of rain fell in 11 hours over the mountains above La Crescenta, which had burned in November 1933. Over 600,000 cubic yards of debris-laden flows (an estimated 600,000 cubic yards) descended out of the canyons at high velocities and overran the community. In a little over 1 hour, 40 lives were lost, and 400 structures were destroyed (Troxell and Peterson, 1937). The damage estimated at the time was $6 million (almost $141 million in 2024 dollars) (Turhollow, 1975). This event spurred the U.S Army Corps of Engineers' construction of the County's first debris basins and the Eaton Wash Dam.

6.4.34 1927 Flood

At this time, the population of Los Angeles County as a whole was about 2.2 million people (Los Angeles Almanac 2020).

The February 1927 flood caused widespread moderate damage to the Los Angeles region. Channels and streams filled up and over their tops and bridges were damaged and destroyed. Bridges crossing the major rivers were impacted by the flood waters. Some were heavily damaged and washed away. In present day City of Industry, the United Pacific Railroad Bridge over Puente Creek was swept away, and a passenger train bound for Chicago plummeted into the swollen river, injuring 15 passengers and killing 2 crew members. Floodwaters on the Los Angeles River in the Atwater area damaged the Glendale Avenue Bridge. Floodwaters also damaged bridges over the San Gabriel River in the south east County. The pooled water behind the District's partially completed Pacoima Dam overflowed and roared down the canyon, destroying the construction camp set up below the dam. Flooding occurred across the nation in 1927, prompting Congress' interest in flood control.

6.4.35 1916 Flood

From January 14-20, 1916, and from January 23-29, 1916, two storm systems produced a flood slightly smaller than the 1914 Flood, doing moderate damage and depositing about 3 million cubic yards of sediment in the harbors. Flooding occurred in Long Beach near the Los Angeles River. Reports indicate about half the water was flowing into the Long Beach Harbor and the other half into the Los Angeles Harbor, and lasted longer. In the Carson area, 1,800 acres of the Laguna Dominguez was flooded. No lives were lost in Los Angeles County, but approximately $775,000 worth of damage (over $22 million in 2024 dollars) occurred. The flood reinforced support for the flood control plan the newly formed Los Angeles County Flood Control District was preparing . The voters subsequently passed bond issues in 1917 and 1924 for the construction of the District's dams and its initial channels.

6.4.36 Flood of 1914

In February 1914, a devastating flood hit Los Angeles County, which by that time had a population of almost 800,000 people in 31 cities and the unincorporated areas (Los Angeles County, 2012a). For four

days, rain soaked the cities, the farms, the beaches, and the mountains. On the first day, 1.5 inches of rain fell on the city of Los Angeles in just one hour. By the third day, more than 19 inches of water had fallen in parts of the San Gabriel Mountains, and three or more inches along the coast. Runoff from almost barren mountain slopes, from city roofs and streets, and from farms began almost immediately.

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

The flood destroyed many bridges, flooded many properties, and filled the harbors of the Ports of Los Angeles and Long Beach with over four million cubic yards of sediment (rendering them almost unusable). For one week there was practically no communication with the outside world. Rail traffic was entirely suspended. Long Beach was an island, cut off on all sides by rushing waters. Hundreds of people became temporary refugees. Many people were injured. The estimated damage was $10 million (over $314 million in 2024 dollars), including wreckage to bridges, roads, rail lines, buildings, agriculture, industry, and public utilities. In addition, the Corps of Engineers estimated that $400,000 (over $12 million in 2024 dollars) would be needed to dredge out the deposit of sediment at the harbors (Bigger, 1959). In response to this event, the California State Legislature adopted the Los Angeles County Flood Control Act, which established the Los Angeles County Flood Control District.

6.4.37 Dam Failures

The most catastrophic dam failure in California's history was that of the St. Francis Dam in Los Angeles County in the Santa Clara River watershed in March 1928. This failure resulted in the deaths of more than 450 people and destruction of nearly 1,000 homes and buildings. Numerous roads and bridges were destroyed or damaged beyond repair. The California Division of Safety of Dams came into existence as a direct result of this catastrophe. Other significant dam failures in California's history include the Baldwin Hills Dam failure in December of 1963, which resulted in five deaths, and the near‐failure of the Lower San Fernando Dam in 1971 (Association of State Dam Safety Officials. 2011).

6.5 Location

6.5.1 Mapped FEMA Flood Zones

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

- September 26, 2008—Digitization of FIRMs for Los Angeles County
- April 26, 2018—FIRMs for the Triunfo Creek watershed
- December 21, 2018—FIRMs for Topanga Canyon and other nearby canyons in the Santa Monica Mountains
- December 21, 2018—FIRMs for the Ballona Creek watershed
- April 21, 2021 – FIRMs for the Open Pacific Coast in Los Angeles County
- June 2, 2021 – FIRMs for the Santa Clara River watershed

- Numerous Letters of Map Revision issued by FEMA

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

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

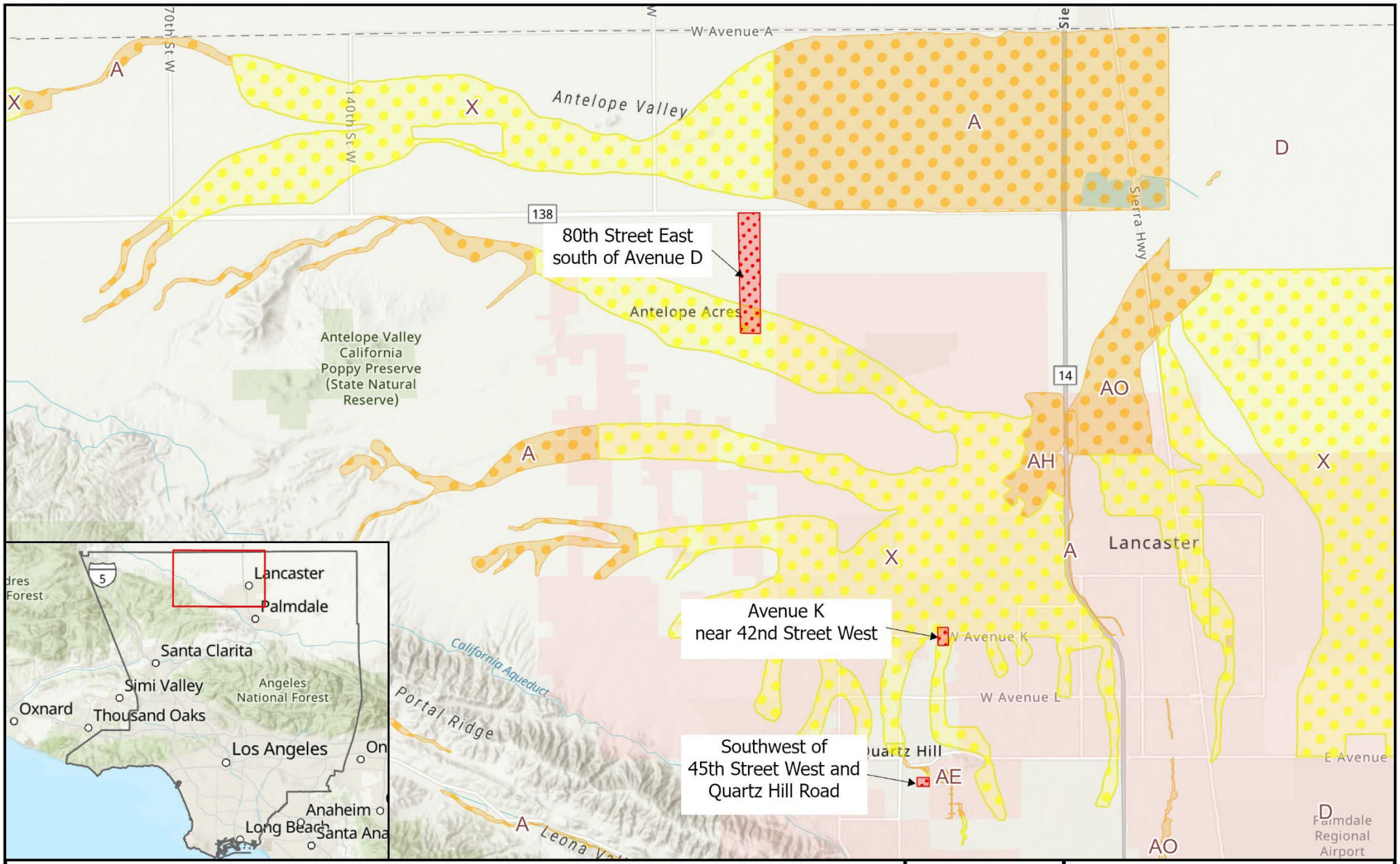
6.5.2 County Floodways

The floodway is an area immediately adjacent to a watercourse where floodwaters during a flood are deepest and fastest-moving. It is the most dangerous part of the floodplain, and its hazardous nature requires that development in this area be carefully managed. The floodway must remain free of obstruction and construction unless engineering analysis demonstrates that flood hazards will not be increased on adjoining properties. Ideally, development in the floodway should be restricted to uses that do not interrupt the natural flow of the water (tennis courts, swimming pools, etc.). The limits of the County floodway are defined as the point where the velocity of flood flow is 10 feet per second or the water surface elevation is one foot above the floodplain water surface elevation. The first of either criteria reached controls the floodway width. Where the flow velocity exceeds 10 feet per second for the entire width of the floodplain, the floodplain lines and floodway lines are the same.

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

6.5.3 Non-SFHA Urban Drainage Flood Areas

Flooding problem areas outside SFHAs are identified on a case-by-case basis. One source of information is mapping performed by the Los Angeles County Road Maintenance Division in northern unincorporated portions of the County. Areas mapped through this process are shown on Figure 6-8 and Figure 6-9.



Legend

- Incorporated Areas
- Flood Prone Areas
- County Regulated Floodplain
- FEMA 100 yr Flood Zone
- FEMA 500 yr Flood Zone

NORTH

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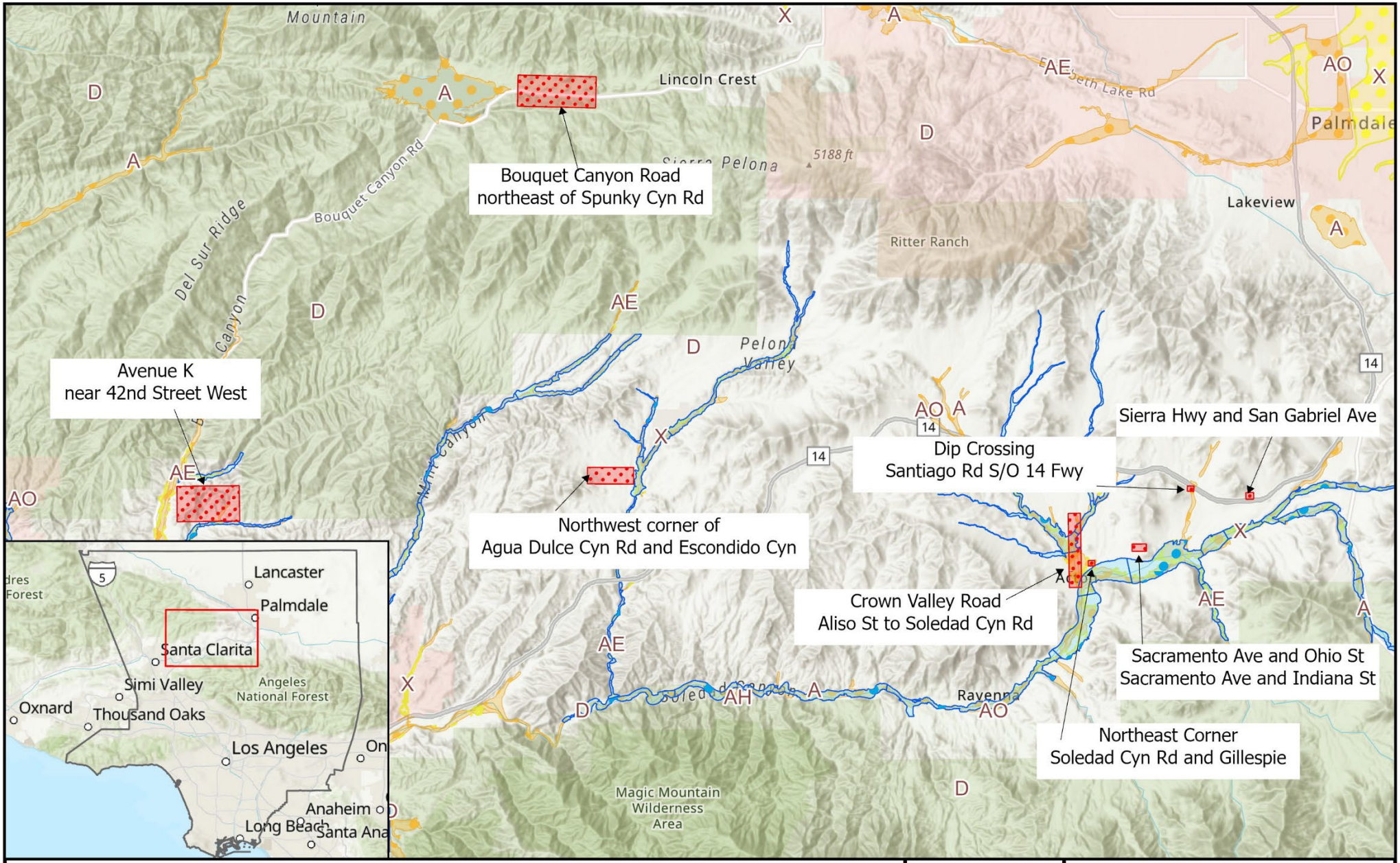
Scale in Miles

BURNS McDONNELL

Northern LA County Flood-Prone Areas Outside SFHA (West) Figure 6-8

Source: Esri World Topographic Map, California Department of Water Resources 2024

Issued: 9/9/2024



Legend

- Incorporated Areas
- Flood Prone Areas
- County Regulated Floodplain
- FEMA 100 yr Flood Zone
- FEMA 500 yr Flood Zone

NORTH

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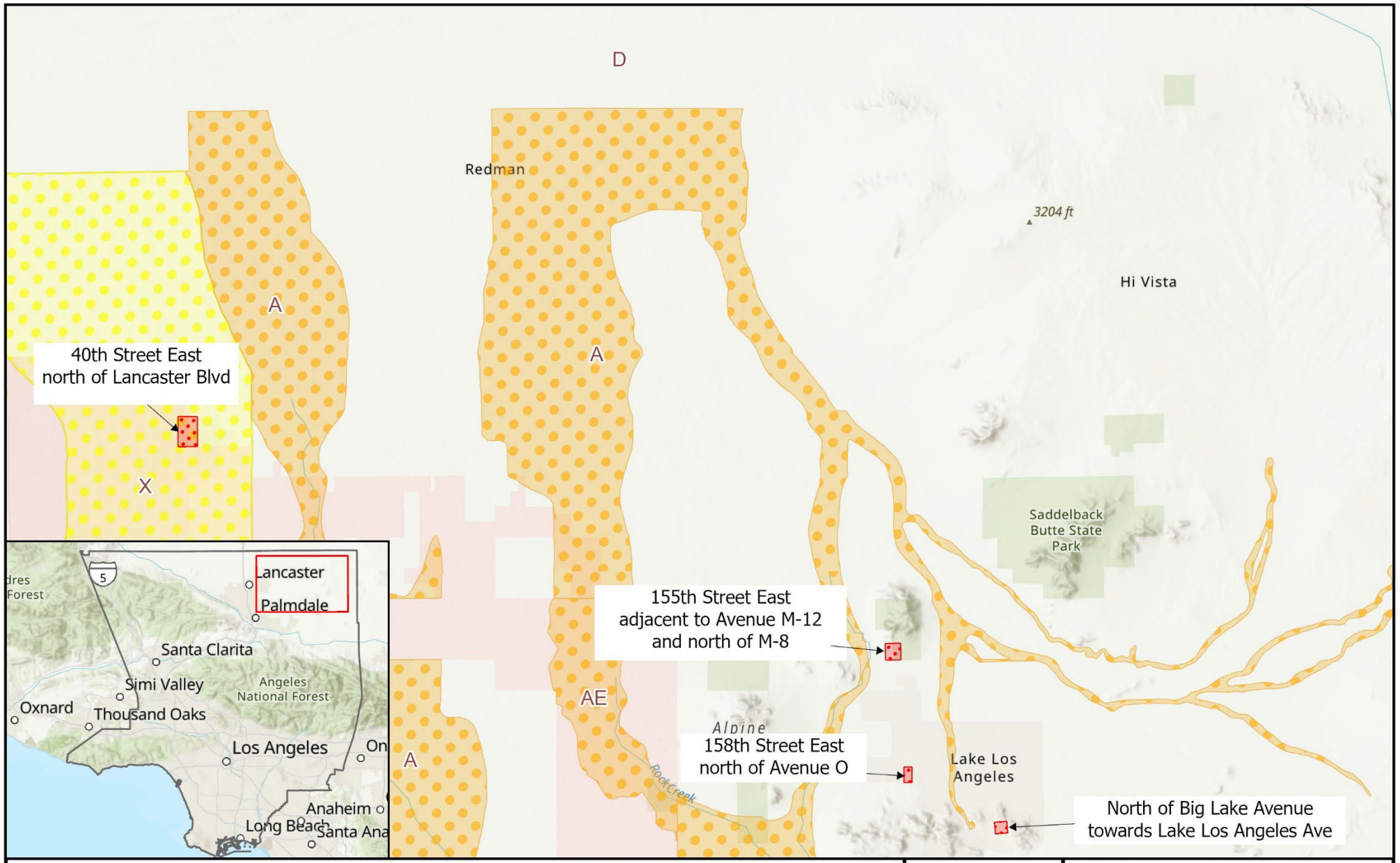
Scale in Miles

BURNS McDONNELL

Northern LA County Flood-Prone Areas Outside SFHA (West) Figure 6-8

Source: Esri World Topographic Map, California Department of Water Resources 2024

Issued: 9/9/2024



Legend

- Incorporated Areas
- Flood Prone Areas
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NORTH

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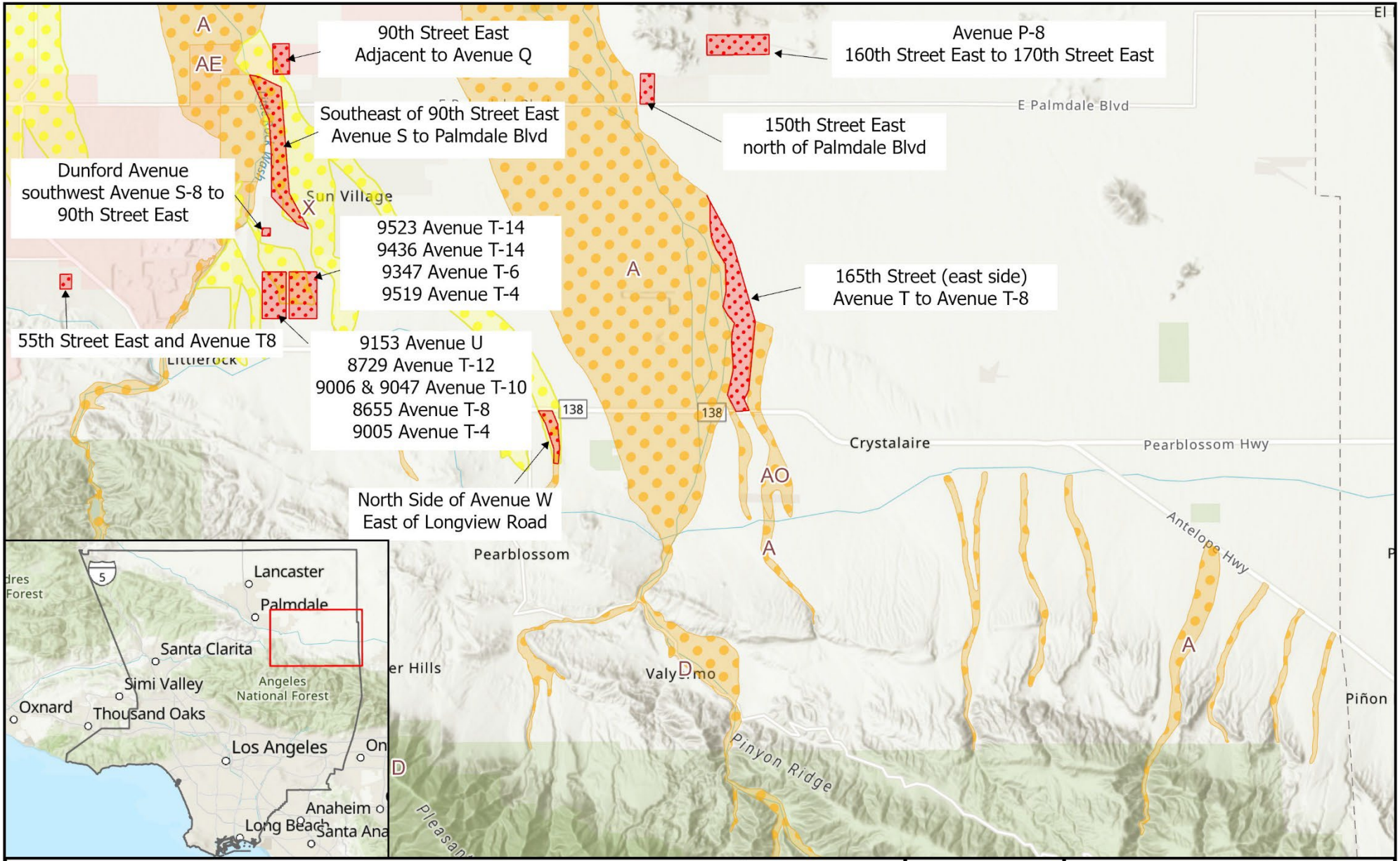
Scale in Miles

BURNS McDONNELL

Northern LA County Flood-Prone Areas Outside SFHA (East) Figure 6-9

Source: Estri World Topographic Map, California Department of Water Resources 2024

Issued: 9/9/2024



Legend

- Incorporated Areas
- Flood Prone Areas
- County Regulated Floodplain
- FEMA 100 yr Flood Zone
- FEMA 500 yr Flood Zone

NORTH

2 1 0 2

Scale in Miles

BURNS McDONNELL

Northern LA County Flood-Prone Areas Outside SFHA (East) Figure 6-9

Source: Esri World Topographic Map, California Department of Water Resources 2024

Issued: 9/9/2024

6.6 Frequency

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

- Dam failures are difficult to predict and do not typically have an associated frequency. Dam vulnerability is unique to each dam, depending on its type, age, and previous incident information. Dam failure frequency is typically based on anecdotal information and historical events (FEMA, 2019a).
- Coastal erosion is a frequent event that is tied to both natural and human activities. While all beaches experience coastal erosion, rate and severity vary by location. Because coastal erosion is tied so closely to other activities, frequency rates and severity levels are best evaluated in conjunction with other related hazards' probabilities and by analyzing secondary impacts from storms, human actions, etc. (FEMA, 1996).
- Storm surge frequency is similar to coastal erosion in that its frequencies are tied to other hazard events, such as severe storms. In general, the severity of a storm can provide a rough prediction for the occurrence of storm surges.
- Sea level change is an ongoing process and can be monitored on both long-term and shorter-term scales. Global sea level changes are due to changes in the volume of water in ocean basins through thermal expansion, glacial melt, or net changes in the size of ocean basins. Global sea rise has been occurring for the past 20,000 years as a natural result of glacial maximum decline (NOAA, 2022b; NASA 2024c).

6.7 Severity

6.7.1 Riverine Flooding

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

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

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Acton Canyon At confluence with Santa Clara River	20.9	900	2,750	4,080	9,050

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Acton Canyon upstream of Escondido Canyon Creek	7.5	370	1,130	1,670	3,700
Agua Dulce Canyon Creek At confluence with Santa Clara River	29.5	670	2,030	3,010	6,680
Agua Dulce Canyon Creek At Sierra Highway	15.6	390	1,190	1,770	3,930
Agua Dulce Canyon Creek At Agua Dulce Canyon Road	—	650	1,970	2,920	6,480
Aliso Canyon Creek Approximately 0.9 miles upstream of Aliso Canyon Road	—	930	2,840	4,210	9,340
Aliso Canyon Creek At Aliso Canyon Road	—	940	2,880	4,270	9,470
Aliso Canyon Creek At confluence with Santa Clara River	—	1,030	3,160	4,680	10,380
Amargosa Creek East of Antelope Valley North of Avenue H	206	3,000	9,000	13,000	30,000
Amargosa Creek West of Antelope Valley Freeway North of Avenue H	147	2,000	5,600	8,400	18,000
Amargosa Creek at 90th Street West	6.9	580	2,000	3,100	4,500
Anaverde Creek Acton Canyon Road, Escondido Canyon Road, and Crown Valley Road	20.3	—	—	3,421	6,052
Anaverde Creek West of Sierra Highway at Avenue P-8	19	700	2,100	3,100	6,600
Anaverde Creek East of Antelope Valley Freeway	16	700	2,100	3,000	6,400
Anaverde Creek 3,000 feet east of 165th Street East Approximately 4.000 feet south of Pearblossom Highway	7.3	500	1,700	2,300	4,700
Anaverde Creek West of 136th Street East of Avenue W-8	2.4	440	1,500	1,900	3,900

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Anaverde Creek 165th Street East Approximately 4,000 feet South of Pearblossom Highway	1.0	370	1,300	1,600	3,100
Ballona Creek	16.7	2,100	4,700	6,000	9,400
Big Rock Wash	23.0	—	—	15,000	—
Bouquet Canyon Creek Upstream of the confluence of Vasquez Canyon	35.4	1,700	5,180	7,680	17,030
Bouquet Canyon Creek Upstream of the confluence of Texas Canyon Creek	24.4	920	4,180	9,270	9,270
Bouquet Canyon Creek Approximately 1.7 miles upstream of confluence of Texas Canyon Creek	—	860	3,870	8,580	8,580
Castaic Creek At Santa Clara River Confluence (Pump Capacity)	203	17,950	33,490	41,260	58,270
Castaic Creek At confluence with Santa Clara River	—	3,220	9,830	14,560	32,290
Castaic Creek At Golden State Freeway	—	3,200	9,770	14,480	32,120
Castaic Creek Approximately 0.9 miles upstream of Golden State Freeway	—	3,120	9,540	14,130	31,340
Castaic Creek At Castaic Road	—	2,610	7,990	11,830	26,240
Castaic Creek Approximately 2,100 feet upstream of Confluence with Charlie Canyon	16.8	—	—	11,805	22,326
Cheseboro Creek	7.6	2,169	4,779	6,088	9,551
Cold Creek at the intersection of Crater Camp Drive and Piuma Road	8.1	2,280	5,019	6,406	10,023
Cold Creek Approximately 250 feet upstream of Malibu Meadows Road	7.8	2,280	5,041	6,432	10,066
Cold Creek Approximately 300 feet downstream of Cam Colibri	5.7	1,734	3,826	4,881	7,640
Dark Canyon Cross Section A	1.2	753	1,600	2,118	3,314

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Dowd Canyon at Calle Corona Extended	3.9	—	—	2,982	5,963
Dry Canyon – Cross Section C	1.1	527	1,104	1,484	2,323
Dry Canyon – Cross Section M	0.8	490	1,083	1,382	2,162
Dry Canyon – Cross Section T	0.4	242	534	681	1,065
Dry Canyon – Approximately 2,000 feet upstream of San Francisquito Road	5.5	—	—	5,235	10,470
Elizabeth Canyon Approximately 2,300 feet downstream of Elizabeth Lake Pine Canyon Road	7.7	—	—	3,455	7,176
Escondido Canyon at Confluence with Acton Canyon Creek	13.0	530	1,610	2,390	5,300
Garapito Canyon – Cross Section A	2.9	996	2,171	2,807	4,392
Garapito Canyon – Cross Section E	2.0	675	1,470	1,910	2,974
Gorman Creek Approximately 250 feet north of Interstate Highway 5 Overcrossing Gorman Road	3.8	—	—	1,713	3,221
Halsey Canyon Approximately 1,150 feet downstream of Halsey Canyon Road	7.3	—	—	5,544	10,163
Halsey Canyon Approximately 500 feet downstream of Romero Canyon Road	5.9	—	—	4,523	8,292
Haskell Canyon at confluence with Bouquet Canyon Creek	9.8	730	2,240	3,320	7,360
Las Flores Canyon	4.1	1,758	3,882	4,954	7,752
Las Virgenes Creek Approximately 1,500 feet downstream of the confluence of Stokes Canyon	24.3	9,230	13,678	15,521	18,704
Las Virgenes Creek Downstream of the confluence of Stokes Canyon	24.3	9,228	13,673	15,515	18,811
Las Virgenes Creek Upstream of the confluence of Stokes Canyon	19.7	9,193	13,766	15,646	19,340

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Las Virgenes Creek At Mulholland Highway	19.1	6,873	10,346	11,929	14,853
Las Virgenes Creek Upstream of the confluence of Liberty Canyon	16.6	6,871	10,348	11,935	15,210
Las Virgenes Creek Approximately 1,500 feet upstream of the confluence of Liberty Canyon	16.5	5,862	8,799	10,069	12,755
Las Virgenes Creek Approximately 1,500 feet upstream of the confluence of Liberty Canyon	16.5	5,783	8,799	10,069	12,755
Liberty Canyon- Cross Section E	1.4	938	2,072	2,645	4,140
Lindero Canyon – Cross Section C	6.7	1,725	3,809	4,860	7,604
Lindero Canyon – Approximately 700 feet downstream of Thousand Oaks Boulevard	4.1	1,369	3,024	3,858	6,037
Lindero Canyon – Cross Section H	3.8	1,343	2,965	3,783	5,920
Lindero Canyon – At Reyes Adobe Road	3.4	1,290	2,847	3,632	5,685
Lindero Canyon – Cross Section N	3.1	1,258	2,776	3,542	5,545
Little Rock Wash at Little Rock Reservoir	48.0	—	—	20,000	—
Los Angeles River – At Compton Creek	808	92,900	133,000	142,000	143,000
Los Angeles River – At Imperial Highway	752	89,400	126,000	140,000	156,000
Malibu Creek – Cross Section A	109.6	14,183	31,648	40,544	63,934
Malibu Lake	64.6	11,859	26,556	34,043	53,712
Medea Canyon – Cross Section B	24.6	5,794	12,788	16,319	25,537
Medea Canyon – Cross Section H	23.0	6,174	13,628	17,389	25,537
Medea Canyon – Cross Section K	22.2	6,363	14,074	17,925	28,049

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Medea Canyon – Cross Section P	6.3	2,558	5,647	7,204	11,272
Mint Canyon Creek Approximately 2,700 feet downstream of Fitch Avenue	—	1,787	4,471	5,814	8,253
Mint Canyon 600 feet downstream of Vazquez Canyon Road	—	1,769	4,134	5,283	7,359
Mint Canyon 1,300 feet downstream of Sierra Highway Crossing 4	—	1,717	3,958	4,994	6,897
Mint Canyon Creek Upstream of confluence of Spade Spring Canyon Creek	—	685	1,494	1,834	2,461
Oak Springs Canyon Approximately 100 feet upstream of Union Pacific Railroad	5.7	—	—	2,703	4,054
Oak Springs Canyon At intersection of Sixth Street and Quincy Avenue	1.0	271	598	763	1,194
Old Topanga Canyon – Approximately 300 feet downstream of Zuniga Road	1.7	567	1,253	1,597	2,499
Old Topanga Canyon – Approximately 450 feet downstream of the intersection of Oak Drive and Sycamore Drive	0.8	251	554	706	1,104
Palo Comado Creek – Cross Section E	4.1	1,159	2,562	3,268	5,113
Palo Comado Creek – At Fairview Place	3.5	1,074	2,374	3,028	4,738
Palo Comado Creek – Cross Section K	3.2	1,032	2,279	2,908	4,551
Pine Canyon Approximately 1,200 feet upstream of Lake Hughes Road	6.4	—	—	2,969	6,166
Placerita Creek At Placerita Canyon Road	—	1,464	2,457	2,880	3,868
Plum Canyon approximately 2,350 feet upstream of Bouquet Canyon Road	3.4	—	—	1,942	3,453

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Ramirez Canyon – Cross Section B	3.3	1,066	2,352	3,000	4,696
Ramirez Canyon – Cross Section I	2.8	1,150	2,540	3,240	5,070
Rio Hondo River – At Stewart and Gray Road	132	35,600	41,000	39,300	40,200
Rio Hondo River – At Beverly Boulevard	113	33,800	37,500	38,000	38,400
Rio Hondo River – At Outflow from Whittier Narrows Dam	110	33,500	36,500	36,500	36,500
San Francisquito Canyon at Spunky Road	2.7	—	—	2,140	4,281
San Martinez-Chiquito Canyon Approximately 1,000 feet upstream of Chiquito Canyon Road (Lower Crossing)	4.7	—	—	4,659	8,607
San Martinez-Chiquito Canyon Approximately 400 feet upstream of Chiquito Canyon Road (Upper Crossing)	3.1	—	—	3,112	5,705
San Martinez-Chiquito Canyon Approximately 250 feet downstream of Verdale Street	1.1	—	—	1,205	2,208
Sand Canyon Creek 700 feet above 25975 Sand Canyon Road	—	644	1,295	1,591	2,152
Santa Clara River At Los Angeles County/Ventura County Line	639	15,700	45,900	66,600	140,000
Santa Clara River Approximately 4,600 feet downstream of Soledad Canyon Road	233	5,290	17,390	25,910	40,550
Santa Clara River Approximately 1,600 feet upstream of Bootlegger Canyon	85.0	2,260	6,450	9,600	14,690
Santa Clara River – Approximately 500 feet upstream of confluence of Arrastre	76.3	1550	4,780	7,440	11,760

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Santa Clara River Upstream of confluence of Acton Canyon Creek	49.9	1,370	3,480	5,210	8,080
Santa Maria Canyon	3.1	1,070	2,333	3,016	4,719
Soledad Canyon At confluence with Aliso Canyon	—	710	2,170	3,210	7,120
Soledad Canyon Upstream of confluence of Kentucky Springs Canyon Creek	—	490	1,500	2,220	4,920
Soledad Canyon At Angeles Forest Highway	—	250	780	1,150	2,550
South Fork Santa Clara River Approximately 600 feet downstream of Golden State Freeway	12.8	—	—	8,417	13,596
South Fork Santa Clara River Approximately 500 feet Downstream of Wiley Canyon Road	12.9	—	—	8,483	13,704
Spade Spring Canyon Creek At confluence with Mint Canyon Creek	—	471	1,099	1,364	1,839
Spade Spring Canyon Creek At boundary of Angeles National Forest	—	428	911	1,118	1,491
Stokes Canyon – Cross Section C	2.9	1,089	2,403	3,067	4,799
Stokes Canyon – Cross Section B	2.4	934	2,062	2,632	4,117
Tick Canyon At confluence with Santa Clara River		380	1,150	1,710	3,790
Topanga Canyon – Cross Section H	19.6	4,095	9,040	11,537	18,054
Topanga Canyon – Approximately 750 feet upstream of the Intersection of Walnut Trl and Topanga Canyon Boulevard	15.0	5,404	11,930	15,223	23,882
Topanga Canyon – At the confluence of Old Topanga Canyon	14.5	5,208	11,499	14,672	22,960

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Topanga Canyon – Approximately 1600 feet upstream of Circle Trl	7.3	2,560	5,656	7,215	11,289
Topanga Canyon – Approximately 200 feet downstream of Hillside Dr	7.0	2,364	5,222	6,601	10,422
Topanga Canyon – At the confluence with Santa Maria Canyon	5.5	1,862	4,113	5,247	8,210
Topanga Canyon Approximately 100 feet upstream of Liberty Ln	0.3	259	572	729	1,141
Trancas Creek – Upstream of Pacific Coast Highway	8.6	2,499	5,518	7,040	11,106
Triunfo Creek Approximately 1,200 feet upstream of Crags Drive	39.2	10,167	17,118	20,021	26,901
Triunfo Creek Approximately 320 feet downstream of Kanan Road	38.1	9,942	16,647	19,443	26,105
Triunfo Creek Approximately 1,340 upstream of Kanan Road	36.8	9,675	16,163	18,870	25,364
Triunfo Creek Approximately 4,940 feet upstream of Kanan Road	36.5	9,608	16,041	18,725	25,168
Triunfo Creek Approximately 7,520 feet upstream of Kanan Road	30.1	8,135	13,520	15,781	21,252
Unnamed Canyon (Serra Retreat Area, Malibu Area)	0.4	281	619	791	1,237
Vasquez Canyon Approximately 1,373 feet upstream of Vasquez Canyon Road	4.2	—	—	2,851	5,009
Violin Canyon Approximately 2,000 feet downstream of Interstate Highway 5	10.5	—	—	9,421	17,818
Wildwood Canyon Approximately 600 feet upstream of Intersection of Valley Street and Maple Street	0.23	—	—	172	279

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Zuma Canyon – Cross Section A	8.9	2,024	4,469	5,705	8,925
Zuma Canyon – Cross Section B	8.4	2,079	4,590	5,858	9,167

Source: FEMA, 2021b

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

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

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

6.7.2 Coastal Flooding

Los Angeles Unincorporated County only contains coastal areas near Leo Carrillo State Park, South Topanga Canyon State Beach, and Marina del Rey. This is approximately seven miles of the 75-mile coastline in Los Angeles County. Coastal flood hazards greatly differ between the Pacific Coast and the Atlantic and Gulf Coasts. While large storm surges (up to 20+ feet) caused by high wind stress over broad and shallow continental shelves dominate the hazards on the Atlantic and Gulf coasts, the narrow continental shelves along the Pacific Coast limit surges to just a few feet.

Long-period large waves can induce both static and oscillating changes in water levels at the shore. This combined effect is known as 'wave runup.' The oscillating component of wave runup can have periods ranging from tens of seconds to several minutes. Coastal hazards arise from wave runup and the energy of powerful breaking waves, leading to significant beach erosion and structural damage. Additionally, due to substantial rainfall associated with Pacific storms, coastal and riverine flooding can synergize, amplifying flood risks near river mouths.

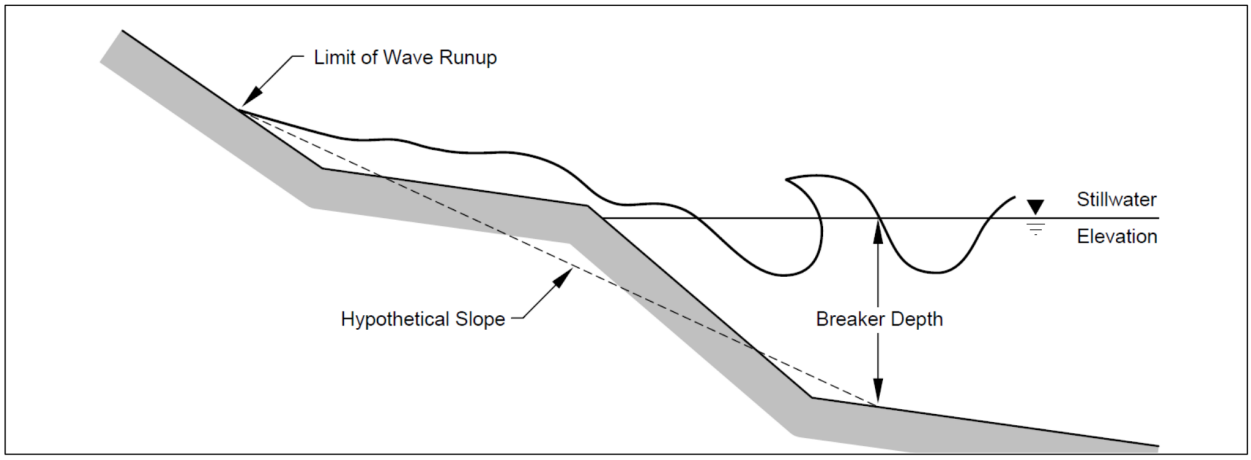
In time-steady conditions, the excess wave force is balanced by a slope in the average water level called wave setup. The magnitude of wave setup is largest in shallow water, and the value is roughly 10 to 20 percent of the incident breaking wave height at the stillwater shoreline. Note that wave setup is only significant in the breaking region, with the most pronounced effect in the inner surf zone and near the

stillwater shoreline. At elevated water levels, broken waves run up on beaches and structures where they can pose a significant flood hazard. These wave run-up elevations have been shown to reach 15 feet or more for a steep beach slope when incident waves have a significant wave height of 20 feet. (FEMA, 2019b).

FEMA evaluates the potential impact of a flood event along the coastline through coastal hydraulic analysis and wave run-ups. Wave run-ups are defined as "the uprush of the wave along the shore; also, the combined vertical and horizontal distance that a tsunami moves inland from the shoreline" (Keller and Blodgett, 2008). The FEMA standard definition of wave run-up is " the height above the stillwater elevation (tide and surge) reached by the swash" (FEMA 2005). Figure 6-10 shows the features of wave run-up.

Run-up calculations provide a greater understanding of potential beach and dune erosion that may result from a flood or storm. Run-up can be impacted by factors including local water level, wave conditions of a particular incident (height, period, steepness, direction), and the nature of the impacted beach/structure (FEMA 2005). Run-up analysis considers "wave setup," which is the increased elevation of the water level that occurs from transferring wave-related momentum to the surf zone (FEMA, 2018).

Wave run-up measurements are important for making accurate evaluations of overtopping that occurs when a barrier's crest height is lower than the potential run-up level, so that waves running up the face of the barrier pass over the crest. If a run-up calculation indicates potential overtopping, it can increase a hazard zone in flood maps (FEMA, 2018).



Source: FEMA 2005

Figure 6-10: Wave Run-Up

The 2021 Los Angeles County Flood Insurance Study (FIS) report studied the stillwater elevation along Los angeles Coast. This was determined by using the stillwater elevation combined and wave setup and runup heights to determine total stillwater elevation (TWL) at each analysis transect along the coast.Table 6-4 below shows the transects on either side of the mouth of Mainra del Rey, which is the only part of the coastline within unincorporated Los Angeles County.

Table 6-4: Total Stillwater Elevations for Coastal Areas of Unincorporated Areas in Los Angeles County

Coastal Transect	X, Y Coordinates (Meters, NAD83 UTM Zone 11N)		Total Water Level (feet NAVD88)		
	X	Y	10% Annual Chance	1% Annual Chance	0.2% Annual Chance
West Leo Carrillo State Park (1)	320653.1357	3768287.9841	16.5	18.2	19.3
East Leo Carrillo State Park (2)	321969.8308	3768276.4153	11.1	12.8	14.2
West Topanga Canyon River Area (44)	354426.0884	3766974.6102	11.5	12.5	13.1
Central Topanga Caynon River Area (45)	354677.2706	3767029.5611	17.4	20.4	22.5
East Topanga Canyon River Area (46)	355131.7004	3767138.4302	12.1	19.6	32.7
North of Marina Del Ray (60)	364331.9588	3759300.5518	17.5	19.2	20.1
South of Marina Del Ray (61)	364773.4088	3758101.1857	15.1	16.4	17.0

6.8 Warning Time

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

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

The potential warning time a community has to respond to a flooding threat is a function of the time between the first measurable rainfall and the first occurrence of flooding. The time it takes to recognize

a flooding threat reduces the potential warning time that a community has to take actions to protect lives and property. The action stage represents the level where the National Weather Service (NWS) or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The appropriate action is usually defined in a weather forecast office (WFO) hydrologic services manual (NWS, 2009). NWS has established thresholds for action stages on the major rivers in Los Angeles County as follows:

- Los Angeles River—Forecasted river stage of 12 feet or higher at the gage near Tujunga Avenue and 15 feet or higher at the gage below Wardlow Road.
- Ballona Creek—Forecasted river stage of 13 feet or higher at the gage near Sawtelle Boulevard (NWPS, 2024).

Another element that characterizes a community's flood threat is the length of time floodwaters remain above the flood stage. The Los Angeles County flood threat system consists of a network of precipitation gages throughout the watershed and stream gages at strategic locations in the County that constantly monitor and report stream levels. This information is provided to the NWS and National Oceanic and Atmospheric Administration. In addition to this program, the NWS provides data and flood warning information.

Wireless Emergency Alerts from NWS are notices about potentially hazardous weather that are sent out to all compatible cell phones in affected areas. All of this information is analyzed to evaluate the flood threat and possible evacuation needs. Figure 6-11 shows stream gauge locations for Los Angeles County, as provided in the 2021-2022 Hydrologic Report.

Figure 6-12 is a typical hydrograph for major waterways in Los Angeles County. The hydrograph provides real-time data with action levels and minor, moderate, and major flood stages in relation to current river heights.

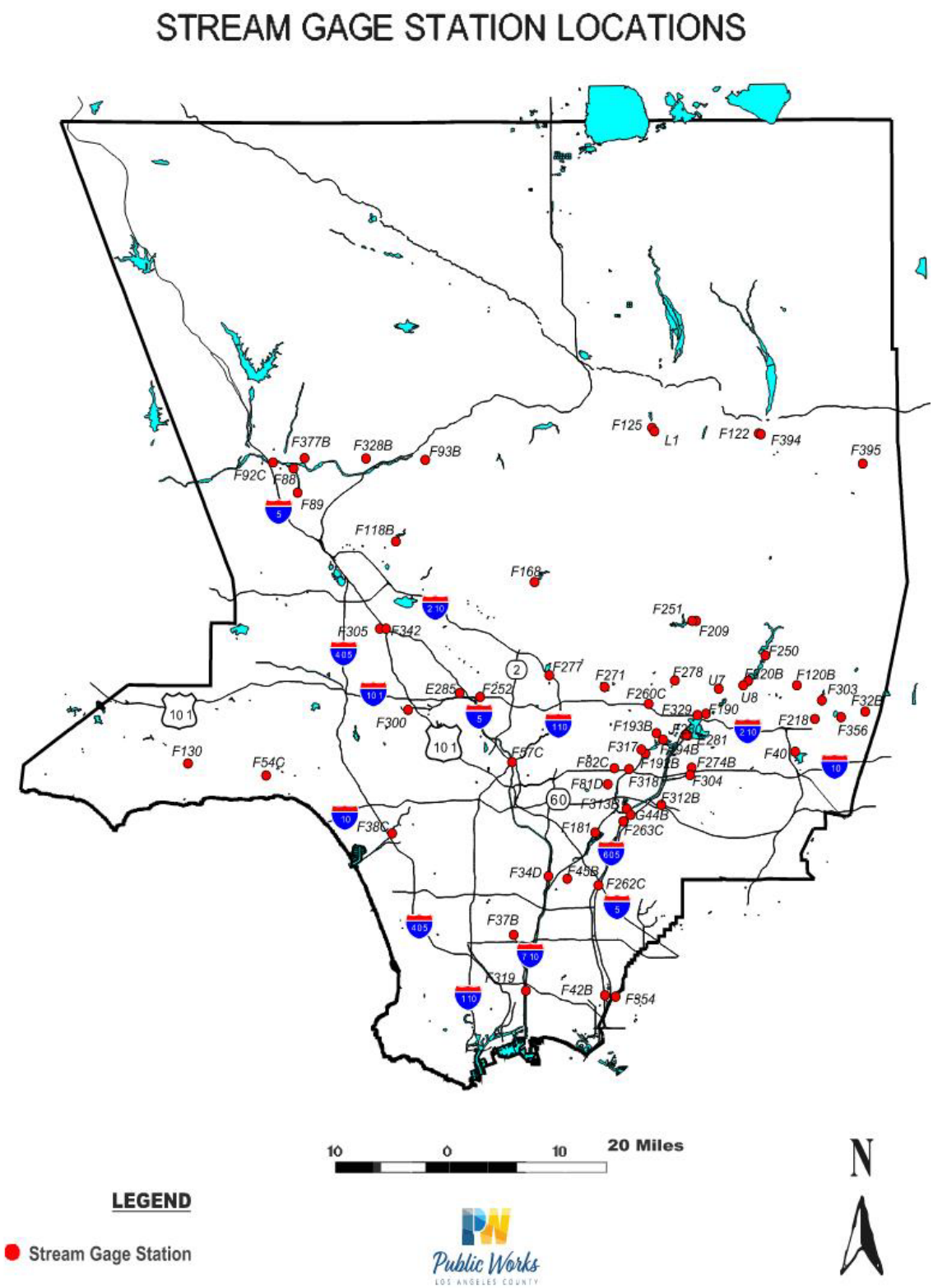
The NWS issues watches and warnings as follows when forecasts indicate rivers may approach bank-full levels:

- Minor Flooding— indicating minimal or no property damage but possibly some public inconvenience.
- Moderate Flooding— The inundation of secondary roads. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding— Extensive inundation and property damage. This is usually characterized by the evacuation of people and livestock and the closure of both primary and secondary roads. (NWS, 2009).

When a watch is issued, the public should prepare for the possibility of a flood. A flood watch is issued to inform the public and cooperating agencies that current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent. When a flood warning is issued, the public is advised to stay tuned to a local radio station for further information and be prepared to take quick action if needed. The warning is to inform the public of flooding along larger streams in which there is a serious threat to life or property (NWS, 2009). A warning means a flood is

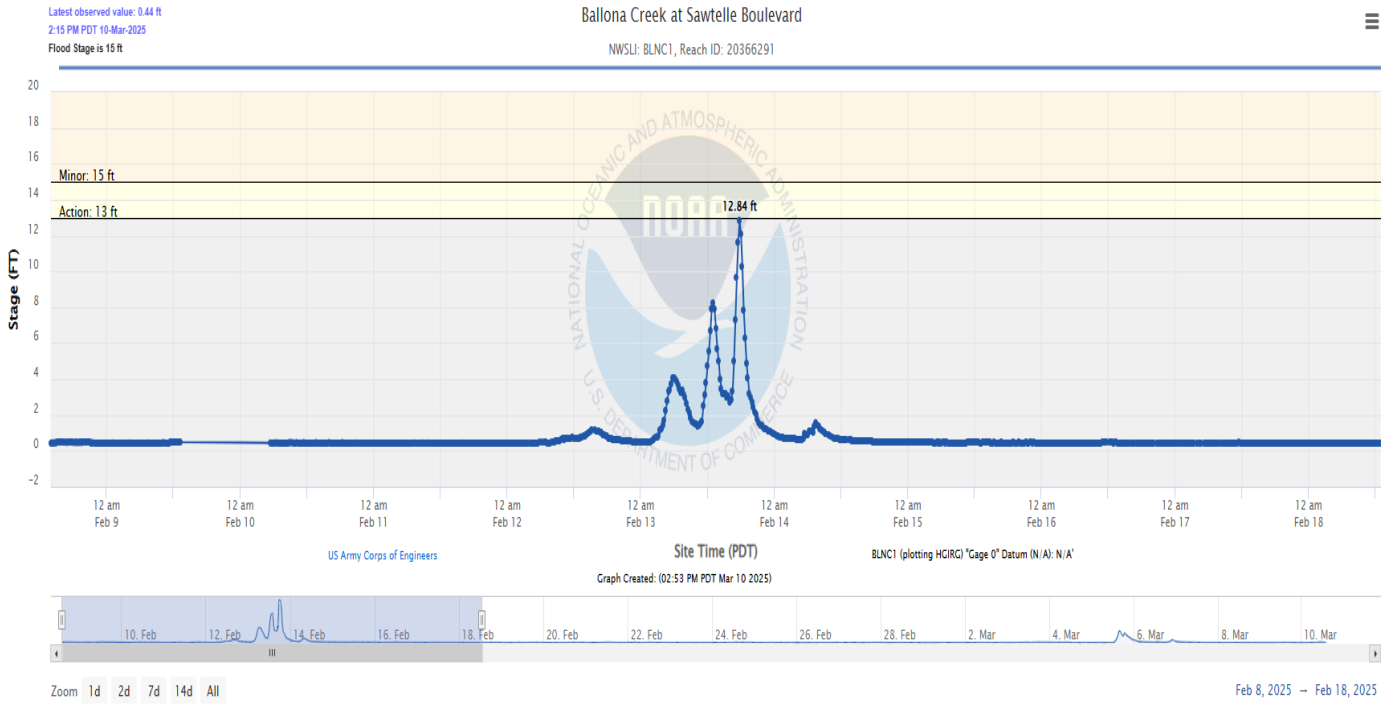
imminent, generally within 12 hours, or is occurring. Local media broadcasts NWS warnings. NWS has established thresholds for flood warnings on the major rivers in Los Angeles County as follows:

- Los Angeles River—Forecasted river stage of 13.9 feet or higher at the gage near Tujunga Avenue and 17 feet or higher at the gage below Wardlow Road.
- Ballona Creek—Forecasted river stage of 15 feet or higher at the gage near Sawtelle Boulevard (NWPS, 2024).



Source: Los Angeles County Hydrological Report, 2021-2022

Figure 6-11: Stream Gage Locations in Los Angeles County



(NWPS, 2024)

Figure 6-12: Ballona Creek Hydrograph at Sawtelle Boulevard

6.9 Secondary Hazards

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

6.10 Future Trends

The County of Los Angeles has established a commitment to mitigating natural hazards and improving community resilience to hazards, in order to protect life and property and preserve natural systems. The County links hazard mitigation to the County of Los Angeles 2035 General Plan development goals to ensure that the County's continued development is managed as sustainably and efficiently as possible (Los Angeles County, 2020). The General Plan identifies goals and initiatives for natural hazard planning, including, but not limited to, the following (Los Angeles County Department of Planning, 2022):

- Goal LU 3: A development pattern that discourages sprawl, and protects and conserves areas with natural resources and significant ecological areas.

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

The County has several other plans and initiatives designed to promote healthy watersheds, create greener infrastructure, maintain coastal zones, and manage stormwater.

One of these plans is the Safe Clean Water Program which is a program in Los Angeles County that aims to clean and conserve stormwater, increase the local water supply, reduce urban flooding, and provide other community benefits. With over $513.5 million allocated to regional initiatives, it supports 126+ projects across the county, prioritizing historically underserved communities and leveraging natural processes for water filtration and storage.

Los Angeles County Public Works also has many plans dedicated to sustainability including LID, green zones, purchasing policies and more sustainable infrastructure that can all impact the flood plains in a positive way. These plan components strive to steer future trends in development away from increasing flood risks in Los Angeles County's unincorporated areas. Additionally, Los Angeles County participates in both the NFIP and CRS programs (Class 6). It has adopted flood damage prevention regulations in response to those requirements. The County is committed to maintaining its good standing under the NFIP through actions identified in this plan.

The County forecasts that the unincorporated areas will continue to see substantial population growth, with a projected population of 1,399,500 by 2035 (Los Angeles County Department of Planning, 2022). This is a 22 percent increase from the 2020 population of 1,095,592. As the County targets increased local industry and businesses, new houses, and other opportunities, it will do so in a way that carefully regulates development and redevelopment in critical and flood-prone areas. The cumulative implementation of these plans and regulations will reduce the impacts of future growth in the floodplains and high-risk unincorporated areas of Los Angeles County and will lessen the impacts of flooding on future development.

6.11 Scenario

The primary water courses in the planning area have the potential to flood at regular intervals (disaster declarations for flooding have been issued an average of once every 3.5 years), generally in response to a

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

6.12 Issues

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

- Programs to sustain efforts to gather historical damage data (such as high-water marks on structures and damage reports) to measure the cost-effectiveness of future mitigation projects are lacking within the planning area.
- Current county codes and standards, such as the Subdivision, Health and Safety – Water Hazards, and Flood Control District Property and Facilities ordinances, are complex and difficult to interpret.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the County.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The potential impact of climate change on flood conditions needs to be better understood.
- The County's adaptive capacity to address impacts of climate change should be evaluated.
- Floodplain compatible uses such as low-impact development, open-space preservation and low-density development should be considered where feasible and both publicly and politically supported.
- The capability for prediction/forecast modeling needs to be enhanced.
- Flood warning capability should be tied to flood phases.
- Enhancement of modeling is needed to understand the true flood risk better.
- Floodplain restoration/reconnection opportunities should be identified as a means to reduce flood risk.
- Post-flood disaster response and recovery actions need to be solidified.
- Staff capacity is required to maintain the existing level of floodplain management.
- The approximate mapping on FEMA's current effective Flood Insurance Rate Maps has been found to have significant inaccuracies.
- The increasing cost of flood insurance is shifting the public's perception of flood risk.

- Certification/accreditation of levees is inconsistent within the planning area.
- The stormwater/urban drainage flooding risk has not been mapped, which makes it difficult to assess this hazard, other than looking at historical loss data.
- A lack of awareness about flood risk by property owners and other stakeholders can translate to a lack of political will to make changes.
- With a large percentage of pre-FIRM flood insurance policies in force, the County can expect to see significant increases in the costs of flood insurance to its residents. This will create challenges in the promotion of flood insurance and residents' ability to afford flood insurance.

7 Flood Hazard Exposure

The previous section presnted the sources, frequency, extent and causes of flooding in the unincorporated area of the county. This section presents Step 5 of the planning process for the Floodplain Management Plan that includes the assessment of impact of flooding on people, property, infrastructure, the local ecomony and natural floodplain function. This assessment of risk or exposure analysis from the impact of flooding on the community (the unincorporated areas of Los Angeles County) uses the Hazus model as a tool to quantify these impacts.

The Hazus model uses FEMA generated flood mapping for the 10-, 50-, 100- and 500-year event and available population, structure and flood loss data. This planning tool may over-estimate the extent of flood impacts in some cases. Therefore, the results from the model regarding potential impacts on population, structures and critical facilities are provided as relative comparisons accounting for the possible conservative nature of the results. A series of maps are presented for each of the storm event frequencies.

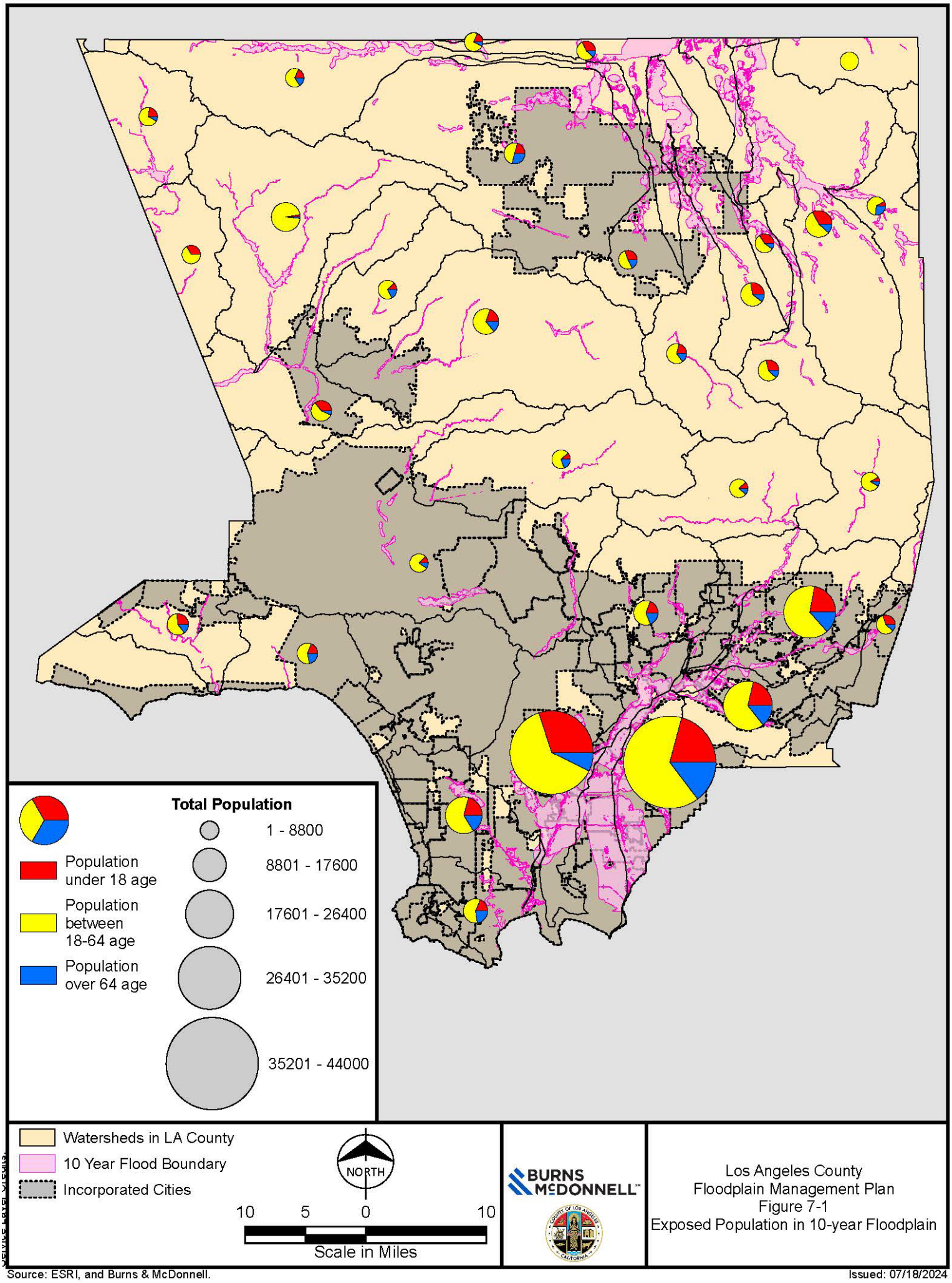
7.1 Population

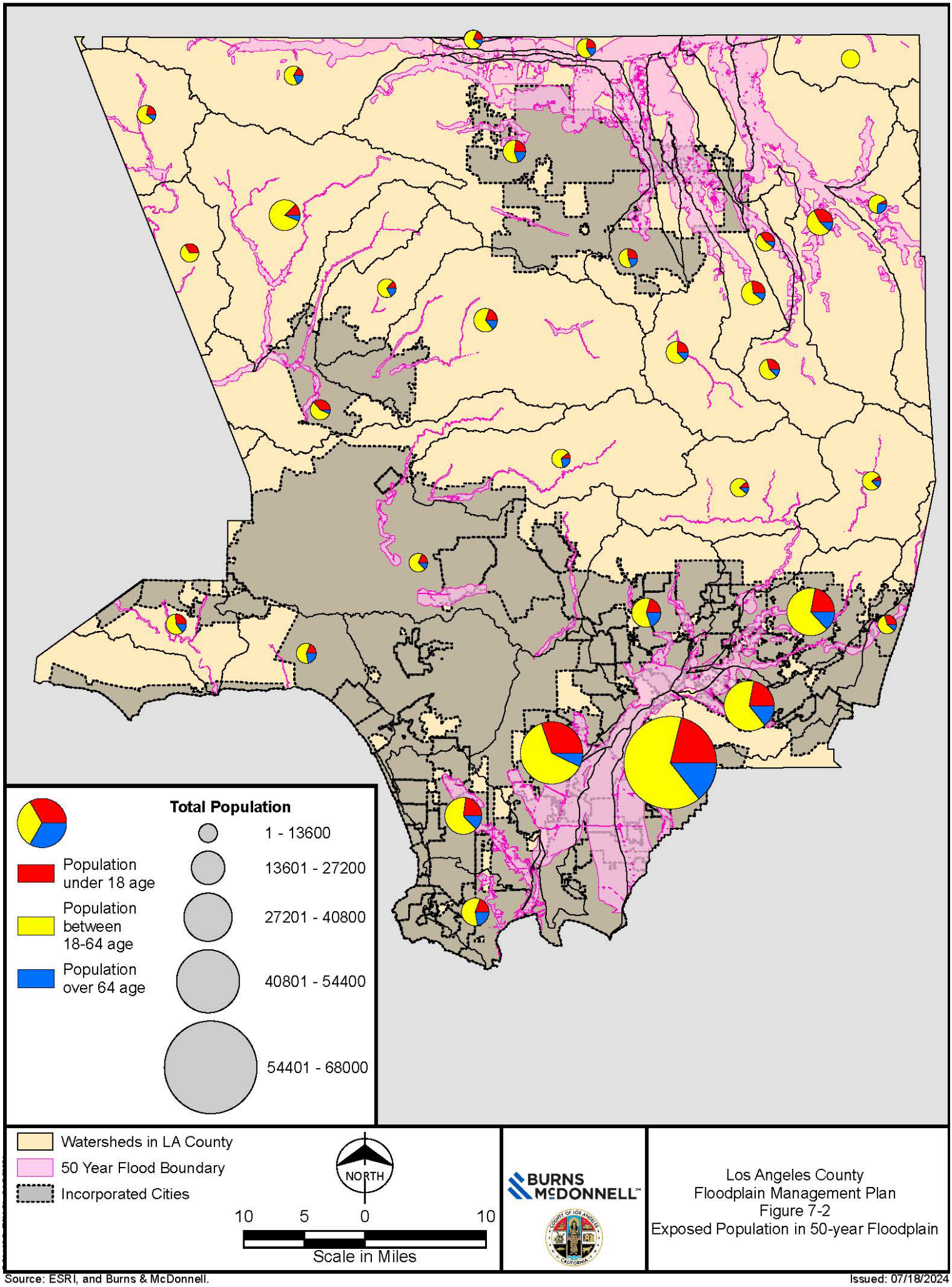
To assess the potential impact on the total population and more vulnerable segments of the population from flood hazard, the Hazus model was used to identify the areas of the floodplain for the 10-, 50-, 100- and 500-year storm event and the 2020 census data correlated to these areas. This required post-processing the results of the Hazus model using the output that includes census data blocks within the model-generated floodplains. The census blocks are geospatially referenced and used to determine impacted populations within the unincorporated areas of each of the sub-watersheds.

Figures 7-1 to 7-4 present the total population potentially exposed to the flood hazard for the 10-, 50-, 100- and 500-year storm events, respectively, for each of the sub-watersheds within the unincorporated area. This assessment results provide a relative comparison by sub-watershed of the exposed population to flood hazards when considering life safety and the need for warning and evacuation due to flooding. These results also provide an assessment of vulnerable populations when considering public health including health hazards to individuals from flood waters and mold. Each circle represents the total number of people exposed within the generated floodplain (floodplain shown in pink) for each watershed using a gradation of size to represent various ranges of population. As indicated in Figures 7-1 to 7-4, the largest population exposures are in the more urbanized areas of the county even though the areas of the unincorporated county are smaller. These are densely populated areas compared to the more rural areas of the unincorporated area that are characterized by significant open space. A greater percentage of vulnerable portion of the total population is indicated in the sub-watersheds of the Antelope-Fremont Valleys Watershed.

The largest potentially exposed populations are within the Lower Los Angeles River and San Gabirel River Watersheds. As noted in Section 6, these drainage areas have had the greatest amount of investment in flood management infrastructure including dams, levees, debris basins and channelization that have signifincatly reduced impacts to populations and property.

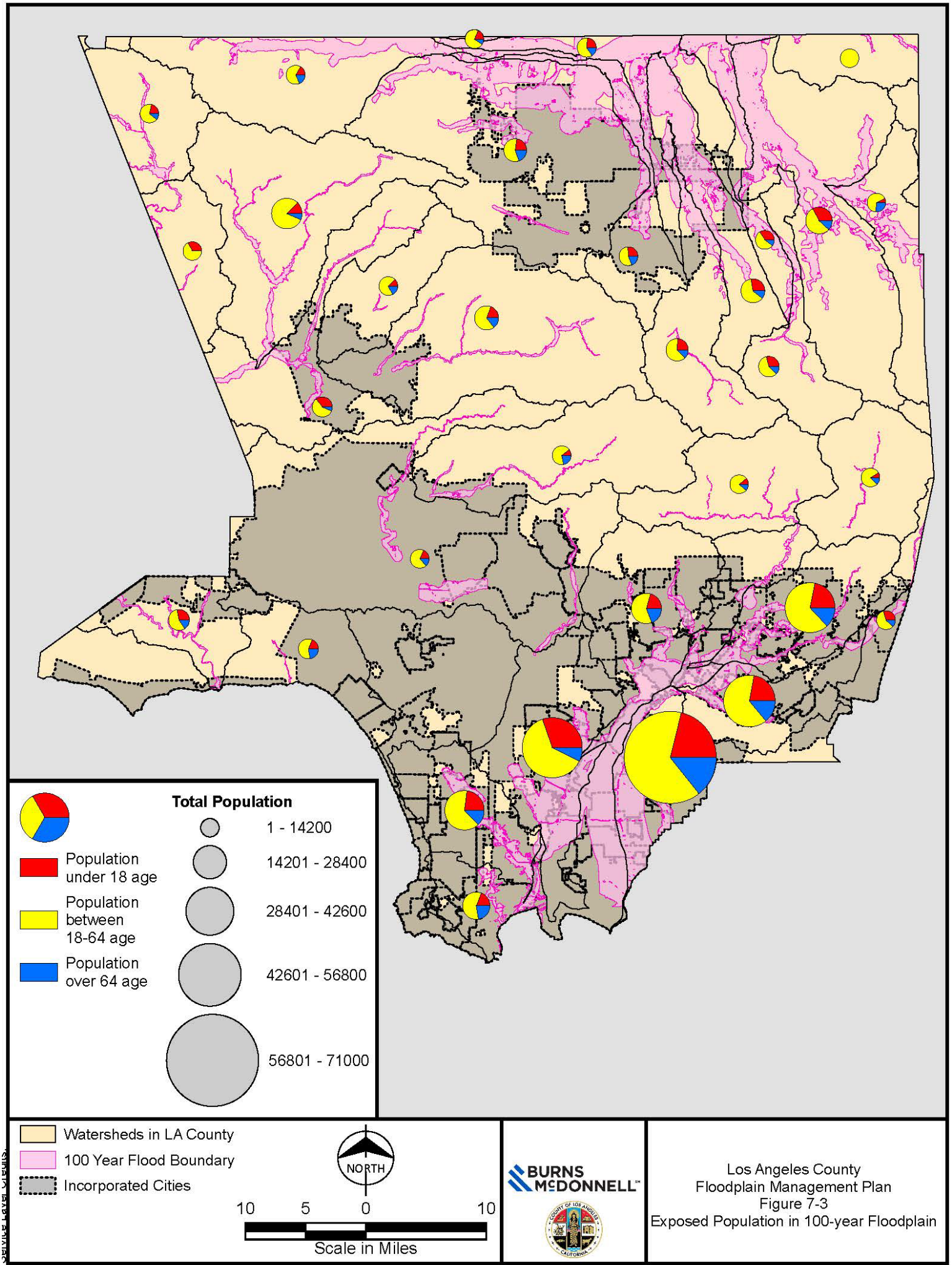
Also shown on Figures 7-1 to 7-4 are the percent of the total exposed population comprised of potentially more vunderable populations under 18 years of age and above 64 years of age.


Total Population
1 - 8800
8801 - 17600
17601 - 26400
26401 - 35200
35201 - 44000
Population under 18 age
Population between 18-64 age
Population over 64 age
Watersheds in LA County
10 Year Flood Boundary
Incorporated Cities
NORTH
10 5 0 10
Scale in Miles
BURNS McDONNELL
Los Angeles County
Floodplain Management Plan
Figure 7-1
Exposed Population in 10-year Floodplain
Source: ESRI, and Burns & McDonnell.
Issued: 07/18/2024



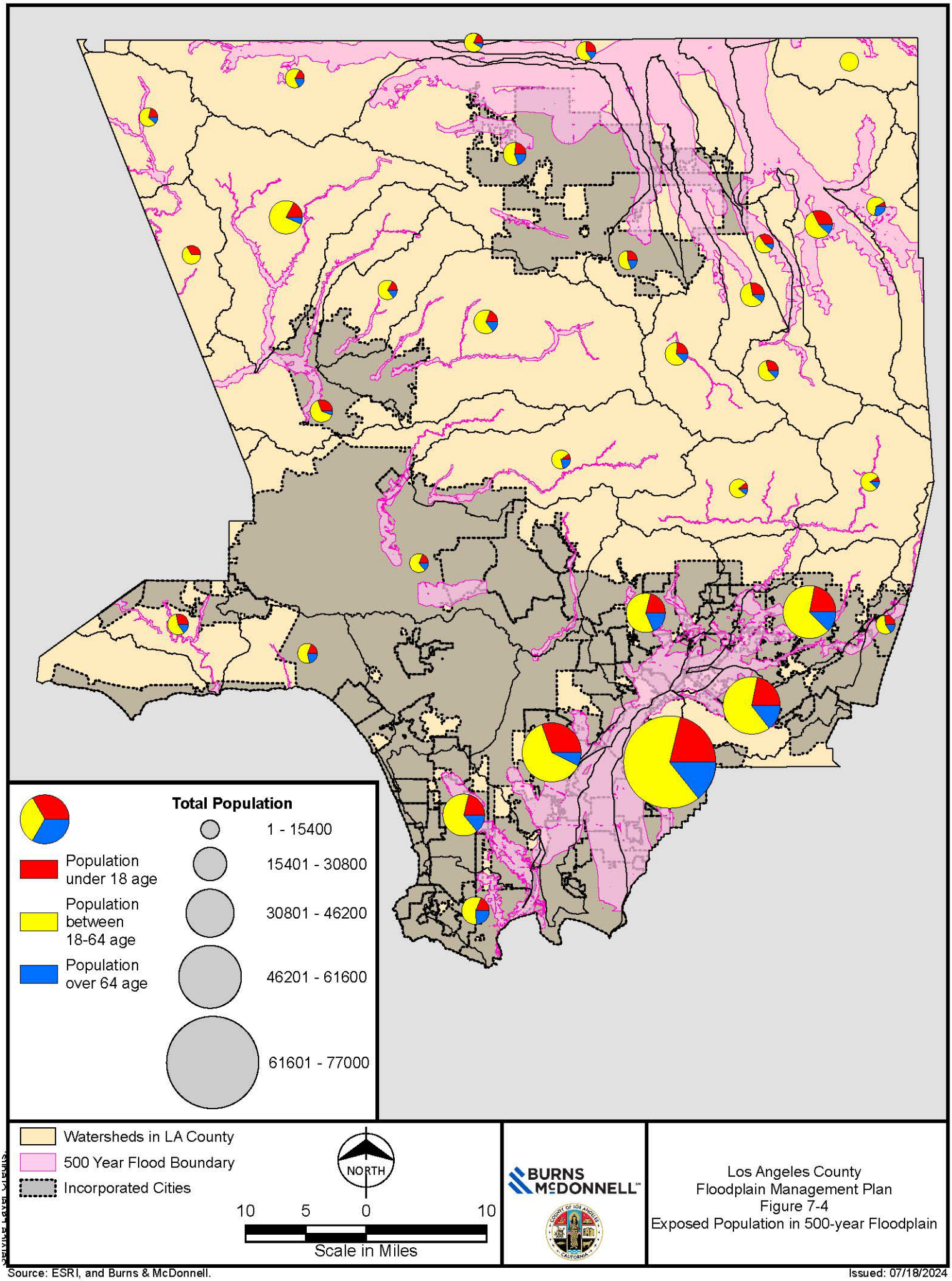
Source: ESRI, and Burns & McDonnell.

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Source: ESRI, and Burns & McDonnell.

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Source: ESRI, and Burns & McDonnell.

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7.2 Property

7.2.1 Structures in the Floodplain

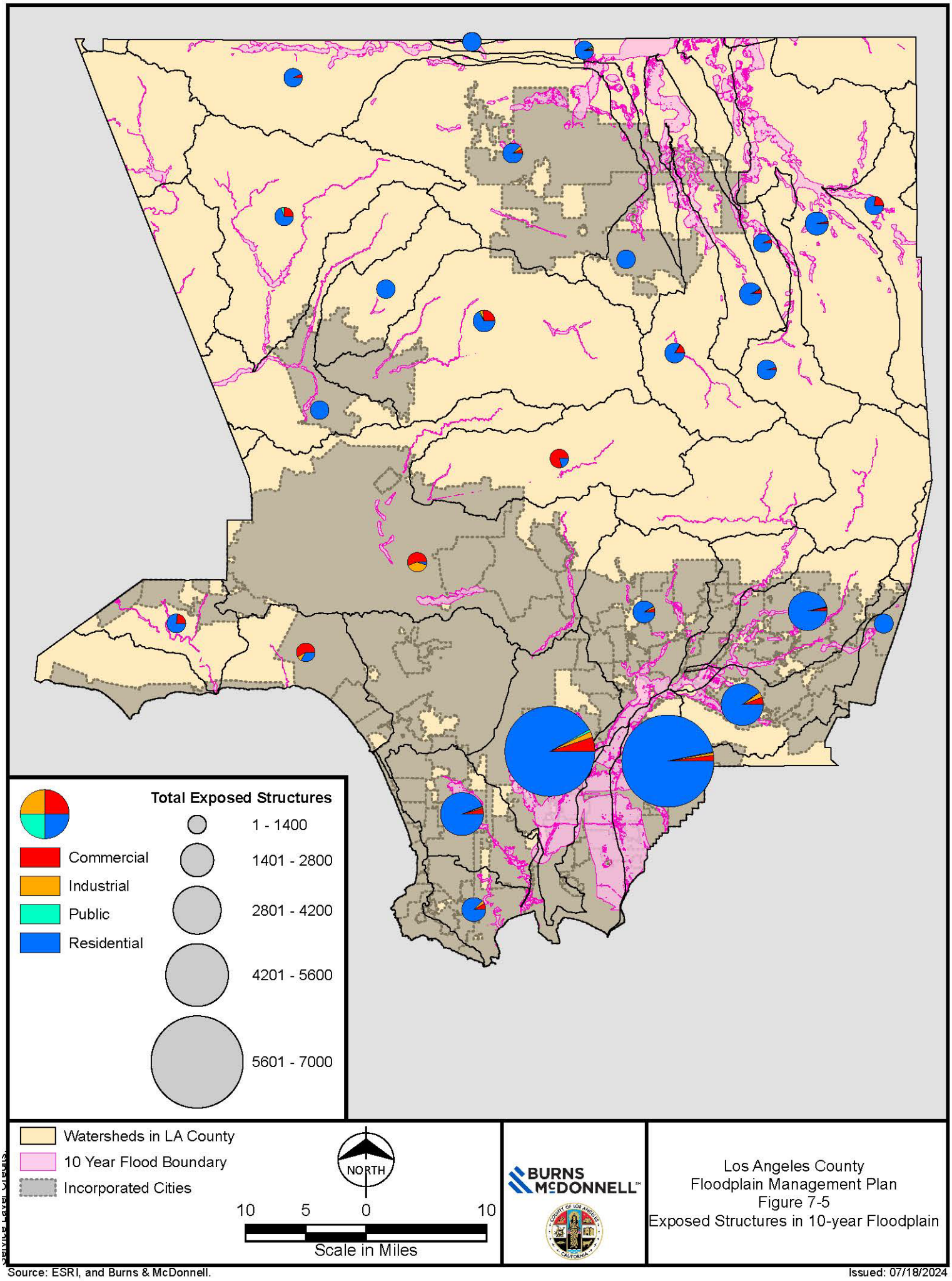
To assess the potential impact to property from flood hazards, the Hazus model was used to identify the number and type of structures impacted by flooding for the 10-, 50-, 100- and 500-year storm events. Figures 7-5 to 7-8 present the total number of structures impacted by flood hazards for the 10-, 50-, 100- and 500-year storm events, respectively, within the unincorporated area for each sub-watershed. The size of the circles represent the range in the number of impacted structures. The type of impacted structures is represented as a percentage of the total (portion of the pie chart) for each sub-watershed. The extent of the floodplain that defines the area of potential impact is also shown (floodplain shown in pink) for each flood event.

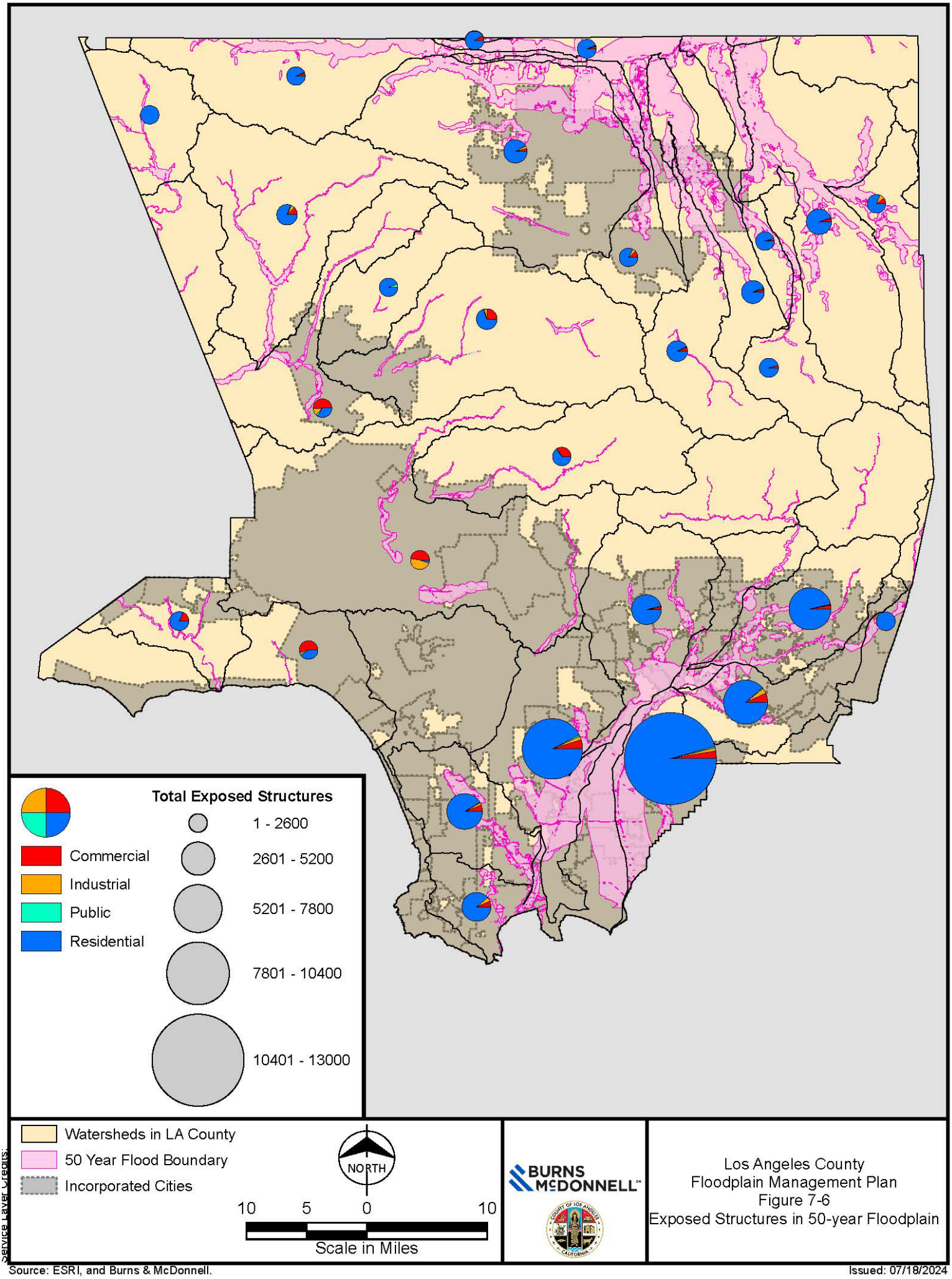
The results of this exposure analysis for structures indicates the largest numbers in the more urbanized areas of the county. As discussed under the population exposure analysis, these are densely developed areas although they are the smallest areas of the overall unreciprocated county. These highly urbanized portions of the unincorporated area as discussed are in the Los Angeles River and San Gabriel River Watersheds where the most investment has been made to flood management infrastructure including levees and lined flood control channels as discussed in Section 3.2.3.

The largest percentage of exposed structures within most of the unincorporated area is residential (blue portion of pie charts). Mitigation measures to reduce flood hazard exposure impacts to structures shall consider these results and target residential properties of education outreach. Commercial structures dominate the exposed structures in the Upper Los Angeles River Watershed within the unincorporated area.

In comparing the total number of structures in the unincorporated County (271,156) to the total number of exposed structures in the Hazus designated flood hazard zones, this percentage by flood event is as follows:

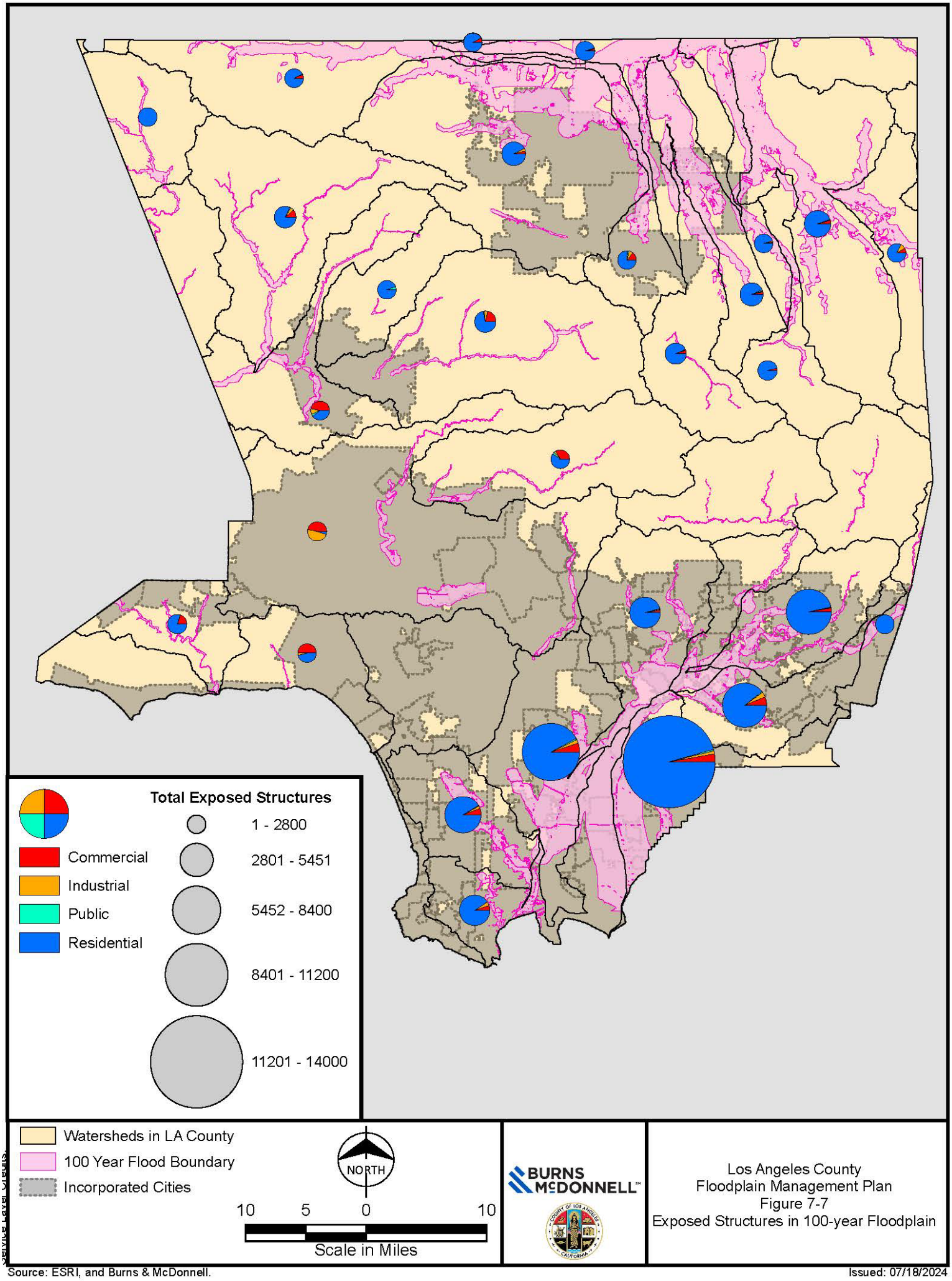
- 8.2% were in the 10-year flood zone
- 14.7% were in the 50-year flood zone
- 16.5% were in the 100-year flood zone
- 20.3% were in the 500-year flood zone


Total Exposed Structures
Commercial
Industrial
Public
Residential
1 - 1400
1401 - 2800
2801 - 4200
4201 - 5600
5601 - 7000
Watersheds in LA County
10 Year Flood Boundary
Incorporated Cities
NORTH
10 5 0 10
Scale in Miles
BURNS McDONNELL
Los Angeles County
Floodplain Management Plan
Figure 7-5
Exposed Structures in 10-year Floodplain
Source: ESRI, and Burns & McDonnell.
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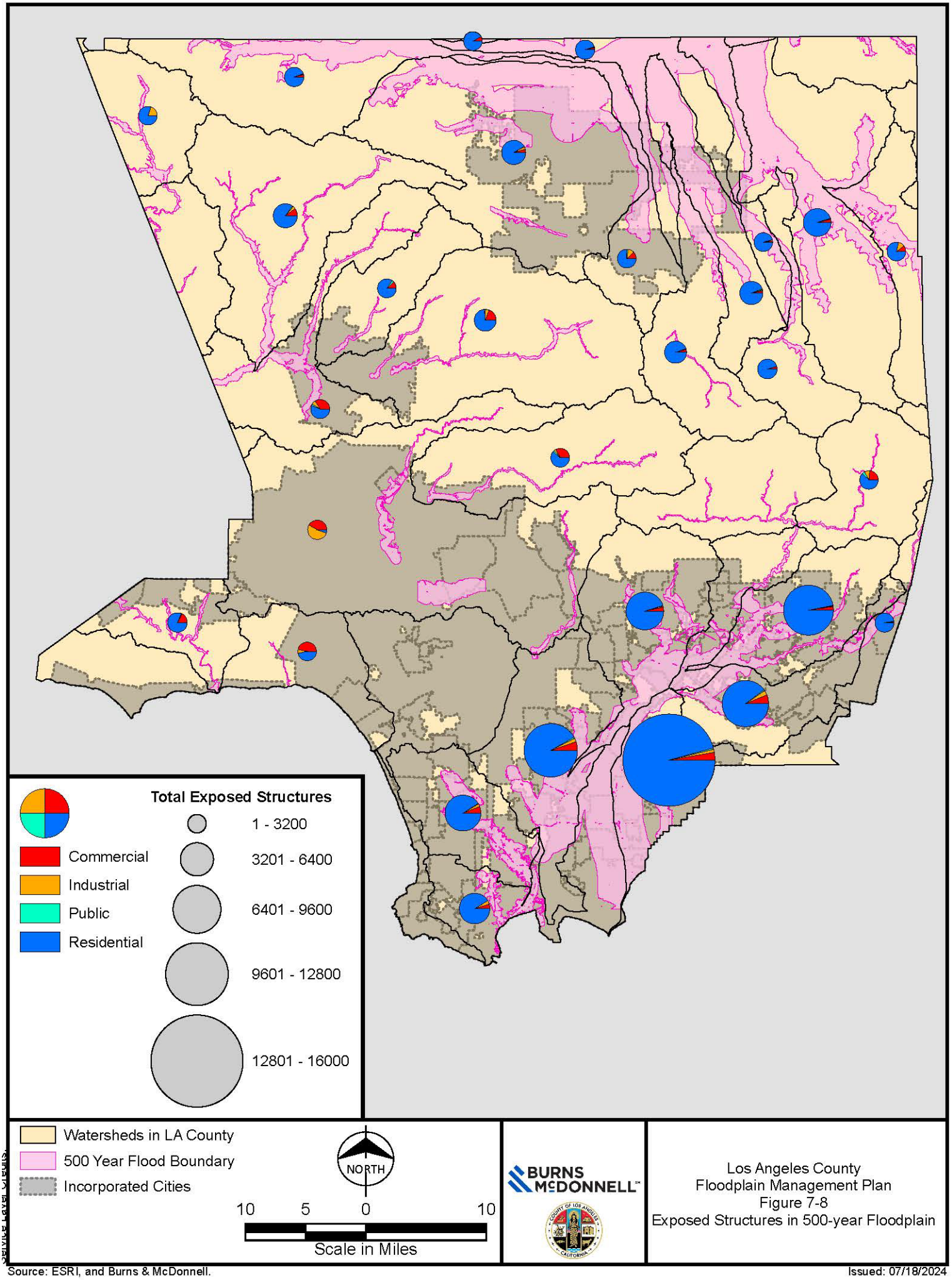
Source: ESRI, and Burns & McDonnell.

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Source: ESRI, and Burns & McDonnell.

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Total Exposed Structures
1 - 3200
3201 - 6400
6401 - 9600
9601 - 12800
12801 - 16000
Commercial
Industrial
Public
Residential
Watersheds in LA County
500 Year Flood Boundary
Incorporated Cities
NORTH
10 5 0 10
Scale in Miles
BURNS McDONNELL
Los Angeles County
Floodplain Management Plan
Figure 7-8
Exposed Structures in 500-year Floodplain
Source: ESRI, and Burns & McDonnell.
Issued: 07/18/2024

7.2.2 Land Use in the Floodplain

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land, open space or parks. Figure 7-9 presents the land uses within the unincorporated area that shows the predominance of rural and open space in the northern portion of the county and greater urbanization in the southern portion of the county. Table 7-1 shows the present land use of parcels in the 100-year and 500-year floodplains within the planning area based on County Assessor data, including vacant parcels and parcels in public/open space uses. The predominant land use within the unincorporated area is rural land and open space at 83.9% within the floodplain. This correlates to the lower exposed populations and structures in the sub-watershed within the largest areas of the overall unincorporated area compared to the urbanized areas that represent a much smaller portion of the unincorporated area. Many of these more rural areas are experiencing rapid population growth and new development such as the Antelope Valley. This is indicated by the yellow residential land use areas in this watershed. Potentially exposed populations and structures can be anticipated to increase in these areas.

Table 7-1: Present Land Use Within the Floodplain in Unincorporated Areas

Land Use	% of 100-year Floodplain Area	% of 500-year Floodplain Area
Commercial	0.6%	0.7%
Industrial	2.5%	3.2%
Mixed Use	0.3%	0.2%
Public and Semi-Public	8%	10.5%
Residential	2.2%	2.6%
Rural Land & Open Space	83.9%	81%
Specific Plan	2.5%	1.8%
Total	100.0%	100.0%



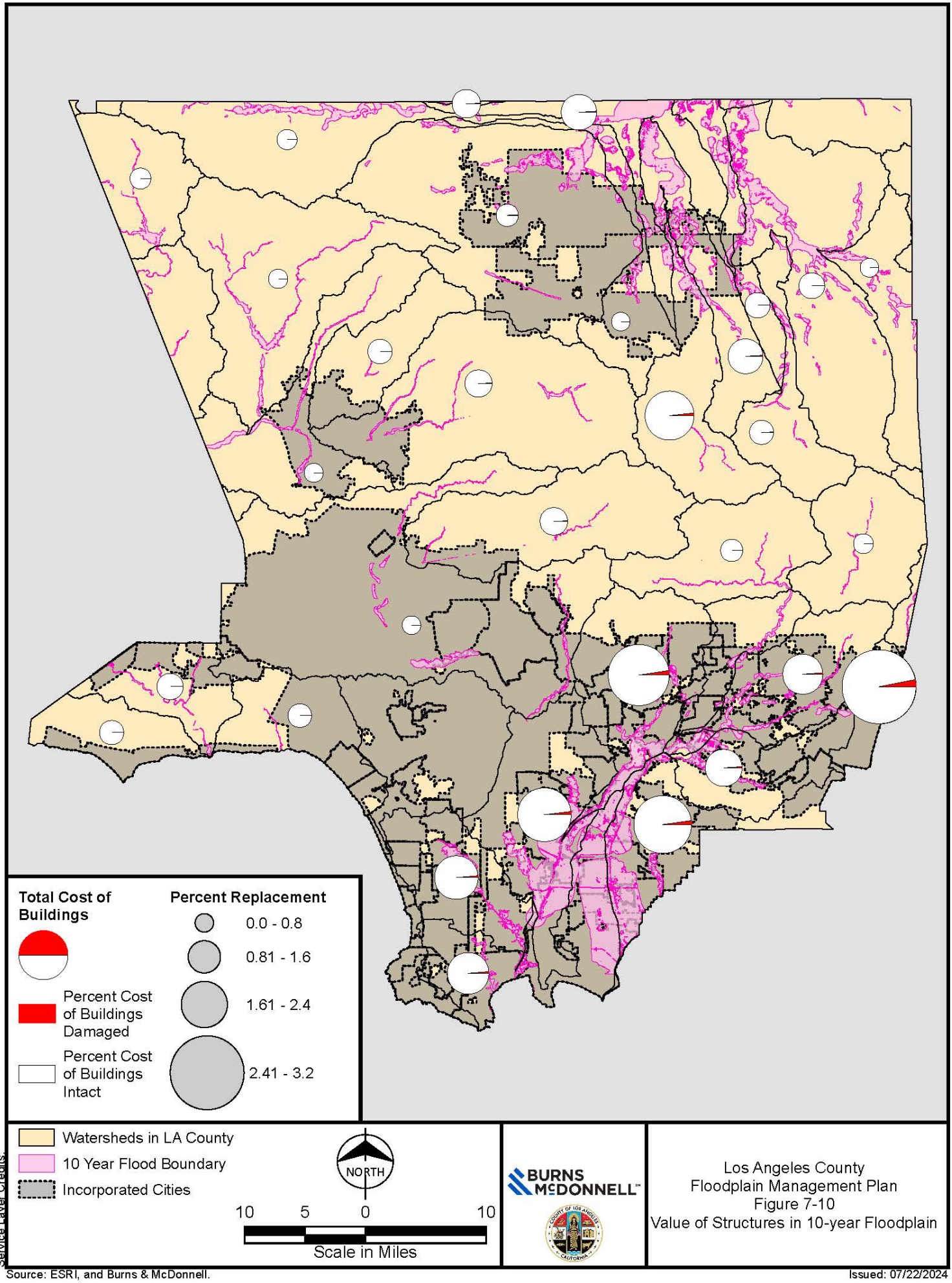
Source: Estri World Topographic Map, Los Angeles County Database

7.2.3 Exposed Value

To further assess the exposure of flood hazards within the unincorporated county, the Hazus model was used to assess potential impact to the community's economy based on flood losses to structures within the floodplain for the 10-, 50-, 100- and 500-year storm events. The Hazus model calculates flood losses to structures based on flooding depth and structure type. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory.

Figures 7-10 to 7-14 present the portion of the total value of the exposed structures that may be damaged (percent replacement) by flood hazards for the 10-, 50-, 100- and 500-year storm event, respectively, within the unincorporated area for each sub-watershed. The size of the circles represent the range in the total cost of the exposed structures. The replacement cost is represented as a percentage of the total (portion of the pie chart) for each sub-watershed. The extent of the floodplain that defines the area of potential impact is also shown (floodplain shown in pink) for each flood event.

As shown on Figures 7-10 to 7-14 the percent replacement costs are a small portion of the total costs and range from 0.06% to 11.07%, and average 2.96% within the unincorporated area. As indicated from the assessment of the type of structures on Figures 7-5- to 7-8, these structures are predominantly residential. Impact to the economy would therefore be to community housing and potential temporary impact to loss or working days due to structural losses.



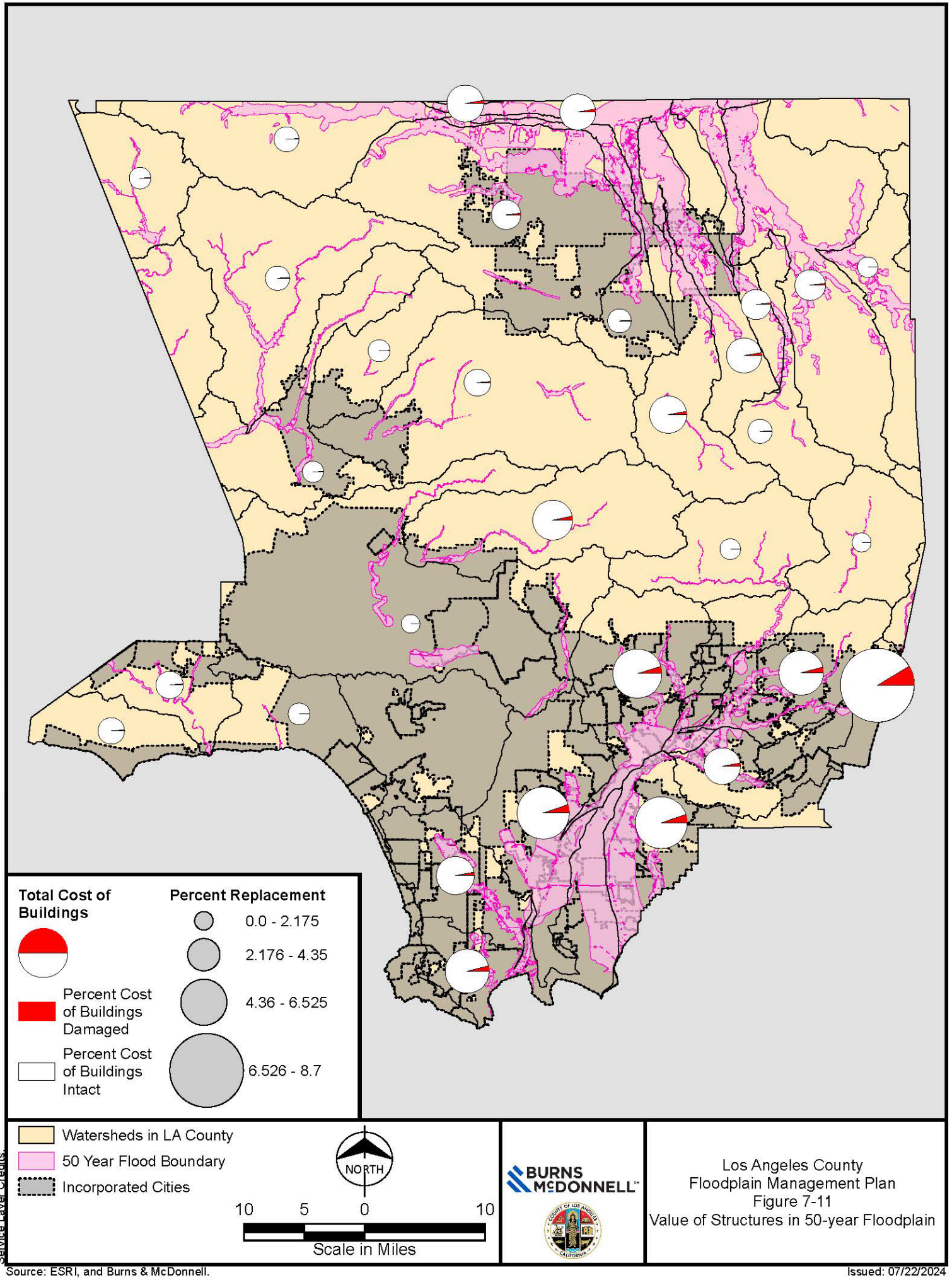
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Los Angeles County
Floodplain Management Plan
Figure 7-10
Value of Structures in 10-year Floodplain

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Service Layer Credits:

Source: ESRI, and Burns & McDonnell.

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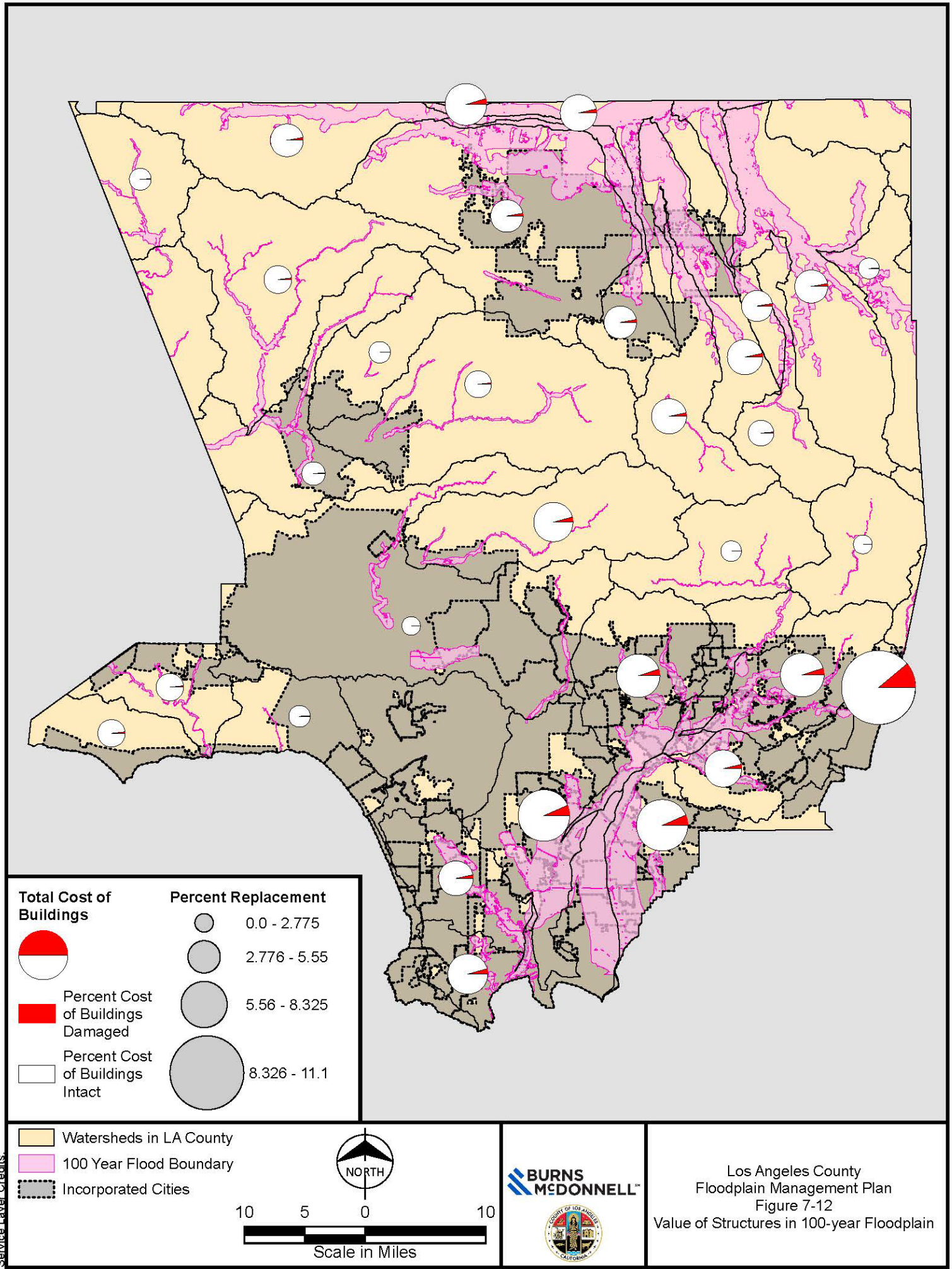


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Los Angeles County
Floodplain Management Plan
Figure 7-11
Value of Structures in 50-year Floodplain

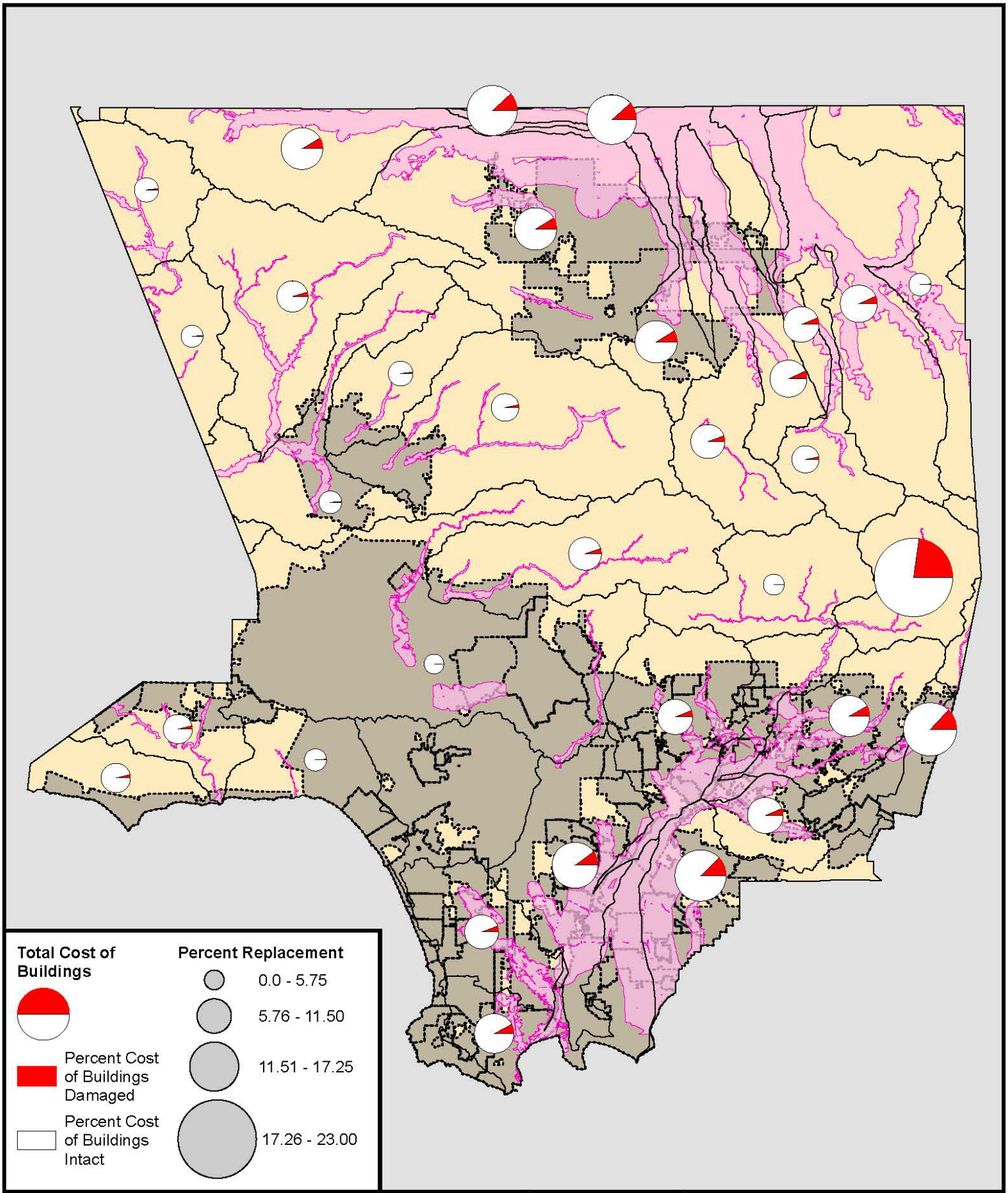
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Los Angeles County
Floodplain Management Plan
Figure 7-12
Value of Structures in 100-year Floodplain

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Los Angeles County
Floodplain Management Plan
Figure 7-13
Value of Structures in 500-year Floodplain

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Service Layer Credits:

Source: ESRI, and Burns & McDonnell.

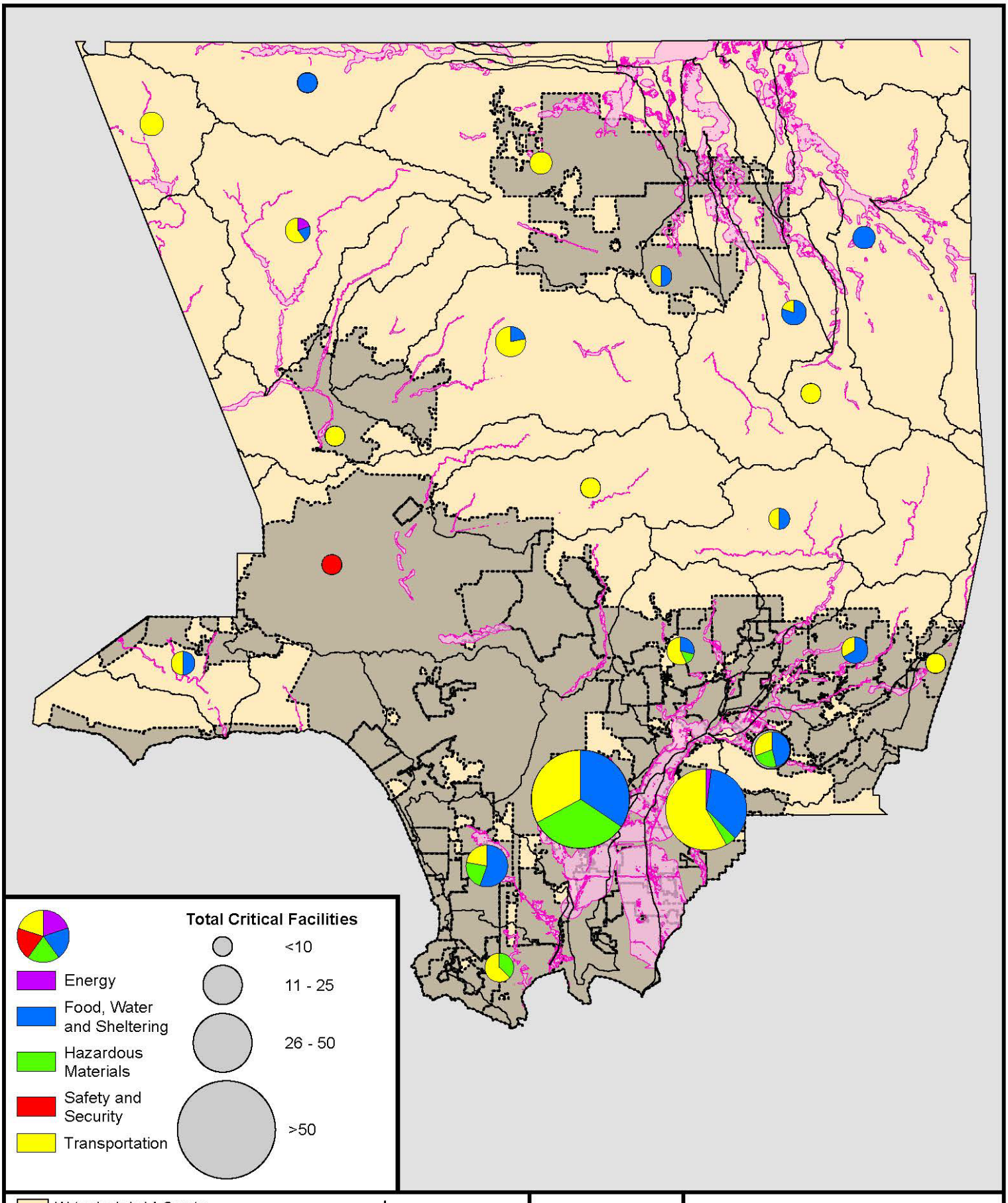
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7.3 Critical Facilities and Infrastructure

Critical facilities must remain operable during flood events to maintain essential services. Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, and similar facilities. These facilities should be given special consideration when formulating regulatory alternatives and floodplain management plans (FEMA 2020). To assess potential impacts to due to flood hazards, the Hazus model was used to identify exposed critical facilities and infrastructure in the unincorporated county for the 10-, 50-, 100- and 500-year storm event. Figures 7-14 to 7-18 present the total number of critical facilities and infrastructure impacted by flood hazards for the 10-, 50-, 100- and 500-year storm events, respectively, within the unincorporated area for each sub-watershed. The size of the circles represents the range in the number of impacted critical facilities and infrastructure structures. The type of impacted critical facilities and infrastructure is represented as a percentage of the total (portion of the pie chart) for each sub-watershed. The extent of the floodplain that defines the area of potential impact is also shown (floodplain shown in pink) for each flood event.

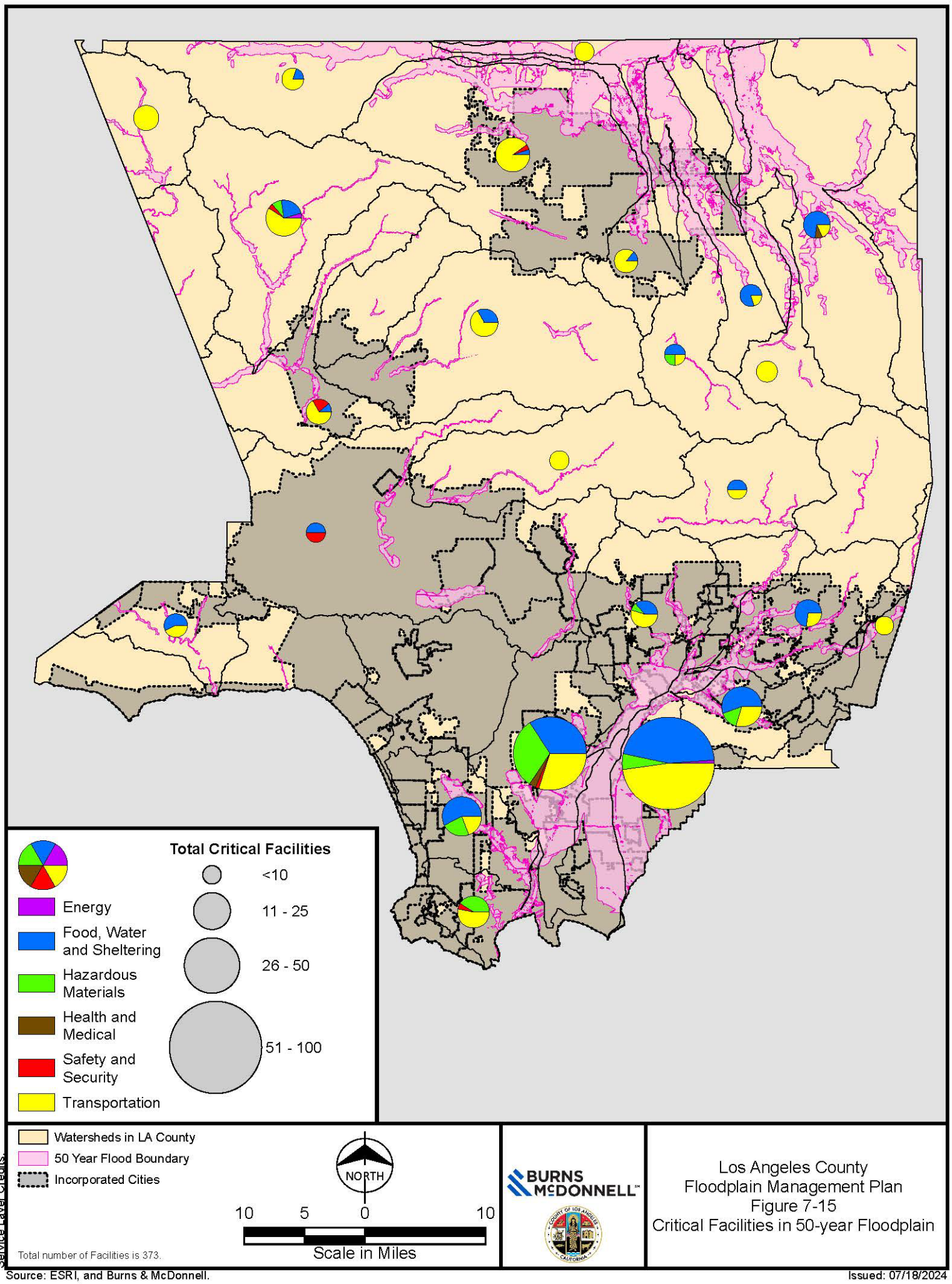
The findings of this assessment of critical facilities and infrastructure includes:

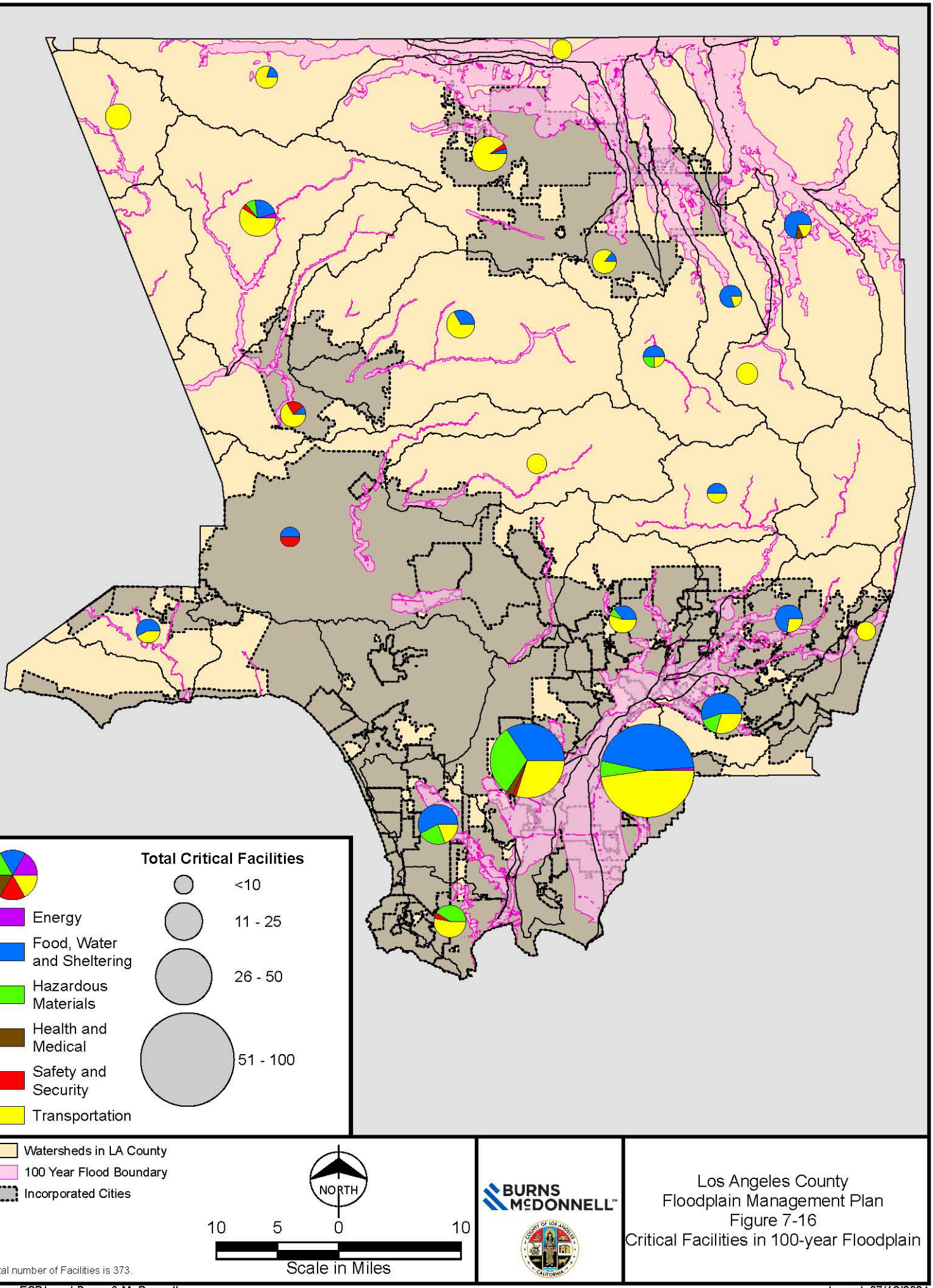
- The majority of the exposed critical facilites and infrastructure within the floodplains consist of of transporation related facilities that include bridge that span these floodplains. These structures are designed to function during flood events up to the design event. Further discusssion of impacts to bridges, roads and utlities is presented in the following subsection.
- The next larger percentage of exposed critical facilities and infrastructure are food, water and sheltering.
- The watersheds with the most critical facilities include the Lower San Gabriel River, Lower Los Angeles River, San Jose Creek and Dominguez Channel. As previously discussed, these watersheds are heavily urbanized and have also received significant funding for the implementation of flood management infrastructure.
- The next range of the number of exposed critical facilities and infrastructure includes Castic Creek, Amargosa Creek, and the Headwaters Santa Clara River Watersheds. :

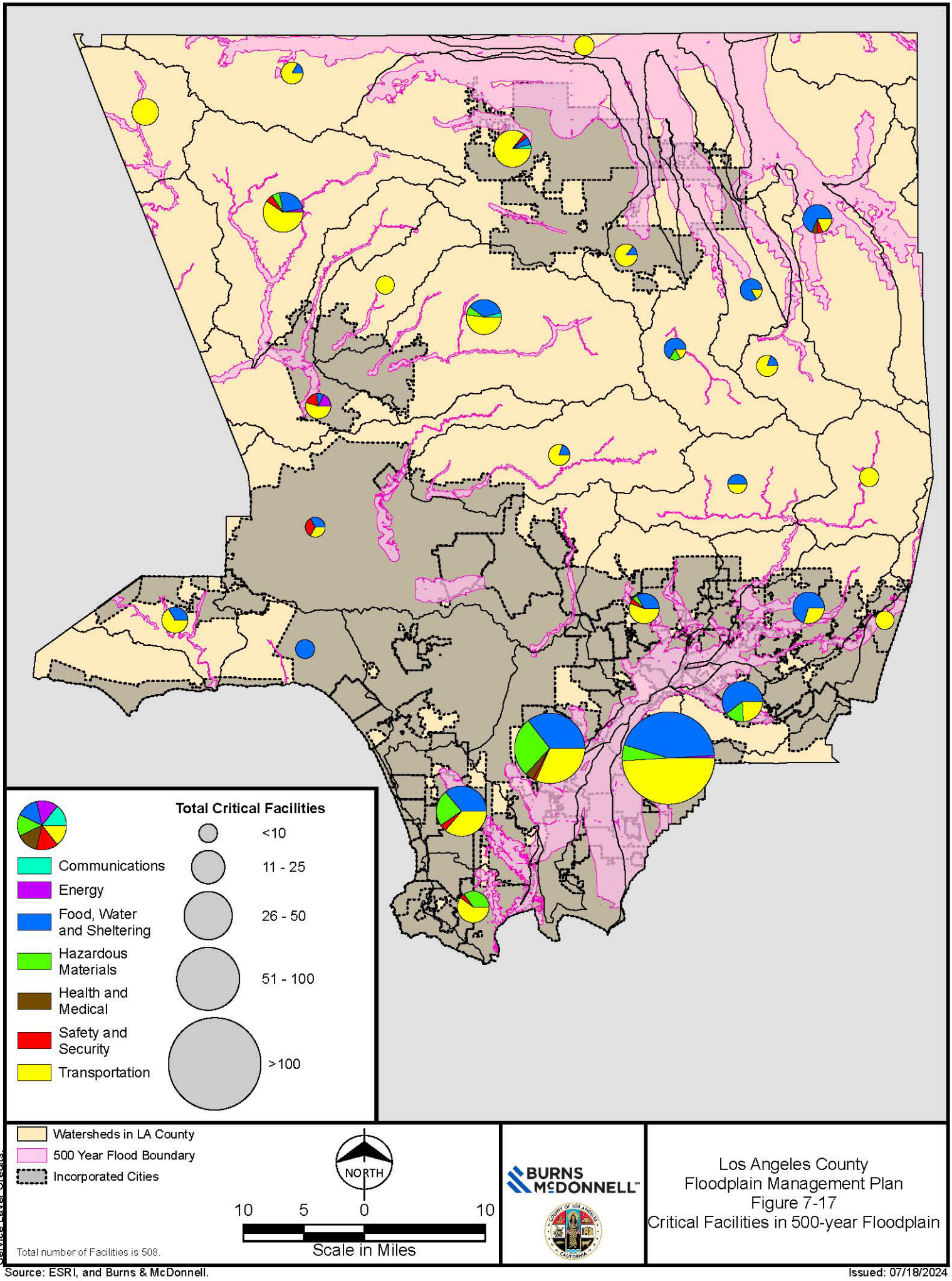


Los Angeles County
Floodplain Management Plan
Figure 7-14
Critical Facilities in 10-year Floodplain

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Service Layer Credits:
Source: ESRI, and Burns & McDonnell.
Issued: 07/18/2024


Total Critical Facilities
<10
11 - 25
26 - 50
51 - 100
Energy
Food, Water and Sheltering
Hazardous Materials
Health and Medical
Safety and Security
Transportation
Watersheds in LA County
50 Year Flood Boundary
Incorporated Cities
NORTH
10 5 0 10
Scale in Miles
Total number of Facilities is 373.
BURNS McDONNELL
Los Angeles County
Floodplain Management Plan
Figure 7-15
Critical Facilities in 50-year Floodplain
Path: C:\System_Local Projects\Floodplain Management Plan Data Help\Floodplain Management Plan Data Help.aprx ARRao 07/18/2024
Service Layer Credits:
Source: ESRI, and Burns & McDonnell.
Issued: 07/18/2024


Total Critical Facilities
<10
11 - 25
26 - 50
51 - 100
Energy
Food, Water and Sheltering
Hazardous Materials
Health and Medical
Safety and Security
Transportation
Watersheds in LA County
100 Year Flood Boundary
Incorporated Cities
NORTH
10 5 0 10
Scale in Miles
Total number of Facilities is 373.
BURNS McDONNELL
Los Angeles County
Floodplain Management Plan
Figure 7-16
Critical Facilities in 100-year Floodplain
Path: C:\System_Local Projects\Floodplain Management Plan Data Help\Floodplain Management Plan Data Help.aprx ARRao 07/18/2024
Service Layer Credits:
Source: ESRI, and Burns & McDonnell.
Issued: 07/18/2024



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Service Layer Credits:

Source: ESRI, and Burns & McDonnell.

BURNS McDONNELL℠

Los Angeles County
Floodplain Management Plan
Figure 7-17
Critical Facilities in 500-year Floodplain

Issued: 07/18/2024

7.3.1 Hazardous Materials Facilities

Hazardous materials facilities are those that use or store materials that can harm the environment if damaged by a flood. There are 56 hazardous materials facilities within the 500 year flood zone of unincorporated Los Angeles County. During a flood event, containers holding these materials can rupture and leak into the surrounding area, having a disastrous effect on the environment as well as residents.

7.3.2 Utilities and Infrastructure

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

Roads

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

- Interstate 10G
- Interstate 110G
- Interstate 210G
- Interstate 405G
- Interstate 5G
- State Highway 27G
- Camino El Real
- Forest Highway 59 (Angeles Forest Highway
- State Highway 91 (Artesia Freeway)
- Interstate 605 (San Gabriel River Freeway)
- Interstate 105 (Glenn M Anderson Freeway and Transit)
- State Highway 60
- U.S. Highway 101G
- State Highway 118G
- State Highway 1G
- State Highway 2G
- State Highway 47G
- State Highway 90G
- State Highway 110G
- State Highway 138
- State Highway 14 (Antelope Valley Freeway)
- Interstate 710 (Long Beach Freeway)
- State Highway 103 (Terminal Island Freeway)

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

Bridges

Flooding can significantly impact road bridges, which provide the only ingress and egress to some areas. There are over 200 bridges in the 500-year flood zone within the unincorporated Los Angeles County. While most bridges within the planning area are sufficiently protected from the impacts of flooding, some

may have support structures within the river channel that can be exposed to erosion and scour damage in high flow events, as evidenced by the Interstate 10 bridge collapse in Riverside County in July 2015.

Water and Sewer Infrastructure

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

7.4 Environment

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

7.4.1 The Riparian Environment

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

7.4.2 Significant Ecological Areas and Coastal Resource Areas

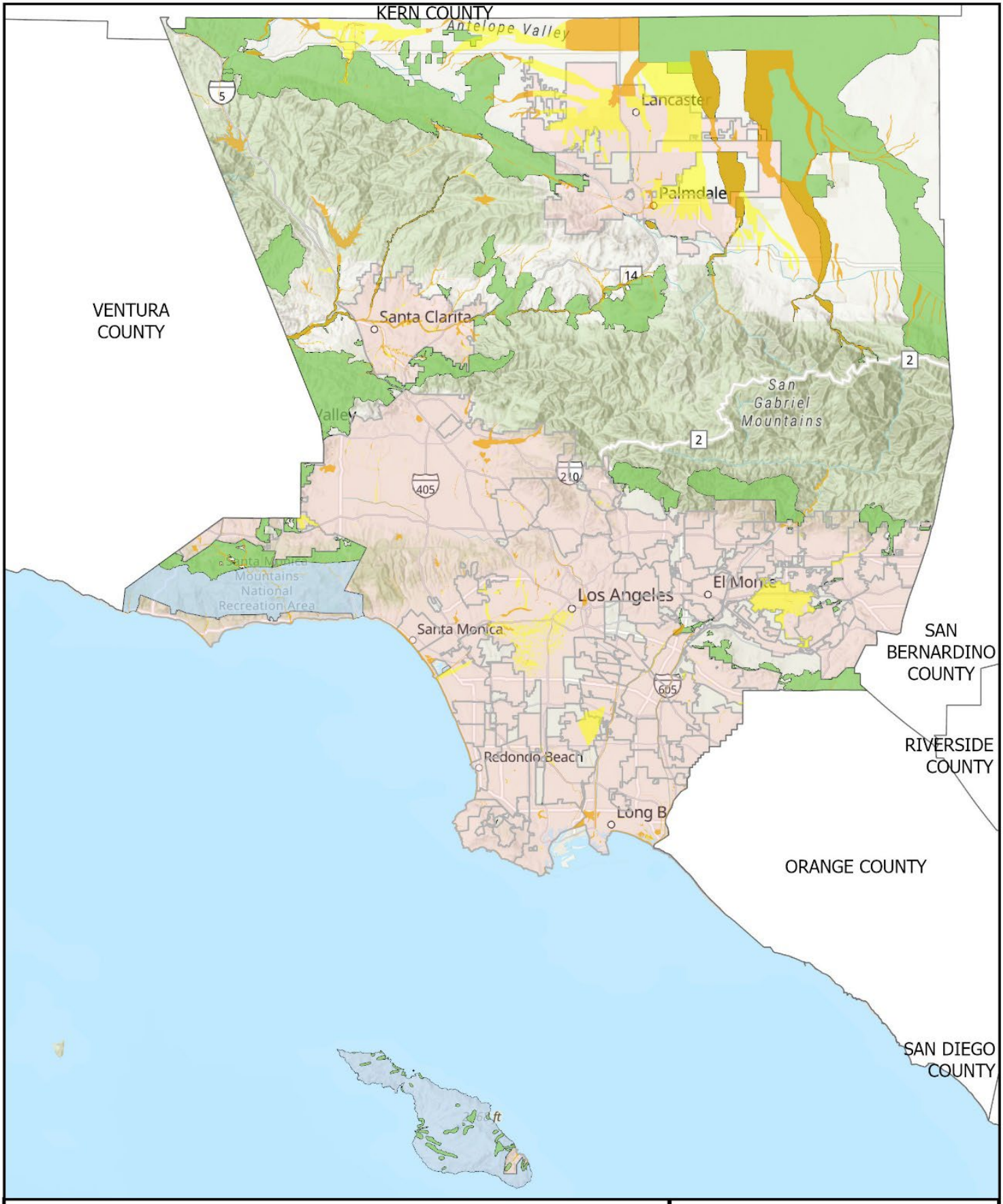
Protection of the biological resources of floodplains is important to Los Angeles County. Equipped with planning tools such as the Conservation and Natural Resource Element of the Los Angeles County General Plan, the Los Angeles River Master Plan and the Enhanced Watershed Management Plans, the County has established preserve areas that maintain the beneficial natural floodplain functions. The Los Angeles County General Plan identifies Significant Ecological Areas (SEAs) that have significant overlap with floodplains of the County (see Figure 7-18)

The following excerpts from the County General Plan describe SEAs that overlap the regulated floodplain in the County. For more detailed descriptions of these areas, please refer to the descriptions provided in the General Plan.

Santa Clara River SEA

The Santa Clara River SEA extends along the entire County reach of the Santa Clara River, primarily within unincorporated areas of the County. The SEA encompasses a wide variety of topographic features and habitat types, as well as major tributaries—all of which contribute to this diversity. It is a major biotic corridor for the County (and Ventura County). The orientation and extent of the SEA depends upon the

surface and subsurface hydrology of the Santa Clara River, from its headwaters, tributaries, and watershed basin, to the point at which it exits the County's jurisdiction. Nearly all of the SEA is designated by Audubon California as a Globally Important Bird Area (IBA). The Santa Clara River IBA extends beyond the SEA in both upstream and downstream directions (across Soledad Pass to the Barrel Springs area in the Antelope Valley and through Ventura County to the mouth of the River at the Pacific Ocean).



Legend

- Coastal Resource Area
- Significant Ecological Area
- Incorporated Areas
- FEMA 100yr Flood Zone
- FEMA 500yr Flood Zone

NORTH

0 5 10 20

Scale in Miles

SEAs, CRAs & FEMA Flood Hazard Areas

Figure 7-18

BURNS McDONNELL

Source: Estri World Topographic Map, Los Angeles County Database, FEMA NFHL 2024

Issued: 8/2/2024

Santa Felicia SEA

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

Antelope Valley SEA

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

Puente Hills SEA

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

Santa Monica Mountains SEA and Coastal Resource Area

The Santa Monica Mountains SEA is located within the Santa Monica Mountains in a mostly unincorporated area of the County. Much of the area is in the Santa Monica Mountains National Recreation Area, but is privately owned. Many of the federal lands under the jurisdiction of the National Park Service are included in the SEA designation. Many of the state parklands, notably Malibu Creek State Park and Topanga State Park, are also included in the SEA. The SEA includes nearly all of the canyons and ridges from the Ventura-Los Angeles County line, and east to Sullivan Canyon, which is near the

communities of Pacific Palisades Brentwood to the south and Encino to the north. From south to north, the SEA extends from the Pacific Ocean shoreline or urban-wildland interface of Malibu, through the unincorporated area of the Santa Monica Mountains proper, to the northern edge of the SEA extending along the undeveloped southern edge of the San Fernando Valley or irregularly along the Ventura-Los Angeles County line. This SEA recognizes the rare habitat of a small regional mountain range with a high diversity of topography and moisture regimes, and with vegetation adapted to a Mediterranean climate, which is globally rare, existing elsewhere only along western portions of continents at 30- to 40-degree latitude. Although the habitats may seem common within the Santa Monica Mountains, in terms of limited indigenous global ranges of the constituent species, their special adaptations to climate, the relatively intact character of the habitats, and the plant assemblage of the Santa Monica Mountains are unique. Development within the SEA that extends the nearby expansive urban development of the Los Angeles Basin and San Fernando Valley needs to be carefully considered to preserve these special resources.

Ballona Wetlands Coastal Resource Area

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

Malibu Coastline Coastal Resource Area

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

8 Flood Hazard Vulnerability

Not all areas that are exposed to the flood risk experience actual flooding or serious damage during a flood event. Vulnerability refers to expected actual harm or damage from a flood. This chapter describes vulnerabilities of population, property, critical infrastructure and the environment. The analysis focuses on the Hazus modeled flood depth floodplain area depicted in the figures of Section 7 for the 10-, 50-,100- and 500-year flood event.

8.1 Population

8.1.1 Vulnerable Populations

Section 7.1 presented (see Figures 7-1 to 7-4) the total population potentially exposed to the flood hazard for the 10-, 50-, 100- and 500-year storm event, respectively, for each of the sub-watersheds within the unincorporated area. These results provide geographically across the incorporated area the total exposed population to flood hazards. These results also provide geographical by sub-watershed an assessment of vulnerable populations below 18 years and above 64 years of age as a percentage of the total exposed population based on age. These assessment results provide a basis to compare the size and location of vulnerable populations when considering life safety and the need for warning and evacuation due to flooding, and public health including health hazards to individuals from flood waters and mold.

To provide further assessment of vulnerable populations across the entire unincorporated area, the results from the Hazus model provides the following findings:

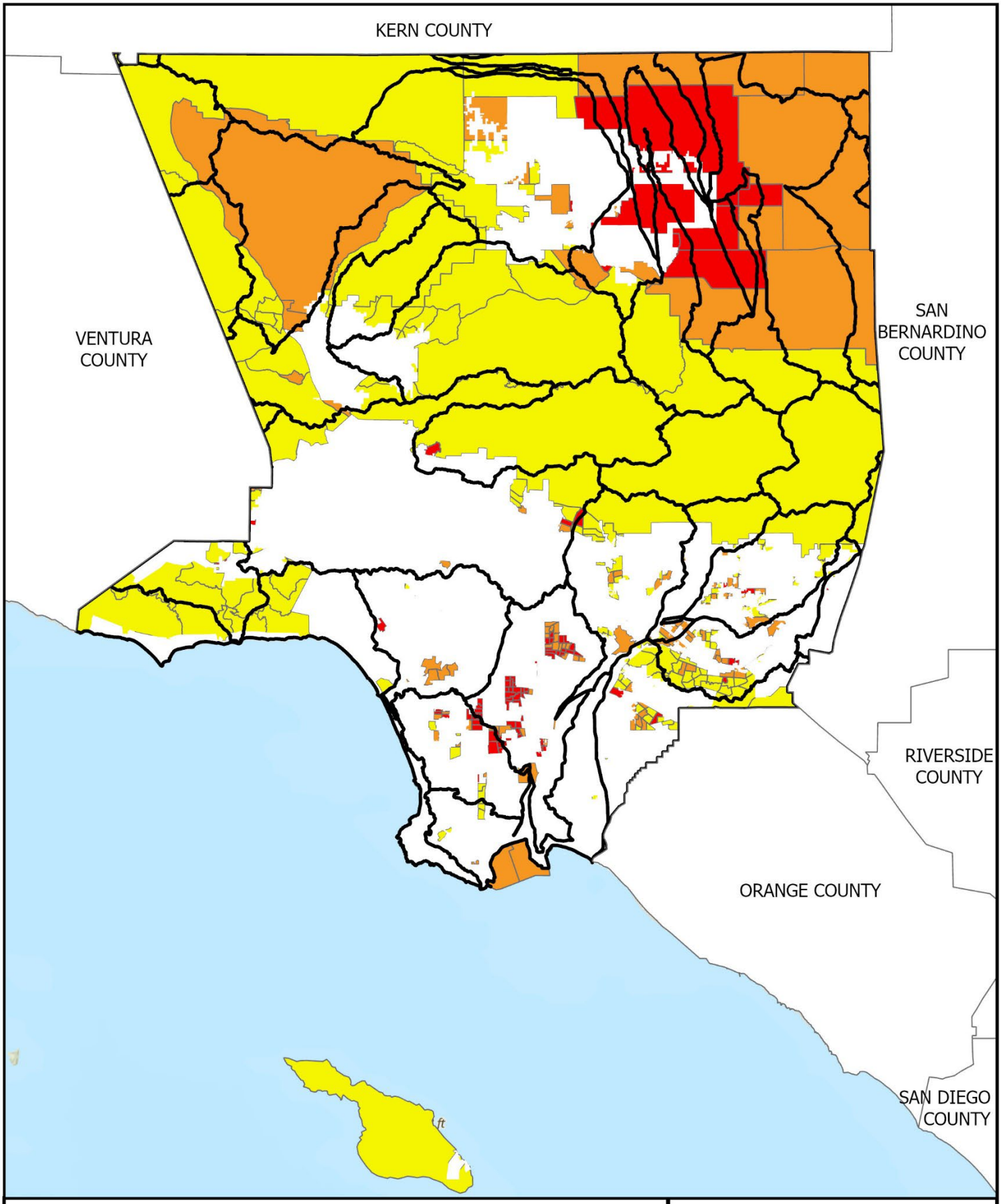
- Economically Disadvantaged Populations—An estimated 5.0 percent of the people within the households in the census blocks that intersect the 100-year floodplain are economically disadvantaged, defined as having household incomes of $30,000 or less.
- Population over 64 Years Old—An estimated 12.7 percent of the population in the census blocks that intersect the 100-year floodplain are over 64 years old. Greater than a third of the over-64 years old population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable.
- Population under 18 Years Old—An estimated 23.2 percent of the population within census blocks located in or near that intersect the 100-year floodplain are under 18 years of age.
- In addition, persons with disabilities or others with access and functional needs are more likely to have difficulty responding to a flood or other hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability will allow emergency management personnel and first responders to have personnel available who can provide services needed by those with access and functional needs. According to the 2018 – 2022 Census estimates 6.7% of individuals in Los Angeles County under the age of 65 years have some form of disability(U.S. Census, 2022a).

Additional analysis was done using the Concentrated Disadvantage Index produced by Los Angeles County. Figure 8-1 depicts this index within unincorporated Los Angeles County. The index uses a Z-score system to determine 'disadvantaged' areas. The Z score indicates a value's relationship to the average of a group of values. Since this variable is calculated countywide, the average of all countywide tracts will always equal zero - exactly the average. The Z-score is calculated taking into account the number of children under 18, the population's income levels, need for public assistance, female head of households, and unemployment rates.

As shown on Figure 8-1, the more disadvantaged populations and potentially more vulnerable are show in red. The largest area of more disadvantaged communities is located in the sub-watersheds within the Antelope Valley Watershed. Disadvantaged communities are also indentifed in the Los Angeles River and San Gabriel River Watersheds in smaller areas of the unincorporated county.

A more detailed map and breakdown of statistics can be found here: https://data.lacounty.gov/apps/3b0610e684b240b29cbbf2fd32347c8e/explore.

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



Source: Esri World Topographic Map, Los Angeles County Database

Issued: 7/22/2024

8.1.2 Public Health and Safety

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

- Unsafe food—Floodwaters contain disease-causing bacteria, dirt, oil, human and animal wastes, and farm and industrial chemicals. They carry away whatever lies on the ground and upstream. Their contact with food items, including food crops in agricultural lands, can make that food unsafe to eat and hazardous to human health. Power failures caused by floods damage stored food. Refrigerated and frozen foods are affected during the outage periods, and thus must be carefully monitored and examined prior to consumption. Foods kept inside cardboard, plastic bags, jars, bottles, and paper packaging are subject to disposal if contaminated by floodwaters. Even though the packages do not appear to be wet, they may be unhygienic with mold contamination and deteriorate rapidly.
- Contaminated drinking and washing water and poor sanitation—Flooding impairs clean water sources with pollutants and affects sanitary toilets. Direct and indirect contact with the contaminants—whether through direct food intake, vector insects such as flies, unclean hands, or dirty plates and utensils—can result in waterborne infectious disease. Wastewater treatment plants, if flooded and caused to malfunction, can be overloaded with polluted runoff waters and sewage beyond their disposal capacity, resulting in backflows of raw sewage to homes and low-lying grounds. Private wells can be contaminated or damaged severely by floodwaters, while private sewage disposal systems can become a cause of infection and illnesses if they are broken or overflow. Unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to disease outbreaks, including life-threatening cholera, typhoid, dysentery and some forms of hepatitis.
- Mosquitoes and animals—Prolonged rainfall and floods provide new breeding grounds for mosquitoes—wet areas and stagnant pools—and can lead to an increase in the number of mosquito-borne diseases such as malaria and dengue and West Nile fevers. Rats and other rodents and wild animals also can carry viruses and diseases. The public should avoid such animals and should dispose of dead animals in accordance with guidelines issued by local animal control authorities.
- Molds and mildews—Excessive exposure to molds and mildews can cause flood victims—especially those with allergies and asthma—to contract upper respiratory diseases and to trigger cold-like symptoms such as sore throat, watery eyes, wheezing and dizziness. Molds grow in as short a period as 24 to 48 hours in wet and damp areas of buildings and homes that have not been cleaned after flooding, such as water-infiltrated walls, floors, carpets, toilets and bathrooms. Very small mold spores can be easily inhaled by human bodies and, in large enough quantities, cause allergic reactions, asthma episodes, and other respiratory problems. Infants, children, older adults and pregnant women are considered most vulnerable to mold-induced health problems.
- Carbon monoxide poisoning—Carbon monoxide poisoning is as a potential hazard after major floods. Carbon monoxide can be found in combustion fumes, such as those generated by small gasoline engines, stoves, generators, lanterns and gas ranges, or by burning charcoal or wood.

In the event of power outages following floods, flood victims tend to use alternative sources of fuels for heating, cooling, or cooking inside enclosed or partly enclosed houses, garages or buildings without an adequate level of air ventilation. Carbon monoxide builds up from these sources and poisons the people and animals inside.

- Hazards when reentering and cleaning flooded homes and buildings—Flooded buildings can pose health hazards after floodwaters recede. Electrical power systems can become hazardous. People should avoid turning on or off the main power while standing in floodwater. Gas leaks from pipelines or propane tanks can trigger explosion when entering and cleaning damaged buildings or working to restore utility service. Flood debris—such as broken bottles, wood, stones and walls—may cause wounds and injuries when cleaning damaged buildings. Containers of hazardous chemicals, including pesticides, insecticides, fertilizers, car batteries, propane tanks and other industrial chemicals, may be hidden or buried under flood debris. A health hazard can also occur when hazardous dust and mold in ducts, fans and ventilators of air-conditioning and heating equipment are circulated through a building and inhaled by those engaged in cleanup.
- Mental stress and fatigue—Exposure to extreme disaster events can cause psychological distress. Having experienced a devastating flood, seen loved ones lost or injured, and homes damaged or destroyed, flood victims can experience long-term psychological impact. The expense and effort required to repair flood-damaged homes places severe financial and psychological burdens on the people affected, in particular the unprepared and uninsured. Post-flood recovery—especially when prolonged—can cause anxiety, anger, depression, lethargy, hyperactivity, sleeplessness, and, in an extreme case, suicide. Behavior changes may also occur in children. There is also a long-term concern among the affected that their homes can be flooded again in the future.

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

8.1.3 Impacts on People

Section 7.1 presents the total exposed population and the percentage of the exposed population that is below 18 and above 64 for the 10-, 50-, 100-, and 500-year storm events geographically across the unincorporated area (see Figures 7-1 to 7-4). These results provide planning tools to target educational outreach activities regarding health and safety concerns related to flooding.

In further assessing vulnerable populaitons across the entire unincorporated area, Table 8-1 presents the total numbe rof displaced and person requiring publicly provded shelters within the planning area for the 10-, 50-, 100- and 500-year flood event based on the Hazus model results.

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

	Number of Displaced Persons[1]	Number of Persons Requiring Publicly Provided Short-Term Shelter[2]
10-Year Flood	97000	6605
50-Year Flood	162955	9658
100-Year Flood	179612	10432
500-Year Flood	216468	12055

1. Results shown are not precise, but are estimates of damage that may occur as the result of the modeled flood.
2. The number of persons requiring publicly provided shelter is less than the number of displaced persons because not all households will require public assistance to find short-term shelter
Note: Sources of data used in Hazus molding are described in Table 5-1.

8.2 Property

8.2.1 Loss Estimates

Section 7.2.3 (Figures 7-10 to 7-14) presented the portion of the total value of the exposed structures that may be damaged (percent replacement) by flood hazards for the 10-, 50-, 100- and 500-year storm event, respectively, within the unincorporated area for each sub-watershed. The percent replacement costs are a small portion of the total costs and range from 0.06% to 11.07% and average 2.96% within the unincorporated area. As indicated from the assessment of the type of structures impacted presented in Section 7.2.1 (Figures 7-5- to 7-8), these structures are predominantly residential. The percent replacement costs include the portion of the structure that requires replacement.

8.2.2 National Flood Insurance Program Statistics

Countywide Statistics

Table 8-2 lists flood insurance statistics that help identify vulnerability in Los Angeles County, including all of the cities and the Unincorporated County. These Countywide statistics were obtained from the FEMA Open Data Source website on June 4th, 2024 (FEMA, 2024c). Based on these statistics, the County and 86 municipalities within it participate in the NFIP, with over 19,000 flood insurance policies providing over $5.9 billion in coverage. According to FEMA statistics, 9,027 flood insurance claims were paid between January 1, 1978 and June 30, 2014, for a total of $69 million, an average of $7,675 per claim. Figure 8-2 shows the location of flood-insured properties in unincorporated Los Angeles County.

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

- The average cost of a flood insurance policy in Los Angeles County is $887. The average cost of a flood insurance policy in the unincorporated area is $920—3.6 percent higher than the County average.

- The average cost of a flood insurance policy in the SFHA is approximately 2.5 times more than the average cost of a policy outside the SFHA.
- The majority of the policies in force are for residences.
- Over half of the policies are for pre-FIRM construction.
- The amount of insurance in force represents under half of the total value of the assets exposed within the SFHA.
- The high percentage of flood insurance policies in force outside the SFHA suggests that the currently effective mapping does not reflect the total flood risk.
- The average claim paid in the planning area ($7,736) represents about two percent of the 2024 average replacement cost ($381,734)value of structures in the floodplain.

Unincorporated Los Angeles County Statistics

A more detailed analysis of insurance policy coverage in the unincorporated areas of Los Angeles was conducted using the data provided to the County by the Los Angeles FEMA Regional Office in February 2024 as part of its ongoing support for helping the County meet its Category C Repetitive Loss Status requirements. Up until 2018, the Insurance Services Office (ISO) would provide updated repetitive loss statistics to all identified repetitive loss communities that participate in the CRS program to support their annual participation prerequisites under Section 502 of the CRS Coordinators' Manual. ISO will no longer distribute NFIP repetitive loss data to CRS communities. All communities must request repetitive loss data and claims directly from the FEMA Regional Office.

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

Table 8-2: Flood Insurance Statistics for Los Angeles County

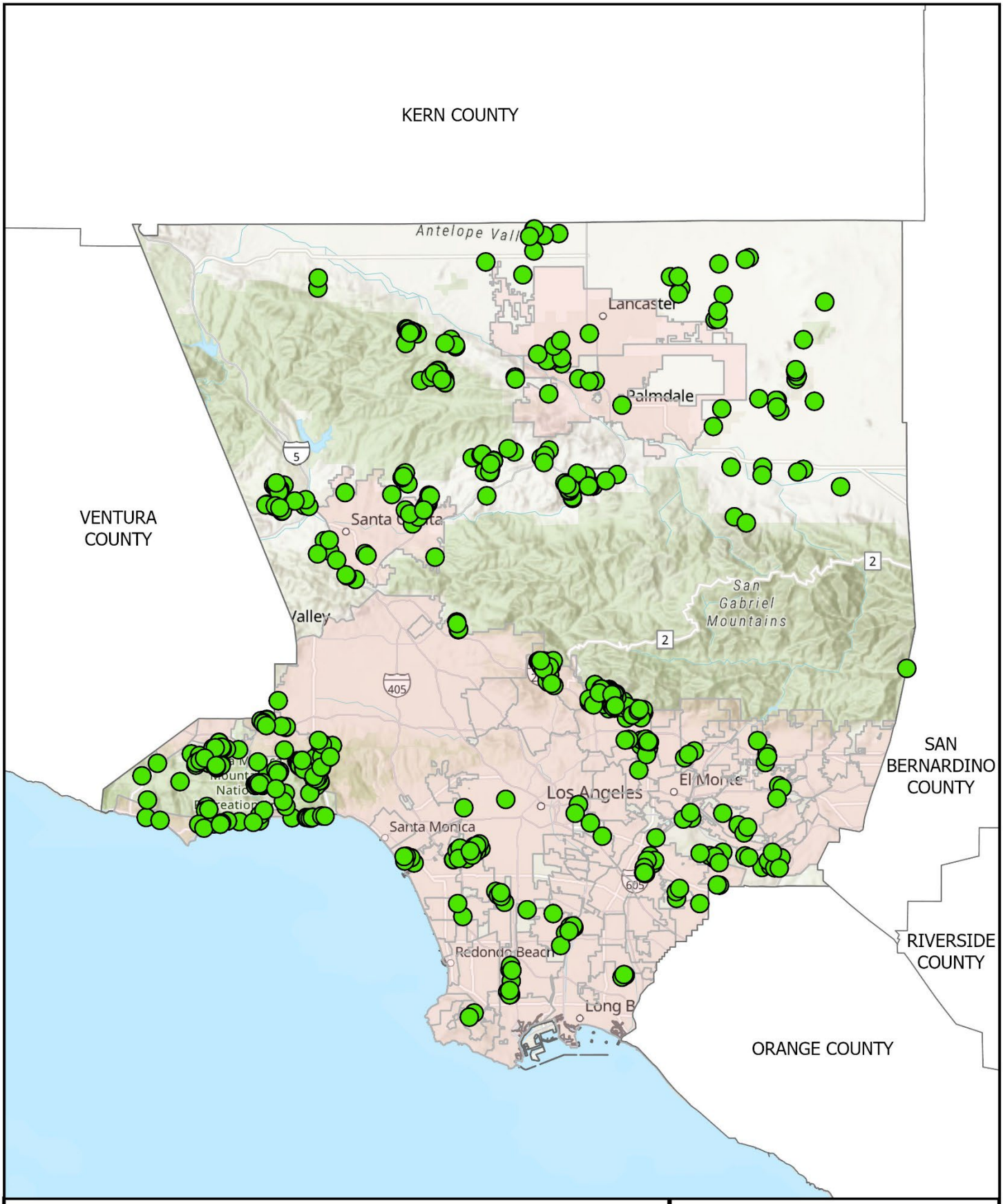
Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/04/2024	Insurance in Force ($)	Total Annual premium ($)	Claims 11/1978 to 6/30/2014	Value of Claims paid, 11/1978 to 6/30/2014 ($)
Unincorporated County	***2/12/1980***	27,710	$7,096,458,900	$25,490,579	3,015	$26,081,589
Agoura Hills	4/3/1986	1,346	$414,305,500	$844,752	66	$580,041
Alhambra	9/26/2008	147	$41,807,000	$50,789	8	$17,162
Arcadia	9/26/2008	296	$102,656,800	$178,850	7	$3,677
Artesia	9/26/2008	71	$16,569,000	$31,835	1	$0
Avalon	9/29/1978	1,141	$282,616,100	$1,864,043	5	$56,471
Azusa	9/26/2008	160	$36,867,000	$105,988	1	$750

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/04/2024	Insurance in Force ($)	Total Annual premium ($)	Claims 11/1978 to 6/30/2014	Value of Claims paid, 11/1978 to 6/30/2014 ($)
Baldwin Park	5/26/1978	106	$32,560,000	$39,417	2	$47,602
Bell	9/26/2008	20	$7,743,000	$14,426	0	$0
Bell Gardens	9/26/2008	12	$2,515,000	$3,546	0	$0
Bellflower	6/7/1998	621	$168,035,700	$277,228	9	$27,385
Beverly Hills	9/26/2008	3,082	$1,048,414,700	$1,628,451	234	$1,600,315
Bradbury	9/26/2008	33	$8,533,000	$15,245	8	$20,721
Burbank	3/16/1981	2,318	$732,876,300	$2,257,550	36	$143,994
Calabasas	2/12/1980	2,007	$539,423,900	$1,127,216	29	$490,273
Carson	6/7/1998	1,259	$419,014,400	$1,004,034	47	$71,729
Cerritos	9/26/2008	933	$299,676,200	$410,898	4	$3,886
Claremont	11/20/2000	649	$188,615,000	$245,003	5	$6,485
Commerce	9/26/2008	41	$19,188,000	$65,540	1	$5,444
Compton	6/7/1998	1,107	$284,489,300	$694,743	16	$139,855
Covina	10/22/1971	139	$39,628,100	$55,172	6	$729
Cudahy	9/26/2008	71	$17,668,000	$21,440	1	$0
Culver City	1/2/1980	1,411	$461,972,500	$1,285,026	27	$95,816
Diamond Bar	9/26/2008	319	$93,239,400	$107,510	3	$6,806
Downey	6/7/1998	1,766	$540,213,600	$971,434	17	$501,598
Duarte	9/26/2008	313	$91,166,700	$148,141	3	$1,726
El Monte	6/16/1999	63	$19,273,000	$24,985	0	$0
El Segundo	9/26/2008	215	$55,170,700	$77,073	3	$3,772
Gardena	6/7/1998	309	$81,923,800	$128,447	5	$4,417
Glendale	9/26/2008	2,394	$683,850,500	$1,320,466	74	$392,759
Glendora	9/26/2008	1,023	$302,522,700	$619,073	9	$239,267
Hawaiian Gardens	5/14/1971	104	$25,524,900	$60,521	3	$11,271

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/04/2024	Insurance in Force ($)	Total Annual premium ($)	Claims 11/1978 to 6/30/2014	Value of Claims paid, 11/1978 to 6/30/2014 ($)
Hawthorne	4/12/1979	202	$46,979,300	$72,214	2	$0
Hermosa Beach	9/26/2008	1,088	$352,213,200	$516,453	12	$10,546
Hidden Hills	7/9/1984	664	$197,860,800	$729,097	40	$465,182
Industry	9/26/2008	72	$39,235,200	$227,381	1	$500
Inglewood	9/26/2008	412	$117,208,200	$177,875	23	$10,855
Irwindale	9/26/2008	17	$5,950,000	$6,953	0	$0
La Canada Flintridge	9/26/2008	1,719	$534,129,100	$807,085	49	$1,609,523
La Habra Heights	9/26/2008	86	$24,622,800	$38,546	3	$3,443
La Mirada	2/7/1980	356	$106,213,500	$200,666	8	$69,823
La Puente	9/26/2008	47	$14,118,700	$17,096	5	$7,942
La Verne	9/26/2008	202	$57,249,600	$83,160	6	$21,908
Lakewood	6/7/1998	1,844	$542,910,100	$696,640	12	$26,321
Lancaster	6/1/1982	2,212	$628,491,900	$1,466,433	12	$95,520
Lawndale	9/26/2008	115	$30,410,000	$46,201	1	$5,431
Lomita	9/26/2008	170	$42,649,000	$56,266	5	$21,788
Long Beach	9/15/1983	53,501	$13,979,135,600	$58,829,661	355	$2,638,169
Los Angeles	2/12/1980	143,097	$42,135,623,800	$100,207,019	3,975	$25,129,622
Lynwood	4/15/1980	1,529	$357,404,800	$1,459,969	19	$179,525
Malibu	9/26/2008	14,518	$4,598,877,700	$37,744,948	279	$5,173,038
Manhattan Beach	9/26/2008	1,676	$543,474,100	$717,051	15	$134,619
Maywood	9/26/2008	13	$3,075,000	$8,943	0	$0

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/04/2024	Insurance in Force ($)	Total Annual premium ($)	Claims 11/1978 to 6/30/2014	Value of Claims paid, 11/1978 to 6/30/2014 ($)
Monrovia	9/26/2008	405	$123,796,100	$247,043	13	$35,205
Montebello	3/18/1980	262	$86,780,400	$120,295	2	$3,935
Monterey Park	9/26/2008	334	$107,211,400	$139,383	28	$22,536
Norwalk	9/26/2008	433	$131,839,400	$163,760	3	$8,167
Palmdale	6/1/1982	2,443	$694,507,400	$1,814,137	20	$397,917
Palos Verdes Estates	11/21/2001	770	$237,868,100	$569,167	15	$39,750
Paramount	6/7/1998	405	$111,005,200	$256,258	14	$30,123
Pasadena	9/26/2008	1,919	$589,643,400	$973,399	67	$232,029
Pico Rivera	6/7/1998	1,341	$400,127,000	$885,314	14	$18,872
Pomona	9/26/2008	221	$84,341,900	$250,723	7	$42,949
Rancho Palos Verdes	9/26/2008	848	$245,905,000	$362,436	8	$261,095
Redondo Beach	9/15/1983	1,285	$358,370,600	$1,053,235	32	$1,241,794
Rolling Hills Estates	9/26/2008	249	$71,457,000	$92,280	9	$12,344
Rolling Hills	9/26/2008	208	$69,155,000	$83,564	1	$0
Rosemead	9/26/2008	98	$26,501,600	$33,131	2	$582
San Dimas	¼/77	193	$50,268,000	$117,000	9	$9,921
San Fernando	11/2/1976	65	$17,252,100	$30,627	15	$96,069
San Gabriel	11/27/1970	107	$40,324,600	$66,418	2	$5,640
San Marino	9/26/2008	204	$69,118,000	$88,119	2	$0
Santa Clarita	9/29/1989	10,143	$2,621,770,000	$12,458,951	87	$374,640

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/04/2024	Insurance in Force ($)	Total Annual premium ($)	Claims 11/1978 to 6/30/2014	Value of Claims paid, 11/1978 to 6/30/2014 ($)
Santa Fe Springs	4/15/1980	307	$144,241,300	$382,158	0	$0
Santa Monica	9/26/2008	3,507	$1,195,883,900	$2,189,036	47	$146,515
Sierra Madre	9/26/2008	486	$133,497,300	$236,905	24	$73,729
Signal Hill	9/26/2008	146	$36,152,000	$47,401	6	$45,610
South El Monte	9/26/2008	47	$17,430,900	$62,474	1	$0
South Gate	6/7/1998	286	$76,332,800	$172,012	5	$4,669
South Pasadena	4/14/1972	415	$129,481,000	$175,154	15	$122,828
Torrance	12/18/1979	1,339	$404,350,300	$692,260	12	$10,089
Walnut	9/26/2008	71	$22,651,000	$73,155	6	$1,371
West Covina	2/4/2012	782	$206,210,900	$908,036	13	$16,866
West Hollywood	6/18/1987	964	$330,195,200	$759,789	28	$75,664
Westlake Village	9/26/2008	928	$283,637,800	$535,684	5	$72,576
Whittier	1/16/1981	692	$224,203,800	$607,204	15	$17,990
Total		**306,629**	**$87,853,861,500**	**$271,925,586**	**8,994**	**$69580770**



Legend

- Incorporated Areas
- Flood Insurance Policies

NORTH

0 5 10 20

Scale in Miles

Location of Flood-Insured Properties
Figure 8-2

BURNS McDONNELL

Source: Esri World Topographic Map, Los Angeles County Database, FEMA

Issued: 6/24/2024

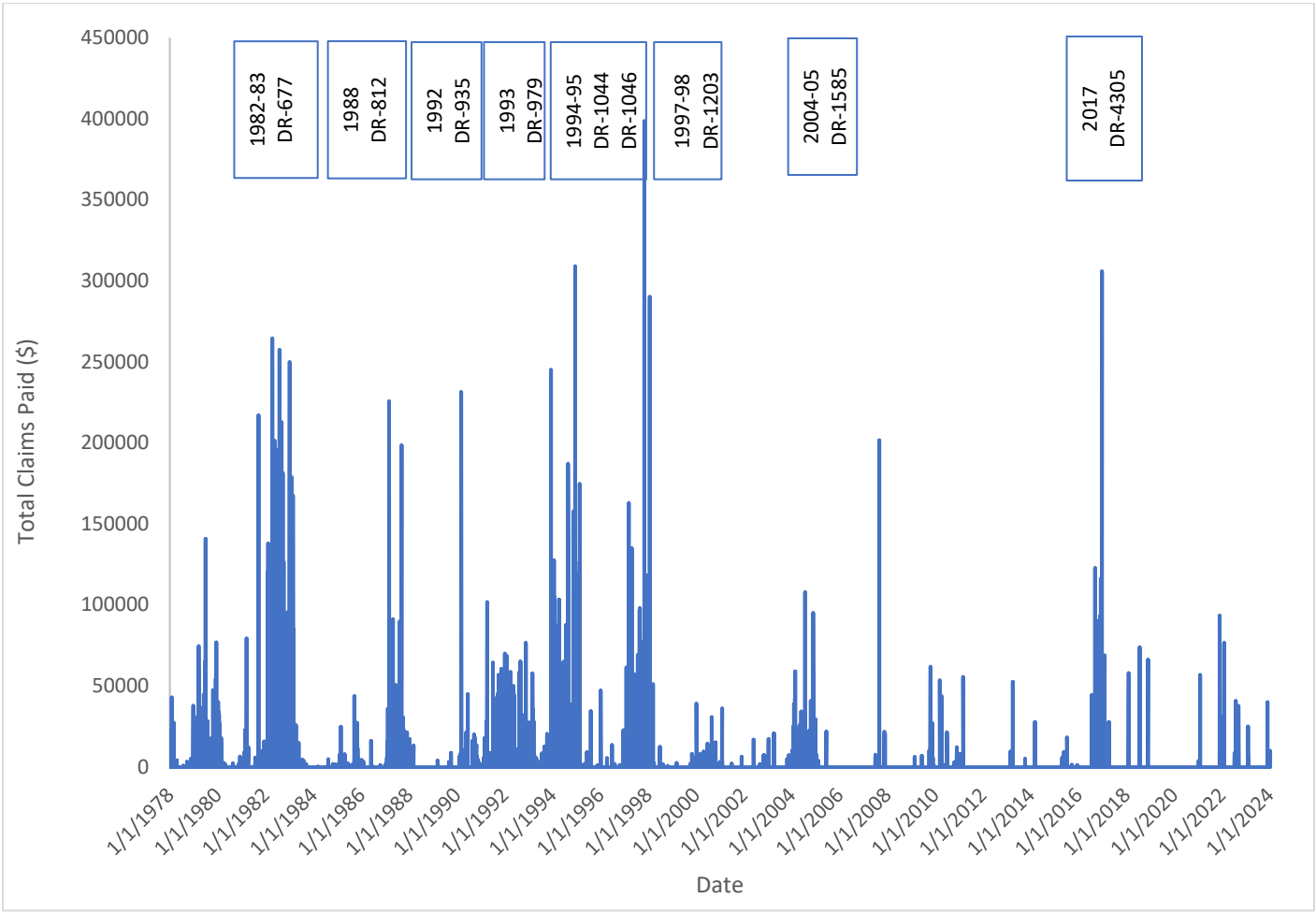


Figure 8-3: Graph of Claims Paid Since 1978

The FEMA provided insurance data was in a spreadsheet format suitable for conversion to a geospatial format that was the basis for this analysis. Figure 8-2 shows the location of flood-insured properties in unincorporated Los Angeles County. The FEMA provided insurance data was used to create Figure 8-2 which depicts the date claims were opened and the total amount paid. The related Federal Disaster Declarations are noted. These declarations are further described in Section 6.4.

Findings from this analysis are as follows:

- As of February 2024, there were 27,710 flood insurance policies in force in the unincorporated area of Los Angeles County, with a total annual premium of $25,490,579 providing $7,096,458,900 in insurance coverage.
- The average premium for that time frame was $919.91 , and the average coverage was $256,097 per policy for both structure and contents.
- Over 97 percent of the policies were for residential occupancy; fewer than 3 percent were non-residential policies.

- There were 11,993 flood insurance policies in force within the SFHA as of February 2024. This represents 43 percent of the total structures in the SFHA, which is below the national average of 49 percent. The breakdown of the 27710, policies by flood zone is as follows:
  - Unnumbered A zones—3,802 policies, or 9.9 percent
  - AE, A1-99—2,8201 policies, or 0.6 percent
  - Unnumbered V Zones—201 policies, or 0 percent
  - VE, V1-99 zones—445 policies, or 1.3 percent
  - AH, AO zones—5,570 policies, or 11.9 percent
- Over 54 percent of all policies in force were for properties outside the SFHA.
- The average replacement cost (building only) for buildings in the SFHA is $558,192. The average amount of insurance coverage in force ($256,014) will cover 45 percent of this value. Flood insurance policies have coverage limits that impact how much coverage can be provided by structure and policy type.

Based on these findings, the following recommendations are provided for consideration in the implementation of its PPI contained in Chapter 14 of this plan:

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

Flood Insurance Reform

The NFIP is currently $20.5 billion in debt and taxpayers will be forced to pay for any additional payouts until that situation is solved. The Biggert-Waters Flood Insurance Reform Act of 2012 changed the NFIP to make it more sustainable. It requires the NFIP to raise rates to reflect true flood risk, make the program more financially stable, and change how FIRM updates impact policyholders. The new law eliminates some artificially low rates and discounts, as well as subsidies to certain pre-FIRM policyholders. Most flood insurance rates will move to reflect full risk, and flood insurance rates will rise on some policies. There are investments property owners and communities can make to reduce the impact of rate changes.

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

As of April 2023, FEMA implemented NFIP's Pricing Approach Risk Rating 2.0. The new approach uses advanced technology to set rates that are actuarially sound and equitable. It incorporates various flood

risk variables, including flood frequency, types of flooding, and property characteristics. Additionally, rates are now more equitable, reflecting the true flood risk and cost to rebuild, addressing previous disparities.

These laws will have profound impacts on the costs of flood insurance and implementation of the NFIP. How changes will impact local communities is not yet known..

Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property for which two or more claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978 (e.g., two claims during the periods 1978–1987, 1979–1988, etc.).

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

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

8.3 Critical Facilities and Infrastructure

Section 7.3 (Figures 7-14 to 7-18) presented geographically the total number of critical facilities and infrastructure impacted by flood hazards for the 10-, 50-, 100- and 500-year storm event, respectively, within the unincorporated area for each sub-watershed. The majority of the exposed critical facilities and infrastructure within the floodplains consist of transporation related facilities that include bridges that span these floodplains. Discussion of impacts to bridges, roads, and utilities is presented in subsection 7.3.2. The next larger percent of exposed critical facilities and infrastructure are food, water, and sheltering.

To further assess the vulnerability of critical facilites, the Hazus model was used to assess the potential damage to critical facilities in Safety & Security and Food, Water & Sheltering from flooding using depth/damage function curves. Based on historical averages, these curves indicate potential damage amounts as a percentage of the value of structures or contents. Actual damage to facilities may be less than these conservative estimates. Hazus also estimates functional downtime, which is the time it might take to restore a facility to 100 percent of its functionality after flood damage occurs. The downtime for

most of these buildings ranged from 0-480 days. The percentages of the total value damaged for the 100-year and 500-year flood events are summarized in Table 8-3 and Table 8-4, respectively.

Table 8-3: Estimated Damage to Critical Facilities in Unincorporated Areas from 100-Year Flood

	Average % of Total Value Damaged	
	Structure	Content
Safety & Security	9.51	27.74
Food, Water, & Sheltering	5.82	32.72
Total/Average	7.66	30.23

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

Table 8-4: Estimated Damage to Critical Facilities in Unincorporated Areas from 500-Year Flood

	Average % of Total Value Damaged	
	Structure	Content
Safety & Security	14.5	50.70
Food, Water, & Sheltering	8.39	49.17
Total/Average	11.45	49.94

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

The total number of exposed critical facilities as determined by the HAZUS model for the 500-yr flood events 508 compared to approximately 2,000 critical facilities and infrastructure in the planning area Of the exposed facilities, those that are at risk of flooding is relatively small.

8.4 Environment

The environment vulnerable to flood hazards is the same as the environment exposed to the hazard. The principal environment impact from flood is the loss of aquatic habitat. One possible measure of environmental impacts from flooding is by looking at the amount of debris that would be generated by each scenario flood event. Hazus includes a debris estimation component. These estimates can provide local governments feedback on not only what they need to deal with through recovery, but also what the potential exposure is to debris that could be carried by floodwaters. The Hazus debris estimates for each of the scenario flood events for the planning area are shown in Table 8-5.

Table 8-5: Estimated Flood-Caused Debris in Unincorporated Areas

	Debris (tons)[a]	Truckloads
10-Year Flood Event	28,949	1158
50-Year Flood Event	86,660	3466
100-Year Flood Event	113,473	4539
500-Year Flood Event	245,524	9821

a. The Hazus flood debris model focuses on building-related debris and does not address contents removal or additional debris loads such as vegetation and sediment. The flood event areas are calculated by the Hazus model using flood depth. The Los Angeles County Department of Public Work's Sediment Management Strategy lists the estimated amounts of sediment produced in a Design Debris Event.

b. Based on an estimate of 25 tons per truckload

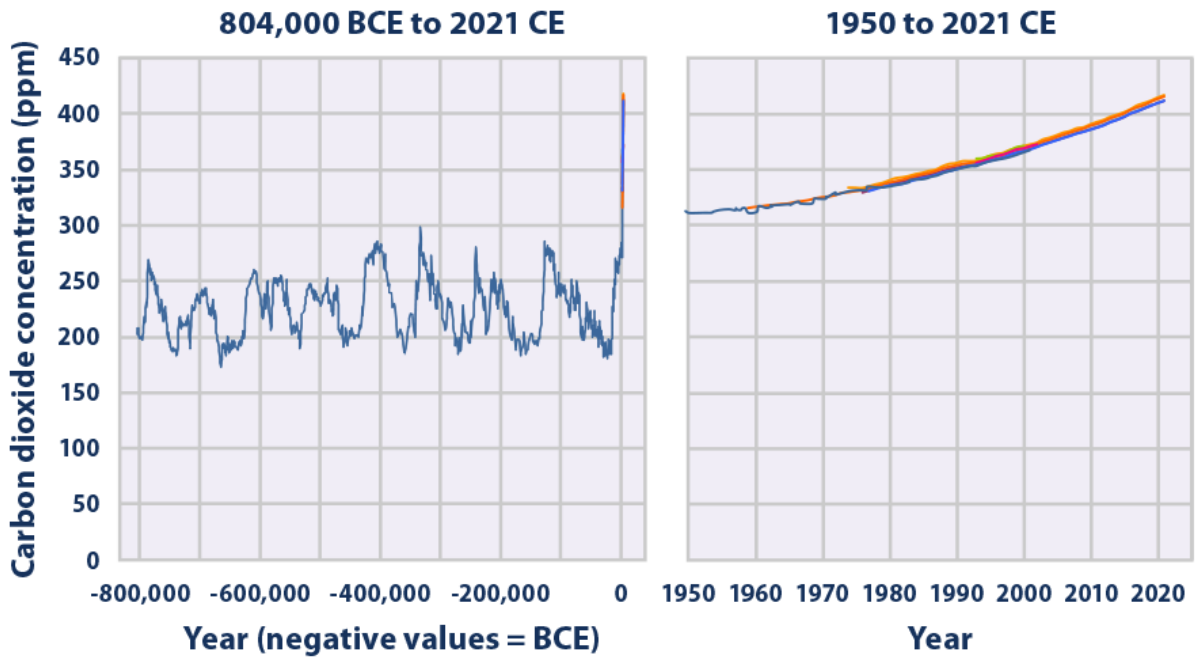
9 Climate Change Considerations for Floodplain Management

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

9.1 Climate Change Overview

Climate consists of patterns of temperature, precipitation, humidity, wind and seasons, and plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. Climate change refers to changes in climate over a long period of time. Worldwide, average temperatures have increased 1.9ºF since 1880 (NASA, 2024a), which is significant enough to lead to large changes in climate and weather.

The warming trend and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases (GHGs) in the Earth's atmosphere. GHGs are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known GHG; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of GHGs come from a variety of sources, such as the combustion of fossil fuels, agricultural production, and changes in land use. According to the U.S. Environmental Protection Agency (EPA), carbon dioxide concentrations measured approximately 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen 48 percent since then, reaching 414 ppm in 2021 (see Figure 9-1, U.S. EPA, 2023a). The EPA attributes almost all of this increase to human activities. If GHG emissions are not reduced, by the end of this century, the region will experience 60 to 90 additional extremely hot days (95ºF or greater) than it currently experiences (CEC, 2018).



Data source: Compilation of eight underlying datasets. See www.epa.gov/climate-indicators for specific information.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Figure 9-1: Global Carbon Dioxide Concentrations Over Time (U.S. EPA)

9.2 How Climate Change Affects Floodplain Management

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

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

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

9.3 Current Global Indications of Climate Change

The major scientific agencies of the United States—including the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA)—agree that climate change is occurring. Multiple temperature records from throughout the world have shown a warming trend, and the Intergovernmental Panel on Climate Change (IPCC) has stated that the warming of the climate system is unequivocal (IPCC, 2023). The past 10 consecutive years have been the warmest 10 years on record since modern recordkeeping began around 1880, and 2023 was the warmest year on record (NASA, 2024b). Globally, each decade since the 1960s has been warmer than the one before (NASA, 2020).

Rising global temperatures have been accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (IPCC, 2023). The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising (NASA, 2024c). Global sea level has risen approximately 6 to 8 inches in the last 100 years (NASA, 2024c). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk.

9.4 Projected Future Impacts

9.4.1 Global Projections

Scientists project global emissions implied by policies implemented by the end of 2020 will lead to a median global warming of 4.0ºF to 6.3ºF by 2100 (IPCC, 2023). Research has concluded that an increase of 2ºC in average global average temperature will increase the amount of rain falling during the heaviest precipitation events, which can increase flooding risks (NASA, 2024e).

The amount of sea level rise expected to occur as a result of climate change will increase the risk of coastal flooding for millions to hundreds of millions of people around the world, many of whom would have to permanently leave their homes (IPCC, 2023). Through 2050, an average rise of 0.8 feet is expected statewide over the next 30 years. By 2100, sea levels are projected to rise between 1.6 and 3.1 feet, though higher amounts are possible. Beyond 2100, the range of potential sea level rise increases significantly due to uncertainties in physical processes like ice sheet loss. By 2150, sea levels could rise between 2.6 and 11.9 feet, with even higher amounts not ruled. Extreme storms and higher tides, sea level rise will accelerate cliff and bluff erosion, coastal flooding, beach loss, and the mobilization of subsurface contaminants (Ocean Protection Council, 2024) Rising seas will make coastal storms and the associated storm surges more frequent and destructive. What is currently termed a once-in-a-century coastal flooding event could occur more frequently.

9.4.2 Projections for the County of Los Angeles

Temperature

In the Los Angeles region, the frequency of heat waves and hot days (i.e., days on which the temperature exceeds 95ºF) is expected to increase. The frequency may triple in coastal areas and central Los Angeles, quadruple in the San Fernando Valley and San Gabriel Valley, and increase five- or six-fold in desert and mountainous regions. Temperature changes are already occurring, as 2023 was the hottest year on record in the county.

Table 9-1 summarizes projections of temperature changes in the County of Los Angeles at the middle of and at the end of the 21st century. The "mitigation" scenario represents aggressive action to curb emissions in the coming decades, and the "business as usual" scenario represents a continued rise in emissions of greenhouse gases. Note that temperatures level off at the end of the century under the mitigation scenario (UCLA, 2015).

Table 9-1: Temperature Increases in the Los Angeles Region

	Mid-Century	End of Century
Mitigation Scenario	3.0	3.0
Business as Usual Scenario	4.3	8.2

Coastal regions in Ventura, L.A., and Orange Counties will experience less warming than inland areas (CEC, 2018). Mountain peaks will experience the greatest amount of warming, due to loss of snow cover and resulting loss of reflection of the sun's heat.

Precipitation

The total amount of precipitation in the Los Angeles region over the coming century is expected to be similar to that of recent decades, with wide swings from year to year. However, a higher percentage of precipitation is expected to be in the form of rain rather than snow (NCA, 2024). This could increase the risk of flooding and decrease windows of time to capture local water.

Snow and Runoff

Annual snowpack in the region may decline by more than a third by 2050 and more than half by 2100 (California State Portal, 2024). This not only would impact the County's potential for snowmelt floods, but it also could reduce freshwater supplies. Such significant changes in climate could lead to more frequent, intense, and longer severe weather events. A rising frequency of winter storms will also increase flooding (California Energy Commission, 2018).

Sea Level

Sea levels are expected to rise in the Los Angeles Region over the next century. Current estimates indicate an increase of 0.8 feet by 2050 relative to the baseline levels in 2000, and 1.6 to 3.1 feet by 2100 (California Ocean Protection Council, 2024). The largest coastal zone populations vulnerable to flooding from a 100-

year storm are Los Angeles, Orange, and San Diego Counties (California Coastal Commission, 2016). More than 400,000 people would be exposed to danger from a 100-year, and could result in $50 billion in property damage (UCI News, 2022).

Given these vulnerabilities, a team of regional partners from local, state and regional agencies worked to develop a comprehensive shoreline change and coastal erosion model (Coastal Storm Modeling System) that provides "region-specific flood hazard projections at a detailed parcel scale from Point Conception to the Mexican border" (USC, 2017). This project, known as Regional Adapt LA: Coastal Impacts Planning in the Los Angeles Region, worked with local jurisdictions toward climate adaptation capacity building, so that the model results can be effectively used in local planning (USC, 2017). Forty sea level rise and coastal storm scenarios were modeled, providing projections for coastal flooding, waves, currents, beach change, cliff retreat, and river discharge. These model results can aid communities in identifying specific vulnerabilities related to coastal storms and sea level rise (USC, 2017).

9.5 Responses to Climate Change

9.5.1 Mitigation and Adaptation

Communities and governments worldwide are working to address, evaluate, and prepare for climate changes that are likely to impact communities in coming decades. Generally, climate change discussions encompass two separate but interrelated considerations: mitigation and adaptation. The term "mitigation" is defined differently across disciplines:

- Mitigation in climate change discussions is defined as "a human intervention to reduce the impact on the climate system." It includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks (U.S. EPA, 2023b).
- Mitigation in emergency management is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters (FEMA, 2023c).

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

Adaptation refers to adjustments in natural or human systems in response to the actual or anticipated effects of climate change and associated impacts. These adjustments may moderate harm or exploit beneficial opportunities (U.S. EPA, 2023b).

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

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

The County of Los Angeles has already begun implementing progressive mitigation actions, and this floodplain management plan is one way in which the County intends to identify and achieve more mitigation projects. The County's Climate Action Plan was developed to reduce greenhouse gas emissions associated with activities in unincorporated communities. The Climate Action Plan establishes a greenhouse gas reduction target that is consistent with state efforts. Potential solutions were developed in five areas: green building and energy; land use and transportation; water conservation and wastewater; waste reduction, reuse and recycling; and land conservation and tree planting. Although many of these actions are not directly tied to flood mitigation, most will indirectly serve to reduce future flood-related hazard events by reducing sea level rise and promoting green space and conservation of resources (Los Angeles County Department of Regional Planning 2023b).

9.5.2 Future Modeling Efforts

Most current modeling efforts are unable to assess climate change at a resolution small enough to determine specific impacts for individual communities. Typically, generalized assessments of larger climatic regions have been used to determine impacts that are most likely to affect these communities. Climate researchers worldwide are working to improve modeling efforts at more refined scales. As such models are developed in the future, the risk assessment presented in this floodplain management plan may be enhanced to better measure these impacts.

9.5.3 Response to Climate Change in California

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

9.6 Potential Climate Change Impact on Flood Hazards

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

9.6.1 Coastal Erosion

Coastal areas may be impacted by climate change in different ways. Coastal areas are sensitive to sea-level rise, changes in the frequency and intensity of storms, increases in precipitation, and warmer ocean temperatures. According to NASA, warmer temperatures may lead to an increase in frequency of storms

(NASA, 2024f), thus leading to more weather events that cause coastal erosion. A study on increased storm wave heights from climate change indicated that sea level rise alone could double rates of coastal erosion and flooding and that increased frequency of major El Niño events (up to double the current frequency) could quadruple the rates of coastal erosion and flooding. Sea level rise and increased El Niño frequency combined could cause up to an order of magnitude increase in coastal erosion and flood frequency. While erosion rates would still be partially dependent on beach slopes and dune crest elevations, this possibility highlights the importance of incorporating climate change and climate control into mitigation practices (Ruggiero 2008).

9.6.2 Dam Failure

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

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

9.6.3 Flood

Changes in Hydrology

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

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection and emergency response.

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

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

Changes in Precipitation

As discussed above, Los Angeles County can expect approximately the same amount of total precipitation this century as it experienced the previous century, but the annual precipitation amounts can vary significantly. Therefore, even though total rates of precipitation should remain constant, more of the precipitation will fall in the form of rain rather than snow, increasing winter flow rates (NCA, 2024). As a result, Southern California could have an increased risk of flooding and less time to capture local water.

9.6.4 Storm Surge

Storm surges are generated by the strong winds and intense low pressure associated with tropical cyclones, hurricanes, and severe storms. While not all severe storms create significant levels of storm surge, global climate models predict hurricanes will increase coastal flood risk due to higher storm surge caused by rising seas (NASA, 2024g).

9.6.5 Sea Level Rise

Changes in global temperatures, hydrologic cycles, coverage of glaciers and ice sheets, and storm frequency and intensity are captured in long-term sea level records. Sea levels provide a key to understanding the impact of climate change (NOAA 2022b). Warmer temperatures result in the melting of glaciers and ice sheets. Increased melting leads to less water being stored on land and a greater volume of water in the oceans. In addition, water expands as it warms. The heat content of the world's oceans has been increasing over the last several decades, which will further contribute to sea level rise.

Sea level rise increases the risks coastal communities face from coastal hazards (floods, storm surges, and chronic erosion), and related hazards like flooding near the mouths of streams and channels, landslides, and seawater well intrusion. It may also lead to the loss of important coastal habitats, wetlands, and estuaries.

Part 3 – Mitigation Strategy

10 Guiding Principles, Goals and Objectives

This chapter identifies goals for reducing long-term vulnerabilities to flooding (CRS Step 6). After reviewing the goals and objectives identified for the 2020 plan and for other locally relevant planning documents, the Floodplain Management Plan Committee developed updated goals and objectives and a mission statement. This work was completed through facilitated discussions over several meetings. Goals were selected that support the mission statement. Objectives were selected that meet multiple goals.

10.1 Mission Statement

A mission statement focuses the range of objectives and actions to be considered. The mission statement for the 2025 floodplain management plan is as follows:

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

10.2 Goals

The effectiveness of a mitigation strategy is assessed by determining how well its goals are achieved. The Floodplain Management Committee established the following updated goals for the 2025 floodplain management plan:

- Enhance community resilience to the impacts of flood hazards while maximizing opportunities for local water supplies.
- Communicate to residents and stakeholders what the flood risks are, based on best available data and science.
- Increase resilience of infrastructure and critical facilities from flood hazards.
- Account for flood risk in land use and planning.
- Preserve, enhance, or restore the natural environment's floodplain functions without increasing flood hazards.
- Encourage the development and implementation of long-term, cost-effective, and environmentally sound flood hazard mitigation projects.

10.3 Objectives

The following objectives were selected that meet multiple goals:

- Work cooperatively with other public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
- Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.

- Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
- Educate proponents of projects in known flood hazard areas about the potential flood risks and the need for mitigation measures to minimize flood risk.
- Consider open space land uses within known flood hazard areas.
- Where feasible and cost-effective, prioritize environmentally friendly natural systems including green infrastructure when reducing flood risk.
- Encourage and support efforts to retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
- Provide flood protection by maintaining flood control systems.
- Implement flood response plan during and after a flood event.
- Consider climate change in planning for flood and inundation hazards.
- Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.

11 Alternatives Analysis

11.1 Alternative Analysis

During the Floodplain Management Committee session that took place on November 12th, 2024, a core capability exercise was performed by the Floodplain Management Committee to assess local strengths, weaknesses, obstacles, and opportunities related to floodplain management (see Section 2.5). The results of this exercise served as the basis for identifying the range of alternatives the County could consider as floodplain management actions. The planning team used the results of this exercise to refresh the "flood hazard mitigation catalog" of alternatives that was created for the 2020 floodplain management planning effort. This catalog represents the range of floodplain management alternatives that were considered by the County in compliance with Step 7 of the CRS 10-step process. It presents a wide range of activities to ensure that all possible measures are explored, not just traditional approaches such as flood control, acquisition, and land use regulation. The Floodplain Management Committee's input on the County's core capabilities informed the alternatives review process. The planning team also used findings of public outreach efforts, the risk assessment results, and the actions identified in the 2020 plan to finalize the catalog for the 2025 update. The resulting catalog includes alternatives that are categorized in two ways:

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

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

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

11.1.1 Alternatives to Mitigate the Flood Hazard

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

Table 11-1: Alternatives to Mitigate the Flooding Hazard

Personal Scale	Corporate Scale	Government Scale
Manipulate the Hazard		
• Clear storm drains and culverts	• Clear storm drains and culverts	• Maintain drainage system • Dredging, levee construction, and providing regional retention areas • Structural flood control, levees, channelization, or revetments. • Stormwater management regulations and master planning • Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff
Reduce Exposure to the Hazard		
• Locate outside of hazard area • Elevate utilities above base flood elevation	• Locate critical facilities or functions outside hazard area	• Locate or relocate critical facilities outside of hazard area • Acquire or relocate identified repetitive loss properties • Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. • Adopt land development criteria such as planned unit developments, density transfers, clustering • Institute low impact development techniques on property • Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff • Preserve undeveloped and vulnerable shoreline • Restore existing flood control and riparian corridors
Reduce Vulnerability to the Hazard		
• Raise structures above base flood elevation • Elevate items within house above base flood elevation • Build new homes above base flood elevation • Flood-proof structures	• Build redundancy for critical functions or retrofit critical buildings • Provide flood-proofing when new critical infrastructure must be located in floodplains	• Harden infrastructure, bridge replacement program • Provide redundancy for critical functions and infrastructure • Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non- conversion deed restrictions. • Stormwater management regulations and master planning. • Adopt “no-adverse impact” floodplain management policies to not increase flood risk on downstream communities • Facilitate managed retreat from, or upgrade of, the most at-risk areas • Require accounting of sea level rise in all applications for new development in shoreline areas

Personal Scale	Corporate Scale	Government Scale
Build Local Capacity to Respond to or Prepare for the Hazard		
• Buy flood insurance • Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event	• Keep cash reserves for reconstruction • Support and implement hazard disclosure for sale of property in risk zones. • Solicit cost-sharing through partnerships with others on projects with multiple benefits.	• Produce better hazard maps • Provide technical information and guidance • Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) • Incorporate retrofitting or replacement of critical system elements in capital improvement plan • Develop strategy to take advantage of post-disaster opportunities • Warehouse critical infrastructure components • Develop and adopt a continuity of operations plan • Consider participation in the Community Rating System • Maintain and collect data to define risks and vulnerability • Train emergency responders • Create an elevation inventory of structures in the floodplain • Develop and implement a public information strategy • Charge a hazard mitigation fee • Integrate floodplain management policies into other planning mechanisms within the planning area. • Consider the probable impacts of climate change on the risk associated with the flood hazard • Consider the residual risk associated with structural flood control in future land use decisions • Enforce National Flood Insurance Program requirements • Adopt a Stormwater Management Master Plan • Develop an adaptive management plan to address the long-term impacts of sea level rise

11.1.2 Alternatives to Mitigate the Dam Failure Hazard

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

Table 11-2: Alternatives to Mitigate the Dam Failure Hazard

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

11.1.3 Community Lifeline Framework

FEMA has recently introduced the community lifeline framework that is shown in Figure 6-1 The seven lifelines and their respective components provide an important tool in developing strategies to reduce hazards and therefore provide guidance in developing the mitigation measures and actions presented in this section. The lifelines shown represent the critical business and government functions and operations essential in providing a resilient community. The Floodplain Management Committee used this community lifeline framework to identify the community lifelines served in each Action Item. In Table

11-4, the Community Lifeline served is listed for each of the Mitigation Actions. The action items also include incorporating this tool into the development of hazard mitigation planning documents, programs, and projects to respond and recover from impacts of natural hazards.

The framework also encourages the identification of opportunities to integrated flood hazard mitigation measures with plans, programs and projects that address other natural hazards such as fires, drought, heat and earthquakes with the goal of long-term community resilience.

An example of this collaboration includes developing and applying for grant funding (Table 11-3- Item 15) under the Building Resilient Infrastructure and Communities (BRIC) grant program, which was created as part of the Disaster Recovery Reform Act of 2018 (DRRA). These types of collaborative projects may include a program to provide education and outreach to residents on measures to protect properties. They aim to improve emergency agencies' resources and implement nature-based solutions in impacted channels to address hillside flooding and mudflow hazards. This is done in coordination with efforts to provide wildfire protection and community resiliency through wildfire planning and mitigation activities. Projects that address impacts from multiple hazards and lifelines provide for greater opportunities for grant funding and greater community resiliency.



Figure 11-1: Community Lifeline Framework

11.2 Selected Mitigation Actions

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

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

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

Table 11-3: Action Plan- Flood Mitigation Actions

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
1—Promote awareness of flood hazards to residents in flood hazard areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Building and Safety Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; County Regional Planning Department	Low	Ongoing	1, 3, 11	Yes-1
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Building and Safety Division, Land Development Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	3, 11	Yes-2
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Los Angeles County Chief Executive Office/Office of Emergency Management (CEO OEM), Public Works (Disaster Services Group) ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	1, 3	Yes-3
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • **Annually notify owners regarding local flood hazards and proper protection activities** • **Provide technical advice regarding flood protection and flood preparedness** • **Distribute a revised questionnaire to new Repetitive Loss Properties.** ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Program for Public Information) ***Funding Source***: Public Works	Low	Ongoing	1, 2, 3, 11	Yes-4

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. ***Lead Agency:*** Fire Department, Public Works (Administrative Services Division, Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group) ***Funding Source:*** FEMA; California Emergency Management Agency (Cal EMA); Fire Department; Public Works	Low	Ongoing	3, 9	Yes-5
6—Provide public education about maintaining the stormwater system free of debris. ***Lead Agency:*** Public Works (Stormwater Quality Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Stormwater Engineering Division, Stormwater Maintenance Division, Stormwater Planning Division, Road Maintenance Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	1, 9	Yes-6
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Maintenance Division, Stormwater Planning Division, Transportation Planning and Programs Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 4, 6, 8	Yes-7
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Community & Government Relations Group) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	1, 3, 11	Yes-8
9—Provide emergency preparedness and flood protection information to the general public. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Stormwater Engineering Division, Program for Public Information, Stormwater Planning Division, Community & Government Relations Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works; USC Sea Grant	Low	Ongoing	1, 9, 11	Yes-9

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. ***Lead Agency:*** CEO OEM, Public Works (Disaster Services Group) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works	Low	Ongoing	1, 9, 11	Yes-10
11—Develop and maintain a list of priority maintenance-related problem sites. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 8	Yes-11
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. ***Lead Agency:*** Public Works (Stormwater Maintenance Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 8	Yes-12
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 8	Yes-13
14—Evaluate LACFCD storm drain, open channel, and flood retention basin facilities for future improvements. Drainage infrastructure outside of the LACFCD may be covered by the Road Maintenance Division where applicable. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Public Works (Design Division, Stormwater Maintenance Division, Stormwater Engineering Division, Stormwater Quality Division) Stakeholders ***Funding Source:*** Public Works	Low	Ongoing	2, 8	Yes-14

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
15— Pursue appropriate flood hazard mitigation grant funding for projects (i.e. BRIC) that use the Community Lifeline Framework, and address multiple hazards, where applicable. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Disaster Services Group, Stormwater Planning Division), CEO OEM ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	1, 8	Yes-15
16—Consider the conversion of high-risk properties into open space. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department; County Parks and Recreation	High	Ongoing	4, 5, 7	Yes-16
17—Refine the plan check system to track properties in the flood zone and address drainage. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 4, 8	Yes-17
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division) ***Funding Source:*** Public Works	Low	Ongoing	4, 7, 8,	Yes-18
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Chief Information Office) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 4	Yes-19
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects, where applicable and grant funding available. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Engineering Division), Stakeholders ***Funding Source:*** FEMA, U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department, Safe Clean Water (SCW) Program (applicable to LACFD), State Water Resources and Conservation Agencies Grant Programs for Nature-Based Solutions	Low	Ongoing	1, 6, 10	Yes-20

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. ***Lead Agency:*** Public Works (Stormwater Planning Division, Stormwater Quality Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; State Water Resources and Conservation Agencies Grant Programs for Nature-Based Solutions	High/ Medium	Long term	1, 2, 3, 5, 6	Yes-21
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. ***Lead Agency:*** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Regional Planning Department, Public Works (Environmental Programs Division, Stormwater Quality Division, Stormwater Planning Division, Stormwater Engineering Division, Project Management Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; Public Works	Low	Ongoing	1, 2, 6	Yes-22
23—Maintain the Operational Area Emergency Response Plan. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Low	Ongoing	1, 3, 9	Yes-23
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. ***Lead Agency:*** Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Quality Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	2, 4, 7, 8	Yes-24
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division, Transportation Planning and Programs Division, Land Development Division) ***Funding Source:*** Public Works; County Regional Planning Department	Low	Ongoing	4, 6	Yes-25

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Transportation Planning and Programs Division) ***Funding Source:*** FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; Public Works; CEO OEM; County Regional Planning Department; County Parks and Recreation	Low	Ongoing	4, 5, 7	Yes-26
27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** County Regional Planning Department; Public Works	Low	Short term	1, 2, 3	Yes-27
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division, Stormwater Maintenance Division), Regional Planning Department ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 4, 6, 8	Yes-28
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; USC Sea Grant	Low	Long term	2, 3, 5, 10	Yes-29

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
30—Identify flood-warning systems for properties where such systems can be beneficially employed. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Sheriff's Department, Public Works (Stormwater Maintenance Division, Disaster Services Group), National Weather Service ***Funding Source:*** FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; Public Works; CEO OEM	Low	Ongoing	1, 8, 9	Yes-30
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Public Works (Disaster Services Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Medium/ Low	Long term	1, 9	Yes-31
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. ***Lead Agency:*** Public Works (Building and Safety Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 4, 8, 11	Yes-32
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** : Public Works (Stormwater Planning Division, Design Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Medium/ Low	Ongoing	1, 2, 3	Yes-33
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	1, 3	Yes-34
35—Continue County coordination with other agencies and stakeholders on issues of flood control. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 8	Yes-35

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
36—Continue to identify and assess drainage needs. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Support Agencies:*** Public Works (Stormwater Maintenance Division, Road Maintenance Division) ***Funding Source:*** Public Works	Medium/ Low	Ongoing	1, 2, 11	Yes-36
37— Pursue Building Resilient Infrastructure and Communities (BRIC) program projects that use the Community Lifeline Framework. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Planning Division, Stormwater Maintenance Division) ***Funding Source:*** Public Works; FEMA	Low	Long Term	1, 11	Yes-37
38— Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Regional Planning Department, Building and Safety Division) ***Funding Source:*** Public Works; FEMA	Low	Annually	1, 3, 11	No

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

11.3 Status of Actions from Previous Plan

All actions from the 2020 Los Angeles County Floodplain Management Plan were reviewed annually through the progress reporting protocol defined in the 2020 plan's maintenance strategy. For this update, the County reviewed the progress reports to assess the status of each action. The review determined that all actions are still relevant and feasible actions, so all have been carried over to the current update. This includes any action that had shown no progress completed in the progress reports. No actions were identified as no longer feasible.

11.4 Benefit/Cost Analysis

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

Costs ratings were defined as follows:

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

Benefit ratings were defined as follows:

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

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

For many of the strategies identified in this action plan, Los Angeles County may seek financial assistance under the FEMA Hazard Mitigation Grant Program or Hazard Mitigation Assistance programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance

from grant programs that require detailed analysis, Los Angeles County reserves the right to define "benefits" according to parameters that meet the goals and objectives of this plan

11.5 Action Plan Prioritization

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

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

Table 11-4: Prioritization of Mitigation Actions

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
1—Promote awareness of flood hazards to residents in flood hazard areas	3	Medium	Low	Yes	Yes	Yes	High	Safety & Security (SS); Food, Water Shelter (FWS)
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas.	2	Medium	Low	Yes	No	Yes	High	SS; FWS; Communication (C); Health & Medical (HM)
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures.	2	High	Low	Yes	No	Maybe	High	SS; FWS; C; HM; Energy (E); Transportation (T); Hazardous Material (HZM)
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • Annually notify owners regarding local flood hazards and proper protection activities • Provide technical advice regarding flood protection and flood preparedness • Distribute a revised questionnaire to new Repetitive Loss Properties.	4	High	Low	Yes	No	Yes	High	SS; FWS; C
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials.	2	High	Low	Yes	Yes	Yes	High	SS; FWS; C

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
6—Provide public education about maintaining the stormwater system free of debris.	2	Medium	Low	Yes	No	Yes	High	SS; FWS
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness.	5	Medium	Low	Yes	No	Yes	High	SS; FWS
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA.	3	Medium	Low	Yes	Yes	Maybe	High	SS; C
9—Provide emergency preparedness and flood protection information to the general public.	3	Medium	Low	Yes	Yes	Yes	High	SS; FWS; C
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.	3	Medium	Low	Yes	No	Yes	High	SS; FWS; C
11—Develop and maintain a list of priority maintenance-related problem sites	2	Low	Low	Yes	No	Yes	High	SS; FWS
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites	2	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management.	3	Low	Low	Yes	No	Yes	High	SS; FWS; HM
14—Evaluate LACFD storm drain, open channel, and flood retention basin facilities for future improvements Drainage infrastructure outside of the LACFCD may be covered by the Road Maintenance Division where applicable.	2	Medium	Low	Yes	No	Yes	High	SS; FWS; HM

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
15— Pursue appropriate flood hazard mitigation grant funding projects (i.e. BRIC) that use the Community Lifeline Framework, and address multiple hazards, where applicable.	2	Low	Low	Yes	No	Yes	High	SS; FWS; HM
16—Consider the conversion of high-risk properties into open space.	3	High	High	Yes	Yes	No	Medium	SS; FWS; HM
17—Refine the plan check system to track properties in the flood zone and address drainage.	4	Medium	Low	Yes	No	Maybe	Medium	SS; FWS; HM
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications	3	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit	3	Medium	Low	Yes	No	Maybe	High	SS; FWS; HM
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects, where appliable and funding is available.	3	Medium	Low	Yes	Yes	Yes	High	SS
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains.	5	Medium	High/ Medium	No	Yes	No	Medium	SS
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits.	3	Medium	Low	Yes	Yes	Yes	High	SS
23—Maintain the Operational Area Emergency Response Plan.	3	Medium	Low	Yes	Yes	Yes	High	SS; C
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution.	4	Medium	Low	Yes	No	Yes	High	SS; FWS; HM

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development.	2	Medium	Low	Yes	No	Yes	High	SS
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.	3	High	Low	Yes	Yes	Yes	High	SS; FWS; HM; E; C; T; HZM
27—Use risked-based information from the Los Angeles County Comprehensive Floodplain Management Plan and the Los Angeles County Hazard Mitigation Plan to update the Safety Element of the County's General Plan.	3	Low	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.	5	Medium	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program	4	Medium	Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; C; T; HZM
30—Identify flood-warning systems for properties where such systems can be beneficially employed	3	Medium	Low	Yes	Yes	Maybe	Medium	SS; FWS; C

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements	2	Medium	Medium / Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; C; T; HZM
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties.	4	Medium	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions.	3	Low	Medium / Low	No	No	Maybe	Medium	SS; FWS; HM; E; T; HZM
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities.	2	Medium	Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; T; HZM
35—Continue County coordination with other agencies and stakeholders on issues of flood control.	3	Low	Low	Yes	No	Yes	Medium	SS; FWS; HM; E; T; HZM
36—Continue to identify and assess drainage needs.	3	Medium	Medium / Low	Yes	Yes	Yes	High	SS; FWS
37— Pursue Building Resilient Infrastructure and Communities (BRIC) program projects that use the Community Lifeline Framework.	2	Medium	Medium	Yes	Yes	No	Medium	SS; FWS; HM; E; T; HZM
38– Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties	3	High	Low	Yes	No	Yes	High	SS, FWS, C,

11.6 Analysis of Mitigation Actions

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

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

Table 11-5 presents the results of this analysis.

Table 11-5: Analysis of Mitigation Actions

Mitigation Type	Applicable Mitigation Actions
Prevention	1, 3, 4, 5, 7, 8, 15, 17, 18, 19, 22, 23, 27, 28, 29, 31, 32, 33, 34, 35, 37
Property Protection	2, 3, 5, 11, 12, 13, 18, 19, 24, 26, 32,38
Structural Projects	11, 12, 13, 14, 15, 16, 17, 19, 20, 22, 24, 25, 26, 28, 30, 32,36
Natural Resource Protection	16, 20, 22, 21, 24, 25
Public Education and Awareness	1, 2, 3, 4, 5, 6, 8, 9, 10, 17, 18, 28, 34, 35
Emergency Services	3, 5, 9, 10, 23, 30, 31

Part 4 – Plan Maintenance

12 Plan Adoption

This chapter documents the formal adoption of the Los Angeles County Comprehensive Floodplain Management Plan by the Los Angeles County Board of Supervisors (CRS Step 9). Prior to adoption, the plan is being submitted for a pre-adoption review to the ISO. Once pre-adoption approval is provided, Los Angeles County will formally adopt the plan. A copy of the resolution will be provided on the following pages once available.

<Insert Resolution Here>

13 Plan Maintenance Strategy

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

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

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

13.1 Implementing the Plan

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

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

13.2 Monitoring, Evaluating, and Updating the Plan

13.2.1 Floodplain Management Committee (Formerly Steering Committee)

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

The principal role of a Floodplain Management Committee in this plan maintenance strategy will be to meet to review the annual progress report and provide input to the Los Angeles County Public Works Stormwater Engineering Division on possible enhancements to be considered at the next update. Future plan updates will be overseen by a Floodplain Management Committee similar to the one that participated in this plan development process, so keeping an interim Floodplain Management Committee intact will provide a head start for future updates. It will be the new Floodplain Management Committee's role to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

13.2.2 Annual Progress Report

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

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

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

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

Annual progress reporting is credited under CRS Step 10.

13.2.3 Plan Update

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

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

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

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

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

13.3 Maintaining Public Involvement

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

13.4 Incorporating the Plan Into Other Mechanisms

Los Angeles County, through adoption of a general plan and zoning ordinance, has planned for the impacts of flooding. The floodplain management plan development process provided the opportunity to review and expand on policies in these planning mechanisms. The Los Angeles County General Plan and the Floodplain Management Plan are complementary documents that work together to achieve the goal of reducing risk exposure. Los Angeles County has created a linkage between the Floodplain Management Plan and the General Plan by identifying a mitigation action as such and giving that action a high priority. Other planning processes and programs to be coordinated with the recommendations of the Floodplain Management Plan include the following:

- Local All-Hazards Mitigation Plan
- Emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments

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

14 Program for Public Information

The CRS describes a PPI as an ongoing local effort to identify, prepare, implement, and monitor a range of public information activities that meet specific local needs. The CRS awards credit for implementing public outreach projects that are identified in a PPI. Los Angeles County elected to incorporate a PPI into this update, using the seven-step planning process required by CRS:

- Step 1. Establish a committee
- Step 2. Assess the community's public information needs
- Step 3. Formulate messages
- Step 4. Identify outreach projects to convey the messages
- Step 5. Examine other public information initiatives
- Step 6. Prepare a PPI document
- Step 7. Implement, monitor and evaluate the PPI.

By integrating the PPI into the 2025 Comprehensive Floodplain Management Plan update, the County can monitor the progress of both programs simultaneously, thus reducing unnecessary redundancy in County programs. This chapter describes the PPI process used by the Los Angeles County planning team during this update.

14.1 Step 1: The PPI Committee

The planning team for the 2025 Comprehensive Floodplain Management Plan update established a PPI Committee by soliciting volunteers and referrals from the Floodplain Management Plan Committee and from Los Angeles County Public Works staff.

The PPI Committee is a strong team able to identify and evaluate a comprehensive range of activities for flood-related outreach in the planning area. Three members are representatives from Los Angeles County Public Works, and three are community representatives who live and/or work in unincorporated communities affected by flood hazards. PPI committee members are listed in Table 14-1. The PPI committee meets the requirements set forth by CRS.

The committee met four times between May 2024 through January 2025 to discuss and develop the PPI. The committee met remotely through an online platform on the following dates, meeting summaries are available in Appendix C.

- Meeting 1 – August 21, 2024
- Meeting 2 – September 17, 2024
- Meeting 3 – November 19, 2024
- Meeting 4 – January 15, 2024

Table 14-1: PPI Committee Members

Name	Affiliation
Patricia Wood	Los Angeles County Public Works Stormwater Engineering – CRS Coordinator
Kari Eskridge	Los Angeles County Public Works Community Service and Government Relations Group
Nam Doan	Los Angeles County Public Works Community Service and Government Relations Group
Shannon Ggem	Malibou Lake Mountain Club
Erica Frausto-Aguado	Red Cross of Greater Los Angeles
Debbie Sharpton	Environmental Restoration Group

14.2 Step 2: Assess the Community's Public Information Needs

According to Activity 330 under the CRS program, before a community can develop a local program for raising public awareness about flood-related issues, the PPI committee needs to assess the flood problems in the community, identify those who need to be informed about these flood problems, and determine what projects are underway. The following sections describe the PPI committee's assessments of these factors.

14.2.1 Identify the Target Areas

Using information from the 2025 Los Angeles County Comprehensive Floodplain Management Plan update, the PPI committee identified target areas for flood problems in unincorporated Los Angeles County through the following activities:

- Review of the risk assessment presented in Chapters 6 through 8 of this plan
- Review of the Repetitive Loss Areas Analysis conducted as a companion process to the Comprehensive Floodplain Management Plan development
- Discussion among PPI committee members.

The sections below describe the three identified target areas.

FEMA-Designated Floodplains

The Los Angeles County FIRMs and issued Letters of Map Change (LOMCs) are FEMA's official delineation of SFHAs for Los Angeles County. Identified SFHAs include shallow flooding, floodways, alluvial fans, and coastal areas. The FIRMs drew upon the following information:

- Statistical analysis of recorded river flow, storm tides, and rainfall
- Information from the County of Los Angeles and the Los Angeles County Flood Control District
- Information from individual property owners for Letters of Map Amendment on their properties
- Floodplain topographic surveys

- Hydrologic and hydraulic analyses.

The FEMA-designated floodplain mapping focused on the mapped 100-year floodplain (SFHA). FEMA's mapped flood zones for the County are shown on maps provided in Appendix F. Chapter 7 of this document further discusses the structures in the floodplain.

County Floodplains and Floodways

The County also considers floodplains and floodways associated with the County's Capital Flood, which is the flood produced by a 50-year frequency rainfall falling on a saturated watershed; where the watershed is undeveloped and the effect of burned conditions is also factored in. The County floodway is an area within the County floodplain where floodwaters during a Capital Flood are deepest and fastest moving. Its hazardous nature requires that development in this area be carefully managed. The floodway must remain free of obstruction and construction unless engineering analysis demonstrates that the flood hazard on adjoining properties will not be increased. Ideally, development in the floodway should be restricted to uses that do not interrupt or excessively accelerate the natural flow of the water (e.g., tennis courts, swimming pools, fences that pass and not fail under the Capital Flood flow). The Los Angeles County Department of Public Works' Capital Flood Protection requirements apply to all unincorporated areas mapped as County floodplains and floodways.

The limits of the County floodway are defined as the point where the velocity of flood flow is 10 feet per second, or the water surface elevation is 1 foot above the Capital floodplain water surface elevation. The first of either criterion reached controls the floodway width. Where the flow velocity exceeds 10 feet per second for the entire width of the floodplain, the floodplain lines and floodway lines are the same. Los Angeles County Public Works' Capital Flood Protection requirements apply to all unincorporated areas mapped as County floodways.

The County's mapped capital floodplains and floodways are shown in Appendix F. Chapter 7 of this document further discusses the structures in the floodplains and floodways.

Repetitive Loss Areas

A repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the NFIP within any given 10-year period since 1978. Repetitive loss areas include these repetitive loss properties and nearby properties with similar flooding conditions. As of this plan's development, there are 55 FEMA-identified repetitive loss properties in the unincorporated areas of Los Angeles County. Forty-nine (49) One repetitive loss properties on the 2023 FEMA list were also FEMA-designated repetitive loss properties identified in the 2020 FEMA list. One repetitive loss property (RL#74498) was not included in the 2023 list but was on the 2020 FEMA list and included in the total 55 properties. Five new repetitive loss properties were added to the 2023 FEMA list. In 2020, 24 repetitive loss areas were described. In this update, four new repetitive loss areas were created based on the locations of four of the five new properties. One of the new repetitive loss properties is located within a previously designated repetitive loss area and did not required modification of this area. Seven repetitive loss properties have been requested to be re-classified through the submittal of the AW-501 form to FEMA. Information on flood

conditions in these areas can be found in the Los Angeles County Repetitive Loss Area Analysis in Appendix I.

Gaps in the Maps

In unincorporated areas of the County, many stream segments do not intersect with FEMA or County-mapped floodplains. The Hazus modeling conducted for the Flood Hazard Exposure (See Part 2 Section 7) identifies these steam segments and runs a real storm event through those streams to determine a flood boundary. The number of impacted structures reported in Part 2 Section 7 includes these modeled flood boundaries.

14.2.2 Identify Target Audiences

After identifying the target areas, the PPI committee brainstormed and identified the following target audiences that need to be informed of flood hazards within the planning area. The target audiences built upon those mentioned in the previous 2020 Comprehensive Floodplain Management Plan.

- Alluvial plain communities
- Areas where there are significant instances of illegal dumping into storm drains, channels, and flood control basins
- Countywide
- Critical facility operators in the regulated floodplains
- Environmental consultants/building contractors or others involved in the permitting process
- Homeowners applying for permits
- Homeowners who do not have a mortgage
- Motorists
- People who are camping/residing in channels and streams outside designated state camping areas
- People/children who hike or bike through channels and streams
- Property owners near recently burned areas
- Real estate agents, lenders and insurance agents
- Realtors and brokers
- Renters in flood-prone areas
- Residents, property owners and businesses in mapped repetitive loss areas
- Residents, property owners and businesses in regulated floodplains
- Residents, property owners and businesses in repetitive loss areas
- Residents, property owners and businesses near recently burned areas
- Residents, property owners, and businesses in the Special Flood Hazard Area (‘100-year floodplain”)
- Residents, property owners, and businesses near natural water formations that could potentially flood or have in the past
- School Districts
- Those located in gap areas on properties identified by maps

Specific outreach projects will not be identified for all target audiences in the first year of the implementation of the PPI, but all are included to inform the annual review and update of the PPI.

14.2.3 Inventory of Other Public Information Efforts

A list of what County departments and other stakeholders in the planning area are already doing for flood-related public information efforts, can be found in Table 14-2.

Table 14-2: Public Information Efforts

Organization	Effort	Notes	Frequency
Los Angeles County Department of Public Works	Public Works Website: dpw.lacounty.gov/	Offer relevant resources and information	Year-round
	Public Works YouTube Channel: youtube.com/@LAPublicWorks		Year-round
	Social Media. Public Works maintains active accounts on Facebook, Instagram, X.		Year-round
	"The Works" mobile app https://pw.lacounty.gov/theworks/	Provides critical services, news, and easy access to reporting.	Year-round
	"Are You Prepared for a Flood?" brochure to properties with structures in a flood zone	Flood readiness and resources	Annually
	Letter to insurance agents and mortgage lenders regarding flood zone determinations, elevation certificates, and other information	Flood-risk awareness	Annually
	Letter with resources on flood protection and retrofitting of structures to property owners	Flood readiness resource for repetitive loss areas	Annually
	Flood protection information available at all County libraries and other facilities	Flood readiness and resources	Year-round
	In-person post fire consultations and assessments	Flood preparedness resource	Available after fires upon request
	Press release	Topics may include flood risk, preparedness, mud-flow advice, and flood insurance	Before, during, or after a flood-related event

	County NFIP Website: pw.lacounty.gov/wmd/nfip/	Website provides information and direct links to information that is credited under the web element of CRS Activity 350 (see Figure 14-1)	Year-round
Los Angeles County Chief Executive Office	Office of Emergency Management. lacounty.gov/emergency/	Outreach for all hazards preparation through the Emergency Survival Program, expos, public venues, and presentations.	Year-round
	Ready LA Website: ready.lacounty.gov/	Emergency readiness and resources	Year-round
	On X as @LACountyCEO		Year-round
	LA County Recovers website: c	Site dedicated to recovery following events within LA County.	Year-round
Los Angeles County Sheriff's Department	AlertLA: ready.lacounty.gov/emergency-notifications/	Emergency mass notification system using recorded phone messages, text messages, and emails.	Year-round
	On X as @LASDHQ	Emergency resources	Year-round
Los Angeles County Department of Parks and Recreation	Social media. Active accounts on Facebook, Instagram, and X as @lacountyparks.	Emergency response services – shelter.	Year-round
	Website: parks.lacounty.gov		Year-round
Los Angeles Homeless Services Authority	Coordinated Entry System: lahsa.org/ces/	Engage people experiencing homelessness in high-danger areas – may include flood-risk zones.	Year-round

14.3 Step 3: Formulate Messages

CRS identifies six priority floodplain management topics that should be addressed by messages developed and implemented in the PPI. The PPI committee decided to keep an additional topic proposed during the previous plan development which relates to general community preparedness, to meet the needs of local communities and target audiences. The seven topics are as follows:

- Know your flood hazard.
- Insure your property against your flood hazard.
- Protect people from the hazard.
- Protect your property from the hazard.

- Build responsibly.
- Protect natural floodplain functions.
- General preparedness (previous topics chosen to remain in 2025 update).

Using the information developed in Step 2, the PPI committee identified messages for each of the topic areas to meet the needs of the community, as shown in Table 14-3.

Table 14-3: Priority Topics and Messages

Topic	Message
Know Your Flood Zone	Know Your Flood Zone
	You Are in a Repetitive Flood Area
Insure Your Property for Your Flood Hazard	You Need Flood Insurance
	Renters Can Buy Flood Insurance
Protect People from The Hazard	Avoid Swift Water!
	Turn around, don't drown
	Be aware of hazardous road conditions
	Do not camp or reside in waterways
Protect Your Property from The Hazard	Need Advice for Protecting Your Property from Flood Hazards After Fires? Please Call Us or Visit Our Website.
	Sandbags Available
	Consider Where You Park During a Storm
	Don't Block the Flows
	Secure Your Belongings
Build Responsibly	A Little Investment Now Could Save You Money Later
Protect Natural Floodplain Functions	No Dumping
	Streams Move
	Give Water Room
General Preparedness	Sign Up for Alert LA County
	Develop a Family Disaster Plan
	Know Your Risk
	Be Aware #LARain is coming

14.4 Step 4: Identify Outreach Projects to Convey the Messages

After the audiences and messages were agreed upon, the PPI committee developed projects to convey each message. These projects and their timing are shown in Table 14-4. Projects have been identified for the next performance period for the PPI.

Table 14-4: Outreach Projects

Outreach Projects	Schedule
Los Angeles County Department of Public Works	
Community outreach to gather input on planning and design of projects	When grant funding and projects become available; Reviewed annually
Distribute informational booklets to Library patrons and other public/ community LA County facilities	Year-round
Drains to Ocean signage/No Dumping signage	Year-round
In-person post-fire consultations and assessments from engineers	Available after fires upon request
Link "Are You Prepared for a Flood?" Booklet on Public Works' NFIP website	Once shared, available year-round
Link illegal dumping, resource on Public Works' NFIP website	Once shared, available year-round
Mail "Are You Prepared for a Flood?" booklet to target audiences	Annually prior to rainy season; October
Mailer/ letters sent to brokers	Annually
Mailing(s) to repetitive loss area properties	Annually in October
Mailings to renters in the Special Flood Hazard Areas.	Annually in October
Maintain Flood Zone Determination website	Annually
Multilingual Community-Specific Videos that reflect the community's unique characteristics	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability
Notice of map information services pursuant to Activity 320 publicity requirements to local realtors/ lenders/ insurance agents	Annually in October
Promote Public Works' NFIP website link (see Figure 14-2): pw.lacounty.gov/wmd/nfip/	Year-round
Promote videos on YouTube channel: youtube.com/@LAPublicWorks	Year-round
Share brochures at local Associations of Realtors offices	Year-round; Once posted on associations' website, permanent resource
Share Frequently Asked Questions (FAQs) on Public Works' NFIP website	Year-round
Share link Water for LA County website. waterforla.lacounty.gov/flood-preparedness/	Year-round
Share Public Works' Homeowners Guide: pw.lacounty.gov/landing/em/docs/HOMEOWNERSGUIDE.pdf	Year-round

Outreach Projects	Schedule
Los Angeles County Department of Public Works	
Share social media campaign(s), message(s), or reminder(s). Public Works maintains active accounts on Facebook, Instagram, X.	Year-round
Social media post(s) for “Are You Prepared for a Flood?” booklet	Annually prior to rainy season in October and year-round
CEO Office of Emergency Management	
Promote Alert LA County: https://ready.lacounty.gov/emergency-notifications/	Year-round
Promote Ready LA County website: ready.lacounty.gov	Year-round
Share Alert LA County Brochure	Year-round
Los Angeles County Department of Regional Planning	
Bring awareness to building and development standards in County code	Year-round
Los Angeles Homeless Services Authority	
Targeted outreach prior to flood season or major storms	Year-round



Figure 14-1: Los Angeles County Public Works Flood Information Website

14.4.1 Flood Response Preparation

Section 332.b of the 2017 CRS Coordinators Manual provides credit for having a pre-flood plan for public information activities ready for the next flood. Credits are available for developing a pre-flood plan for public information projects that will be implemented during and after a flood. A Flood Response Preparations (FRP) package is a collection of outreach projects prepared in advance, but not delivered until a flood occurs. These materials may include templates and masters of handouts, mailers, press releases, etc. that cover key messages that need to be disseminated before, during, and after a flood. The package must include both the materials that will be needed and the procedures for how they will be used.

During the development of this PPI, the PPI Committee reviewed current projects and identified additional projects that could be deployed as part of a flood response. Table 14-5 identifies which of the PPI projects would be deployed by the County as part of a flood response. The table also includes the messaging that would be promoted as part of the response package.

Table 14-5: PPI Implementation Plan

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
Topic 1: Know Your Flood Zone						
Know Your Flood Zone	• Residents, property owners and businesses in the regulated floodplains • Renters in flood-prone areas • Critical facility operators in the regulated floodplains • Real estate agents, lenders and insurance agents	• Increase in hits to Public Works' Flood Zone Determination website pw.lacounty.gov/floodzone/	Mailing of outreach booklet "Are You Prepared for a Flood?" to target audiences	Public Works	Annually prior to rainy season; October	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
			Link on Water for LA County website. waterforla.lacounty.gov/flood-preparedness/	Public Works	Year-round	No
			Social media post for "Are You Prepared for a Flood?" booklet	Public Works	Annually prior to rainy season; October, Year-round	No
			Annual notice of map information services pursuant to Activity 320 publicity requirements to local Realtors/ lenders/ insurance agents	Public Works	Annually, October	No

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
You Are in a Repetitive Flood Area	• Residents, property owners and businesses in mapped repetitive loss areas	• Increase in inquiries to Public Works regarding flood hazards from repetitive loss property owners • Property owners implementing temporary or permanent flood mitigation projects • Increased demand for sandbags during the storm season	Annual mailing to repetitive loss area properties	Public Works	Annually, October	No
Topic 2: Insure Your Property for Your Flood Hazard						
You Need Flood Insurance	• Residents, property owners, and businesses in the Special Flood Hazard Area (‘100-year floodplain”) • Homeowners who do not have a mortgage • Realtors and brokers	• Increase in flood insurance policy holders in the Special Flood Hazard Area (‘100-year floodplain”) • Annual CRS Report • Requests for information from the public	Mailings to property owners in the flood zone and repetitive loss areas.	Public Works	Annually, October	No
			Multilingual Community-Specific Videos that reflect the community’s unique characteristics	Public Works	Developed during rainy season, posted on Public Works’ NFIP website and YouTube channel for year-round availability	No
			Mailer/ letters sent to brokers	Public Works	Annually	No
			Brochures at local Associations of Realtors offices	Public Works; Community organizations	Year-round outreach; Once posted on associations’ website, permanent resource	No

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
			Promote Public Works' NFIP website link	Public Works; Community organizations	Year-round outreach; Once posted on organizations website, permanent resource	No
			Link on Water for LA County website. waterforla.lacounty.gov /flood-preparedness/	Public Works	Year-round	No
			Social media campaign	Public Works	Year-round	No
Renters Can Buy Flood Insurance	• Renters in flood-prone areas • Realtors	• Increase in flood insurance purchase by renters in the Special Flood Hazard Area ('100-year floodplain")	Mailings to renters in the Special Flood Hazard Areas.	Public Works	Annually, October	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
			Social media campaign	Public Works	Year-round	No
Topic 3: Protect People from The Hazard						
Avoid Swift Water!	• People/children who hike or bike through channels and streams • People who are camping/residing in channels and streams • Alluvial plain communities	• Decrease in swift water rescues • Decrease in observed camping/residing in the channels and streams	YouTube videos	Public Works	Year-round on YouTube	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
			Social media reminder	Public Works	Prior to and during rainy season, and during a flood response	Yes
Turn around, don't drown	• Motorists	• Decrease in swift water rescues	Social media reminder	Public Works	Prior to and during rainy season and during a flood response	Yes
Be aware of hazardous	• Motorists	• Increase in hits to Los Angeles	Social media reminder	Public Works	Prior to and during rainy season and during a flood response	Yes

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
road conditions		County's road closure website pw.lacounty.gov/roadclosures/ • Decrease in swift water rescues	Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
Do not camp or reside in waterways	• People who are camping/residing in channels and streams • People who are camping/residing in channels and streams outside designated state camping areas	• Decrease in swift water rescues • Decrease in observed camping/residing in the channels and streams	Targeted outreach prior to flood season or major storms	LAHSA; Public Works	Year-round	No
Topic 4: Protect Your Property from The Hazard						
Need Advice for Protecting Your Property from Flood Hazards After Fires? Please Call Us or Visit Our Website.	• Residents, property owners and businesses in regulated floodplains • Residents, property owners and businesses in repetitive loss areas • Environmental consultants/building contractors or others	• Increase in requests for assistance/advice. https://pw.lacounty.gov/explore-public-works/fire-disaster-information/p	YouTube Video	Public Works	Available year-round online	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
			In-person post-fire consultations and assessments from engineers	Public Works	Available after fires upon request	No
			Social media reminder	Public Works	Prior to and during rainy season and during a flood response	Yes

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
	involved in the permitting process • Those located in gap areas on properties identified by maps • Property owners near recently burned areas		Distribute mailer to affected properties.	Public Works	Prior to and during rainy season and as needed.	No
Sandbags Available	• Residents, property owners and businesses near recently burned areas • Residents, property owners and businesses in regulated floodplains • Residents, property owners and businesses in repetitive loss areas	• Increase in demand for sandbags during the storm season pw.lacounty.gov/dsg/sandbags/	Social media message	Public Works	Prior to and during rainy season and during a flood response	Yes
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
Consider Where You Park During a Storm	• Residents • Motorists	• Increase awareness of proper precautions to keeping flow paths clear: https://pw.lacounty.gov/wmd/NFIP/documents/AreYouPreparedforaFlood.pdf • Decrease damage to personal property	Mailing of outreach booklet "Are You Prepared for a Flood?" to target audiences	Public Works	Prior to and during rainy season and during a flood response	No
			Social media reminder	Public Works	Prior to and during rainy season and during a flood response	Yes

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
Don't Block the Flows	• Residents, property owners, and businesses near natural water formations that could potentially flood or have in the past	• Increase in awareness of keeping flow paths clear in the surrounding natural environment: https://pw.lacounty.gov/wmd/NFIP/documents/AreYouPreparedforaFlood.pdf • Decrease damage to personal property	Building and development standards in County code	Public Works and Regional Planning	Year-round	Yes
			Frequently Asked Questions (FAQs) on Public Works' NFIP website	Public Works	Available year-round, update as needed	No
			Mailing of outreach booklet "Are You Prepared for a Flood?" to target audiences	Public Works	Prior to and during rainy season and during a flood response	No
			Public Works' Homeowners Guide: https://pw.lacounty.gov/landing/em/docs/HOMEOWNERSGUIDE.pdf	Public Works	Year-round	No
Secure Your Belongings	• Residents, property owners, and businesses in regulated floodplains • Residents, property owners and businesses in repetitive loss areas	• Increase awareness of proper precautions • Decrease damage to personal and private property	Public Works' NFIP website (Links to FEMA fact sheets)	Public Works	Available year-round	No
			Frequently Asked Questions (FAQs) on Public Works' NFIP website	Public Works	Available year-round, update as needed	No
			Mailing of outreach booklet "Are You Prepared for a Flood?" to target audiences	Public Works	Annually prior to rainy season; October	No
			Social media post for "Are You Prepared for a Flood?" brochure	Public Works	Annually prior to rainy season; October, Year-round	No
			"Are You Prepared for a Flood?" booklet linked on Public Works' NFIP website	Public Works	Year-round	No
Topic 5: Build Responsibly						
A Little Investment Now Could Save You Money Later	• Environmental consultants/building contractors or others involved in the permitting process • Homeowners applying for permits	• Increase in protection of structures	Promote on social media and Public Works' NFIP website	Public Works	Year- round; Revisions to website by October	No
			Distribute informational booklets to Library patrons and other public/ community LA County facilities	Public Works	Year-round	No
Topic 6: Protect Natural Floodplain Functions						

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
No Dumping	• Countywide • Areas where there are significant instances of illegal dumping into storm drains, channels, and flood control basins	• Reduction of illegal dumping instances	Drains to Ocean signage/No Dumping signage	Public Works	Signs posted year-round at LACFCD facilities	No
			Link illegal dumping, resource on Public Works' NFIP website	Public Works – Environmental Programs Division	Available year-round	No
			YouTube Video	Public Works	Available year round online	No
Streams Move	• Alluvial plain communities	• Increase in awareness of surrounding natural environment • Decrease damage to personal property	Frequently Asked Questions (FAQs) on Public Works' NFIP website	Public Works	Available year-round	No
Give Water Room	• Countywide • Residents, property owners and businesses in regulated floodplains	• Increase in the number of projects which incorporate watershed ecosystem restoration	Community outreach to gather input on planning and design of projects	Public Works	When grant funding and projects become available; reviewed annually	No
Topic 7: General Preparedness						
Sign Up for Alert LA County	• Countywide • Residents, property owners and businesses in the regulated floodplains • School Districts	• Increase in number of residents that register their mobile number for Alert LA County. ready.lacounty.gov/emergency-notifications/	Promote Alert LA County on County Websites.	Public Works; Sheriff, CEO OEM	Available online year-round	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
			Provide Alert LA County Brochure	CEO OEM	Available online year-round	No
			Promote on social media	Public Works	Annually	No
			Promote Alert LA County on County Websites.	Public Works; Sheriff; CEO OEM	Available online year-round	No
Develop a Family Disaster Plan	• Countywide • Residents, property owners and businesses in the regulated floodplains • School Districts	• Increase preparedness by residents • Increase hits to websites ready.lacounty.gov and waterforla.lacounty.gov	Promote on social media and Ready LA County website. ready.lacounty.gov	Public Works; CEO Office of Emergency Management	Quarterly; During rainy season and during a flood response	Yes
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
Know Your Risk	• Countywide • Residents, property owners and businesses in the regulated floodplains • School Districts	• Increased visits to Public Works' NFIP website pw.lacounty.gov/wmd/nfip/ and Flood Zone Determination Website pw.lacounty.gov/floodzone/	Mailer to all properties with structure in the floodplain.	Public Works	Annual mailing; October	No
			Multilingual Community-Specific Videos that reflect the community's unique characteristics	Public Works	Developed during rainy season, posted on Public Works' NFIP website and YouTube channel for year-round availability	No
			Maintain Flood Zone Determination website	Public Works	Annually	No
			Promote on social media	Public Works	Annually	No

Message	Target Audiences	Outcomes	Projects	Role	Schedule	FRP
Be Aware, #LARain is coming	• Countywide • Residents, property owners and businesses in the regulated floodplains • School Districts	• Increased awareness of incoming storms	Social media reminder	Public Works; National Weather Service Los Angeles	During rainy season and during a flood response	Yes

14.5 Step 5: Examine Other Public Information Initiatives

In this step, the PPI committee reviewed and considered other activities for which Los Angeles County is currently receiving credit under the CRS program. In order to build upon, rather than duplicate, what County departments and other stakeholders in the planning area are already doing for flood-related outreach, the planning team reviewed and revised a list of other public information efforts in the County (see Table 14-2).

14.5.1 Website

The cornerstone for Los Angeles County's PPI is a robust website (see Figure Table 14-2) that provides the public direct access to a suite of floodplain management information that is credited under the web element of CRS Activity 350 (Flood Protection Information). The creditable content accessible on this website includes:

- Multi-lingual presentations about flood risks in certain unincorporated Los Angeles County communities (pw.lacounty.gov/wmd/NFIP/CFRP/)
- Information on the NFIP (https://pw.lacounty.gov/WMD/NFIP/)
- Access to the Los Angeles County FIRMs as well as a listing of recent FEMA Map Revisions (pw.lacounty.gov/wmd/NFIP/FIRM.aspx).
- Direct link access to the County flood zone information website (pw.lacounty.gov/floodzone/)
- Resources, including a FAQ and presentation, from a National Flood Insurance Program Overview Workshop (pw.lacounty.gov/wmd/NFIP/Workshop/)
- Information about a new equitable FEMA approach called Risk Rating 2.0 (pw.lacounty.gov/wmd/NFIP/Risk-Rating/)
- Information on FEMA elevation certificates and access to available completed certificates in the unincorporated areas of Los Angeles County (pw.lacounty.gov/wmd/NFIP/EC/)
- Information on "Letters of Map Change" and access to the FEMA Map Service Center (pw.lacounty.gov/Wmd/NFIP/LOMC/)
- Context, references and resources regarding the "Kagel Canyon Letter of Map Revision" (pw.lacounty.gov/wmd/NFIP/KagelLOMR.aspx)
- Information on the Community Rating System (https://pw.lacounty.gov/Wmd/NFIP/CRS/)
- Information on the public outreach the County conducts as part of the PPI (pw.lacounty.gov/wmd/NFIP/FMP2025/POP.aspx)
- Information on the previous 2020 Los Angeles County Comprehensive Floodplain Management Plan (pw.lacounty.gov/wmd/NFIP/FMP/)
- Links to other relevant sites with important flood hazard information (pw.lacounty.gov/Wmd/NFIP/ResourcesLinks/)
- Information about County floodway maps and revisions (pw.lacounty.gov/wmd/NFIP/CountyFloodwayMapRevisions.aspx)
- A resources tab that links to other outreach projects conducted annually by Los Angeles County. (pw.lacounty.gov/wmd/NFIP/ResourcesLinks/)

The CRS provides credit for providing public access to important information via a jurisdiction-sponsored and maintained website under CRS activity 350, the WEB element. Los Angeles County is currently receiving credit for the web element under its CRS program. This website is a key point of distribution and access for the outreach activities identified in this PPI. This website was reviewed by the planning team during the plan update process, all content has been confirmed, and all links are active. The PPI committee was able to review the content of the website via its review of this PPI document.

14.6 Step 6: Prepare the PPI Document

The planning team prepared the PPI document for inclusion as a chapter in the 2025 Comprehensive Floodplain Management Plan Update. The Plan document was reviewed by the PPI Committee as well as the Floodplain Management Committee overseeing the development of the 2025 Comprehensive Floodplain Management Plan.

14.7 Step 7: Implement, Monitor and Evaluate the PPI

The PPI outlines public outreach over a one-year time span. A critical element for its ongoing use is the process for implementing, monitoring and evaluating the PPI. Implementation details are included in Table 14-5. County staff will collect data on project implementation over the course of the public information year in order to evaluate progress and to suggest changes to the PPI framework to the PPI Committee.

The PPI implementation and evaluation schedule will correspond with the rainy season in Los Angeles County. The public information year will begin on October 1 of each year and the annual review will be conducted prior to October 1 of each year, likely during the dry summer months. The PPI evaluation will be coordinated by County Public Works' Stormwater Engineering Division staff. The staff will inform the PPI committee about implementation progress and will suggest changes to the PPI framework. Table 14-5 will form the basis of this review and discussion, with additional columns to be added allowing staff to report on the following items:

- The target audiences, the messages, and the desired outcomes
- The projects in the PPI used to convey the messages
- Which projects were implemented
- Why some projects were not implemented
- What progress was made toward the desired outcomes
- What should be changed.

The PPI committee will review progress and discuss and approve suggested changes. The results of this discussion will be compiled into an annual evaluation report to the Los Angeles County Chief Executive Office and included in the County's annual CRS recertification. This report will be reviewed and approved by the PPI committee to ensure consistency with discussion and changes determined during the annual PPI evaluation. In addition to the annual evaluation report, the PPI committee meeting summary and any other materials documenting PPI committee member participation in the evaluation will be submitted to the ISO, the FEMA contractor which reviews CRS activities.

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APPENDIX A – CRS GUIDELINES FOR FLOOD PLANNING



OMB No. 1660-0022
Expires: March 31, 2020

National Flood Insurance Program
Community Rating System

Coordinator's Manual (Excerpts)

FIA-15/2017

FEMA

510 FLOODPLAIN MANAGEMENT PLANNING—Summary

Maximum credit: 622 points

512 Elements

a. **Floodplain management planning (FMP)**: 382 points for a community-wide floodplain management plan that follows a 10-step planning process:

   Step 1. Organize
   Step 2. Involve the public
   Step 3. Coordinate
   Step 4. Assess the hazard
   Step 5. Assess the problem
   Step 6. Set goals
   Step 7. Review possible activities
   Step 8. Draft an action plan
   Step 9. Adopt the plan
   Step 10. Implement, evaluate, revise.

b. **Repetitive loss area analysis (RLAA)**: 140 points for a detailed mitigation plan for a repetitive loss area.

c. **Natural floodplain functions plan (NFP)**: 100 points for adopting plans that protect one or more natural functions within the community's Special Flood Hazard Area.

Credit Criteria

Each element has a separate section discussing credit criteria.

Impact Adjustment

The impact adjustments for FMP and RLAA are described in separate sections. There is no impact adjustment for NFP.

Documentation Provided by the Community

Each element has a separate section describing needed documentation.

510 FLOODPLAIN MANAGEMENT PLANNING

The OBJECTIVE of this activity is to credit the production of an overall strategy of programs, projects, and measures that will reduce the adverse impact of the hazard on the community and help meet other community needs.

511 Background

Too often flood protection decisions are made quickly, with inadequate or outdated information or without considering all possible mitigation alternatives or the consequences of those alternatives. As a result, the community's resources are not allocated most appropriately, flood problems may not be fully addressed, and natural floodplain functions may suffer.

To remedy this situation, a careful, systematic process of planning is recommended, and may be credited by this activity. The Community Rating System (CRS) does not specify what activities a plan must recommend; rather, it recognizes plans that have been prepared according to the standard planning process explained in this activity.

Benefits: A well-prepared plan will

- Identify existing and future flood-related hazards and their causes;
- Ensure that a comprehensive review of all possible activities and mitigation measures is conducted so that the most appropriate solutions will be implemented to address the hazard;
- Ensure that the recommended activities meet the goals and objectives of the community, are in coordination with land use and comprehensive planning, do not create conflicts with other activities, and are coordinated so that the costs of implementing individual activities are reduced;
- Ensure that the criteria used in community land use and development programs account for the hazards faced by existing and new development;
- Educate residents and property owners about the hazards, loss reduction measures, and the natural and beneficial functions of floodplains;
- Build public and political support for activities and projects that prevent new problems, reduce losses, and protect the natural and beneficial functions of floodplains; and
- Build a constituency that wants to see the plan's recommendations implemented.

Types of plans: This activity credits three kinds of plans:

- Floodplain management planning (FMP): The most credit is for the first element, a community-wide floodplain management plan, but the element can also credit multi-hazard mitigation plans, multi-jurisdictional floodplain management and hazard mitigation plans, and floodplain management plans prepared for the U.S. Army Corps of Engineers. Only one plan may receive credit under this element, and plans may not

be combined as appendices or credited by virtue of internal reference to another plan, because this element credits the process as well as the content of the planning document.

- Repetitive loss area analyses (RLAA): The second element credits more detailed, site-specific plans to reduce flood losses in repetitively flooded areas. It has a narrower scope than a floodplain management plan, and receives fewer credit points.
- Natural floodplain functions plan (NFP): The third element provides credit for plans that address natural floodplain functions in the community.

A Category C repetitive loss community (defined in Section 502) must prepare either a FMP or RLAA area analysis that covers at least all of its repetitive loss areas.

Implementation: Credit is not provided for simply preparing a plan. Continued credit is dependent upon plan implementation. To maintain the credit for Activity 510, every year the community must evaluate its progress toward implementing the projects and programs in the plan, area analysis, or natural floodplain functions plan, and submit a report of that evaluation with its annual CRS recertification. It must update the background information and the recommendations in its floodplain management plans and repetitive loss area analyses at least every five years and in its natural floodplain functions plan(s) every 10 years.

By their very nature as overall guidance for a community's program, plans should be coordinated with other plans and programs as well as the activities of other agencies or offices that have authority over the same area. It is recommended that communities also contact state and regional offices and agencies to review their plans and planning criteria. For example, state planning agencies have requirements for some kinds of plans and state emergency management agencies may have additional elements they would like to see included in a mitigation plan.

NOTE: An ordinance is NOT a plan. *An ordinance sets standards for land development and other activities. Planning may include a review of land development standards and procedures, but it should also cover a much broader range of activities, as noted in Figure 510-4.*

Class 9 Prerequisite: A Category C repetitive loss community (see Section 502) must receive credit under EITHER Section 512.a, floodplain management planning (FMP), with full credit in planning Step 5(c) OR Section 512.b, repetitive loss area analysis (RLAA), with a plan that covers its repetitive loss areas.

512 Elements

512.a. Floodplain management planning (FMP)

The maximum credit for this element is 382 points.

FMP credit is provided for a community-wide floodplain management plan that was prepared by following a standard planning process. To receive any credit under this activity, the planning process must receive some credit under each of the 10 steps listed below. If the plan was approved by the Federal Emergency Management Agency (FEMA) as a multi-hazard mitigation plan and one step is missing, the mitigation plan may receive credit, but FMP credit will be limited to 50 points. If two steps are missing, there is no credit for a multi-hazard mitigation plan.

For some steps, such as Step 1, the community may show that it implemented at least one of the listed credit items. For other steps, specific items are required as a minimum. Required items are noted with "(REQUIRED)" after them.

FEMA's multi-hazard mitigation planning regulations pursuant to the Disaster Mitigation Act of 2000 are explained at www.fema.gov/plan/mitplanning. The 10-step CRS planning process is consistent with those regulations, which identify four phases of hazard mitigation planning. The 10 CRS steps are aligned with the four phases of mitigation planning requirements in Table 510-1.

The CRS-credited planning process must follow the 10 steps. Although the plan document must discuss and document all 10 steps, the written plan does not need to be organized by these 10 steps. To document CRS credit, the community must identify where these steps were covered in its plan, using the CRS planning credit activity checklist (see Figure 510-1).

Documentation or discussion of all but Steps 3 and 9 must be presented in the plan document. Steps 3 and 9 may be in the plan document or they may be explained in a separate memo from the community or the plan's author as explained in the documentation section at the end of each step. The community must update the plan at least every five years and document the update by October 1, five years after the plan was adopted.

Note: It is recommended that the planner review all state and FEMA planning program guidelines, including the CRS planning credit checklist for Activity 510. Doing so will ensure that the planning effort will meet all state, FEMA, and CRS criteria. It is the community's option, but with proper planning, one plan document can fulfill the planning criteria of several FEMA and state programs.

Table 510-1. Planning steps for mitigation and for the CRS.		
Multi-hazard Mitigation Planning	CRS	Maximum
Phase I − Planning process		
§201.6(c)(1)	1. Organize	15
§201.6(b)(1)	2. Involve the public	120
§201.6(b)(2) & (3)	3. Coordinate	35
Phase II − Risk assessment		
§201.6(c)(2)(i)	4. Assess the hazard	35
§201.6(c)(2)(ii) & (iii)	5. Assess the problem	52
Phase III − Mitigation strategy		
§201.6(c)(3)(i)	6. Set goals	2
§201.6(c)(3)(ii)	7. Review possible activities	35
§201.6(c)(3)(iii)	8. Draft an action plan	60
Phase IV − Plan maintenance		
§201.6(c)(5)	9. Adopt the plan	2
§201.6(c)(4)	10. Implement, evaluate, revise	26
Total		382

	512.a Floodplain management planning (FMP):	
✓	(1) Attached is the floodplain management or hazard mitigation plan to be credited.	
✓	Check here if the plan was also approved by FEMA as a hazard mitigation plan	
✓	(2) This CRS planning credit worksheet, completed.	
	CRS Planning Step	**Page/Section**
	Step 1. Organize to prepare the plan	
	(a) Involvement of the office responsible for community planning	Ch. 6, p. 6-2
	(b) Planning committee of department staff	Ch. 1, p. 1-3
	(c) Process or committee formally created by the community's governing board	
✓	(1) Mark the plan document to show how it was prepared and who was involved in the planning process. Show which people or offices implement which of the six mitigation categories.	
	(2) [For item 1.(c)] Attach a copy of the governing body's action or resolution.	

Figure 510-1. An excerpt from a floodplain management planning credit checklist.

Credit Points for FMP

FMP = the total of points credited for Step 1 through Step 10, up to the maximum of 382 points

There are no credit formulae for this activity. The credits for each step are simply added together.

Note that the points listed (Step 1 to Step 10) are maximum possible points. The ISO/CRS Technical Reviewer may determine that one or more items do not warrant full credit.

Step 1. Organize to prepare the plan

The credit for this step is based on how the community organizes to prepare its floodplain management plan.

Credit Points for FMP Step 1
Credit for Step 1 is the total of the following points. (Maximum credit: 15 points)

(a) 4 points, if the office responsible for the community's land use and comprehensive planning is actively involved in the floodplain management planning process. The "office" may be the community's planning or community development department, a consulting firm, or a regional planning agency, provided that it performs regular land use or comprehensive planning duties for the community. This office is usually not the floodplain management or mitigation planner or consultant, because the intention of this credit is to incorporate the floodplain management or mitigation plan into the rest of the community's planning activities. "Actively involved" means that staff regularly attend meetings, assist in the coordination (Step 3), and either write or review draft sections of the plan.

(b) 9 points, if the planning process is conducted through a committee composed of staff from those community departments that implement or have expertise in the activities that will be reviewed in Step 7. One point is provided for each office represented. Divisions of departments can be counted as separate offices. For smaller communities with fewer departments, full credit is provided if the committee has representation from all offices with expertise in all six categories of activities credited in Step 7.

A planning committee is strongly recommended. By involving those who can contribute and will be most affected when the recommendations are carried out, the community will get a more realistic product that will have a much better chance of being

Step 7 Categories

- Preventive measures (e.g., codes)
- Property protection (e.g., elevation)
- Natural resource protection
- Emergency services
- Structural flood control projects
- Public Information

Also see Figure 510-4.

adopted and implemented. Community departments that could be represented on the committee include, but are not limited to

- Building department/code enforcement,
- Engineering,
- Land use planning/zoning,
- Public works,
- Emergency management/public safety,
- Public information,
- Environmental protection/public health,
- Parks/recreation,
- A city manager or council member, and
- Housing/community development.

If the planning committee includes representatives from the public and other stakeholders (with no attachment to local government), additional credit is provided in Step 2. Note that there is extra credit in Step 10 if the committee continues to meet after the plan is adopted in order to evaluate progress and recommend changes.

No credit is provided for the creation of a planning committee if the committee only meets once or twice. It must meet a sufficient number of times to involve the members in the following key steps of the planning process (e.g., at least one meeting on each step):

Step 4. Assess the hazard,
Step 5. Assess the problem,
Step 6. Set goals,
Step 7. Review possible activities, and
Step 8. Draft an action plan.

If the community wants credit for participating in a multi-jurisdictional floodplain management or hazard mitigation planning committee,

- The community must send at least two representatives to the planning committee;
- At least half of the community's representatives must attend all the meetings of the planning committee. In effect, there must be a quorum from each community. Remote attendance, e.g., via a webinar that allows for everyone to talk, is permissible; and
- CRS credit for the multi-jurisdictional planning committee will be based on the representation from offices that implement the activities in Step 7.

Examples

a. A community has a planning committee with representatives from its planning, zoning, building, emergency management, code enforcement, and public works departments, as well as the city manager's public information person. There is no one at the community level that deals with natural floodplain functions. The community's committee would receive six points, one for each representative.

b. A county is preparing a multi-jurisdictional plan for the county and 10 participating cities. This planning committee has 30 members, including two from each city. Among the members are representatives of all six Step 7 categories, e.g., a city engineer, a city public works person, the county planner, and the county soil and water conservation district. The county's committee would receive the full nine points, provided there was a quorum from each community seeking credit.

(c) 2 points, if the planning process and/or the committee are formally created or recognized by action of the community's governing body.

Two points are provided if the community's governing body (e.g., the city council) formally recognizes the planning process. The preferred method is a formal resolution that designates who is responsible for preparing the plan and specifies a completion deadline. If a committee credited under Step 1(b) or 2(a) is used, the resolution should identify the members and the chair (or how the chair is selected) and how staff support is provided.

If a community participates in a multi-jurisdictional committee, its governing body must act in order for the community to receive this credit. A city will not receive this credit for a county council resolution. Conversely, a city can receive this credit even if there is no county credit.

Step 2. Involve the public

The planning process must include an opportunity for the public to comment on the plan during its development and before its approval. Members of the public may be part of the planning committee created under Step 1 or they may be organized as a separate committee.

For this credit, the term "public" includes residents, businesses, property owners, and tenants in the floodplain and other known hazard areas as well as other stakeholders in the

community, such as developers and contractors, civic groups, environmental organizations, academia, non-profit organizations, major employers, and staff from other governmental agencies, such as a levee district, housing authority, Natural Resources Conservation Service, or the National Weather Service.

> The most important partners to assist in the plan development are already within your community: local government officials, community planning and design professionals, business leaders, civic and volunteer groups, emergency services personnel, and interested residents.
>
> . . . .Ensuring that your team has an equitable and diverse representation will enhance your planning efforts and help build support for mitigation.
>
> —*Planning for a Sustainable Future*, FEMA-364

Members of an advisory body to the community that does not have any regulatory authority, such as a stormwater advisory board, can be counted as representatives of the public. Community employees and members of a regulatory body, such as a zoning board of appeals that makes final decisions, are not considered "public" or stakeholders and are counted as representatives of the community departments credited under Step 1(b).

As with staff, involving the public and stakeholders brings them fully into the planning process, provides input on the viability of options being considered, and helps them to become concerned about the outcome. The largest number of points is provided for Step 2(a) because a planning committee with public membership has the following advantages:

- The committee can be a forum to both educate the public and also provide a means for public input into the plan.
- The participants recognize that they are involved and will be more willing to commit themselves to the process.
- The participants can do some of the work, especially data gathering, thereby reducing the overall cost of preparing the plan.
- A committee can be an effective forum for discussing alternatives, debating goals and objectives, and matching the technical requirements of a program to local situations.
- The committee members will provide information on the plan and process to their respective constituencies.
- The participants gain a feeling of "ownership" of the plan and its recommendations, which helps build public support for it.
- Committee members form a constituency that will have a stake in ensuring that the plan is implemented.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

Credit Points for FMP Step 2

The credit for this step is the total of the following points based on how the community involves the public during the planning process. (Maximum credit: 120 points)

(a) Up to 60 points, if the planning process is conducted through a planning committee that includes members of the public and meets the following criteria:

(1) If the committee includes community staff (e.g., the planning committee credited under Step 1(b)), then at least one-half of the members must be representatives of the public or stakeholders for full credit. The credit is prorated for lower levels of public or stakeholder representation. Note that receiving 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities and item (a) is one-half of the credit for Step 2.

(2) It must meet a sufficient number of times to involve the members in the key steps of the planning process, i.e., it must meet the same meeting criteria specified in Step 1(b).

(3) All meetings must be open to the public and the meeting schedule must be publicly posted (e.g., on a website).

(4) If the community wants credit for participating in a multi-jurisdictional floodplain management or hazard mitigation planning committee, it must meet the criteria specified in Step 1(b).

(5) The formalities of organizing and naming the committee are not as important as the membership and the ability of all members to participate. For example, a community may augment an existing committee with an advisory body of stakeholders. Such an arrangement would be credited, provided the stakeholders were treated as full committee members during the meetings, i.e., they can speak up, vote, and receive all the materials that regular members do.

Note that this planning committee can be (and it is recommended that it be) the same committee that prepares a Program for Public Information under Activity 330 (Outreach Projects). The floodplain management plan document can also be or include the Program for Public Information document and/or the flood insurance coverage improvement plan credited under Activity 370 (Flood Insurance Promotion).

There is extra credit in Step 10 if the committee continues to meet after the plan is adopted in order to evaluate progress and recommend changes, provided that the committee continues to meet the above criteria. Such annual evaluations by a committee are required for some of the credits under Activities 330 and 370.

(b) 15 points, if one or more public information meetings is held in the affected area(s) within the first two months of the planning process to obtain public input on the natural hazards, problems, and possible solutions. The meetings must be held separately from the planning committee meetings credited in item (1).

The intent of the public meeting(s) is to go out to the people to gather input. At a minimum, it must be separate from regular meetings of the planning committee or the

community's governing body. It is recommended that at least one of these public meetings be held in the affected neighborhoods.

(c) 15 points, for holding one or more public meetings to obtain input on the recommended plan. The meeting(s) must be at the end of the planning process, at least two weeks before submittal of the recommended plan to the community's governing body.

Simply discussing the plan at a regular public meeting of the governing body, just before it is voted on, is not sufficient public input for CRS credit. To receive credit for this item, there must be at least one public meeting at the end of the planning process, at which the plan and its findings and recommendations are explained and people can ask questions and submit their comments for review, consideration, and potential modification of the plan. The CRS does not require public hearings. State and local laws take precedence, however. The community's legal counsel should determine if a public hearing is required.

(d) 5 points, for each additional public information activity implemented to explain the planning process and encourage input to the planner or planning committee, up to a maximum of 30 points. Examples include, but are not limited to

- A website that explains the planning process and posts the time and place for its meetings, meeting agendas, status reports, and the draft plan, when it is ready for review.
- Conducting a public webcast that explains the planning process and solicits input.
- Questionnaires asking the public for information on their natural hazards, problems, and possible solutions. A questionnaire or survey that is sent to everyone in the floodplain or everyone in the community will receive double credit (10 points).
- Outreach projects, such as those credited in Activity 330 (Outreach Projects), which explain the planning effort and seek comments. These could include brochures, mailers, booths at shopping malls, presentations at civic or neighborhood organizations, etc.

Step 3. Coordinate

Most communities' flood problems have been studied already. There are likely to be existing plans, studies, and reports on flooding that need to be reviewed. There also may be flood protection activities being considered or implemented by other agencies.

This planning step credits incorporating other plans and other agencies' efforts into the floodplain management plan. Other agencies and organizations must be contacted to determine if they have studies, plans, or information pertinent to the floodplain management plan; to determine if their programs or initiatives may affect the community's program; and to see if they could support the community's efforts.

Examples of "other agencies and organizations" include neighboring communities; local, regional, state, and federal agencies; and businesses, colleges, and other private and non-profit organizations affected by the hazards or involved in hazard mitigation or floodplain management.

This credit is for coordinating with other agencies and organizations, particularly those that are not represented on the planning committee credited under Step 1(b) or Step 2(a). No special additional coordination measures are needed for the agencies and organizations on the planning committee, but the planners may want to formally contact the directors and others for the record.

Note that community needs and goals typically are developed during comprehensive planning activities. These goals should be identified in this step, reviewed, and considered during the development of the floodplain management plan. They should be taken into account when the goals for the floodplain management plan are developed in Step 6.

Credit Points for FMP Step 3

The credit for this step is the total of the following points. To receive credit for this step, the coordination must include item (a). (Maximum credit: 35 points)

(a) 5 points, if the planning includes a review of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area. (REQUIRED) Where the information from the existing studies and reports is used in the plan, the source(s) should be referenced.

This review needs to include a review of community needs and goals, past flood studies, disaster damage reports, natural areas plans, and other documents that will provide information for the planning process.

(b) 30 points, for coordinating with agencies and organizations outside the community's governmental structure. There is no credit for talking to other departments within the city or county government. For this credit, "coordinate" means to

- Contact the agency or organization and keep a record of the contact (a generic announcement or notice on a website is not sufficient);
- Ask for data or information related to the hazard;
- Ask if the agency or organization is doing anything that might affect flooding or properties in flood-prone areas; and
- Offer the agency or organization an opportunity to be involved in the planning effort, such as by attending a committee meeting or commenting on the draft plan.

One point is provided for each agency or organization that is contacted.

Two points are provided for meeting or having a telephone conversation with the agency or organization. Such a coordination meeting or conversation must be separate from attendance at a planning committee meeting.

Coordination with an agency can only be counted once. For example, if a letter to an agency results in a follow-up meeting or telephone conversation, the community receives two points.

Examples of such agencies and organizations include, but are not limited to

- Neighboring communities;
- Local and regional agencies involved in hazard mitigation activities;
- Stakeholder-type organizations that are not represented on the planning committee;
- Local drainage, levee, sanitary, and soil and water conservation districts;
- Regional and metropolitan planning agencies;
- State National Flood Insurance Program (NFIP) Coordinator;
- State water resources agency;
- State coastal zone management agency;
- State emergency management agency;
- FEMA Regional Office;
- National Weather Service;
- U.S. Army Corps of Engineers;
- Natural Resources Conservation Service;
- U.S. Bureau of Reclamation;
- U.S. Fish and Wildlife Service;
- National Oceanic and Atmospheric Administration;
- Native American tribes;
- American Red Cross;
- Local homebuilders association; and
- Local environmental groups.

If the community wants the plan to qualify as a multi-hazard mitigation plan, the plan must identify all stakeholders that are involved or given an opportunity to be involved in the planning process. At a minimum, stakeholders must include

1) Local and regional agencies involved in hazard mitigation activities,
2) Agencies that have the authority to regulate development, and
3) Neighboring communities.

An "opportunity to be involved in the planning process" means that the stakeholders are engaged or invited as participants and given the chance to provide input to affect the plan's content.

—*Local Mitigation Plan Review Guide,* FEMA

Step 4. Assess the hazard

At this step in the planning process, the planner or committee reviews, analyzes, and summarizes data collected about the natural hazard(s) that the community faces. This step focuses on the sources, frequency, extent, and causes of flooding while Step 5 will address the impact of flooding on people, property, infrastructure, the local economy, and natural floodplain functions.

Under Step 3(a), the community gathers data about the flood hazard. This step involves reviewing, analyzing, and summarizing the data from existing flood studies, including the Flood Insurance Study, drainage problem studies, historical records, and the knowledge and experiences of the planning committee members.

For CRS credit, the community does not need to conduct studies to develop new flood data. However, if this process determines that new maps or data are needed, they should be described for credit under item (d).

The hazard assessment needs to describe the local flood hazard and not be a broad or generic discussion of flooding in general. It needs to discuss how often it floods, the locations of areas that flood, the depth of flooding, and the source or cause of the flooding. Because the most important readers are elected officials and flood-prone residents, the descriptions of the hazards should be in lay terms.

The CRS Community Self Assessment described in Section 240 can help with this step.

Credit Points for FMP Step 4

The credit for this step is the total of the following points based on what the community includes in its assessment of the hazard. (Maximum credit: 35 points)

- To receive CRS credit for this step, the plan must include a flood hazard assessment credited under item (1).
- If the community is a Category B or C repetitive loss community (see Sections 502–503), this step must cover all of its repetitive loss areas.

(a) 15 points, for including an assessment of the flood hazard in the plan. (REQUIRED) Flood hazard areas that require assessment include

- The Special Flood Hazard Area (SFHA) shown on the Flood Insurance Rate Map (FIRM),
- Repetitive loss areas,
- Areas not mapped on the FIRM that have flooded in the past, and
- Other surface flooding identified in other studies.

(1) 5 points, for a map of the flood hazard areas. Area maps are acceptable for multi-jurisdictional plans.

(2) 5 points, for a description of the known flood hazards, including source of water, depth of flooding, velocities, and warning time.

(3) 5 points, for a discussion of past floods.

(b) 10 points, for including an assessment of less-frequent flood hazards in the plan. For this credit, the community must

(1) Identify the hazard, including

a. Preparing an inventory of levees that would result in a flood of developed areas if they failed or were overtopped during a flood, and/or

b. Preparing an inventory of dams that would result in a flood of developed areas if they failed, and/or

c. Identifying any of the flood-related special hazards listed in Section 401 of the *CRS Coordinator's Manual* that may affect the community, and/or

d. Identifying the coastal A Zone, i.e., the area where wave heights during the 100-year flood are between 1.5 and 3 feet;

(2) Map the area(s) affected. (For planning purposes, an approximate affected area is sufficient. No new engineering studies are needed. Area maps are acceptable for multi-jurisdictional plans.) If an engineering study is conducted, it may receive credit under Activity 410; and

(3) Summarize the hazard(s) in lay terms.

Note that, under Activities 620 (Levees) and 630 (Dams), items (b)(1)a and (b)(1)b are prerequisites for reaching Class 4 or better. Additional guidance on inventorying and mapping the areas affected by levee and dam failures can be found in Section 621.b and Section 631.b, respectively. It is recommended that communities incorporate these inventories into their floodplain management plans.

Item (a) is prorated if part of the "flood hazard" is missing, where applicable. For example, if the community is downstream of a dam, has a levee, and has a coastal A Zone, and the assessment includes only the dam failure hazard, the credit will be less than the full 10 points. If the community does not have a levee, it is reflected in the proration.

Two points are provided if the inventory is conducted and concludes that there are no levees, dams, or special flood-related hazards that threaten the community.

(c) 5 points, if the assessment identifies areas likely to be flooded and flood problems that are likely to get worse in the future as a result of (1) changes in floodplain development and demographics, (2) development in the watershed, and (3) climate change or sea level rise. The credit is prorated if the assessment does not include all three types of changes.

(d) 5 points, if the plan includes a description of the magnitude or severity, history, and probability of future events for other natural hazards, such as earthquakes, wildfires, or tornados. The plan should include all natural hazards that affect the community. At a minimum, it should include hazards identified by the state's hazard mitigation plan.

NOTE: *To qualify as a multi-hazard mitigation plan, the plan must address ALL of the community's flood and other natural hazards identified in the hazard assessment. Not only does an all-hazards plan help qualify for mitigation funds, but also it will better prepare the community for hazards other than flooding. It is common for communities to focus only on mitigation of flood problems because they occur more often. However, assessing the other hazards when preparing a flood plan can help address what can be done for all hazards, some of which may occur less frequently, but have a greater impact on the community.*

Step 5. Assess the problem

Flooding can be a natural and beneficial occurrence. A floodplain is only a problem area if human development (the built environment) gets in the way of, or exacerbates, the natural flooding process.

The previous step assessed the hazards facing the community. In this step, the community planners or planning committee members collect and summarize data on what is at risk. This step looks at the impact of those hazards on the community.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

Credit Points for FMP Step 5

The credit for this step is the total of the following points, based on what is included in the assessment of the vulnerability of the community to the hazards identified in the previous, hazard assessment, step. (Maximum credit: 52 points)

- To receive credit for this step, the assessment must include items (a) and (c). A plan for a Category B or a Category C repetitive loss community that does not include item (c) may still receive up to 50 points for the plan, provided that no other step is missed.
- Each credited item must cover all relevant flood-related hazards identified in Step 4.
- Each credited item must include a description and summary of the problem(s). Simply listing data, such as the names of the critical facilities or the number of flood insurance claims, does not suffice for credit—there must be description of the impact of flooding and what kinds of problems arise, not just raw data.
- For a multi-jurisdictional plan, each item needs to be described for each community. Tables are acceptable to show the data by community, but there still needs to be a narrative description and summary of the problem(s).

(a) 2 points, if the plan includes an overall summary of the jurisdiction's vulnerability to each hazard identified in the hazard assessment (Step 4) and the impact on the community. (REQUIRED)

(b) 25 points, if the plan includes a description of the impact that the hazards identified in the hazard assessment (Step 4) have on the features listed below:

(1) 5 points, for life safety and the need for warning and evacuating residents and visitors.

(2) 5 points, for public health, including health hazards to individuals from flood waters and mold.

(3) 5 points, for critical facilities and infrastructure.

(4) 5 points, for the community's economy and major employers.

(5) 5 points, for the number and types of affected buildings (e.g., residential, commercial, industrial, with or without basements, etc.). For this credit, the

assessment must include an inventory of all buildings owned by the community that are located in flood-prone areas and that identifies which buildings are insured for flood damage.

(c) 5 points, if the assessment includes a review of historical damage to buildings, including all repetitive loss properties and all properties that have received flood insurance claims payments, and/or an estimate of the potential damage and dollar losses to vulnerable structures, including damage from mold and other flood-related hazards. Vulnerable structures must include all buildings within the community's defined repetitive loss area(s).

Communities must include repetitive loss areas in their problem assessment. (REQUIRED of Category B and C repetitive loss communities (see Sections 502–503))

In order to receive the full credit under item (c), the community reviews ALL the addresses of properties that have received flood insurance claims, not just the repetitive loss properties. Such a list is sent annually to all Category B and C repetitive loss CRS communities. Communities can request more recent lists through their FEMA Regional Office.

The Privacy Act

Flood insurance data about private property, including repetitive loss properties, are protected under the Privacy Act. Personally identifiable Information such as the names or addresses of specific properties, whether they are covered by flood insurance or not, whether they have received flood insurance claims, or the amounts of such claims may not be released outside of local government agencies or to the public or used for solicitation or other purposes. Such information should be marked "For internal use only. Protected by the Privacy Act of 1974."

General or aggregated information, such as total claims paid for a community or an area or data not connected to a particular property may be made public.

Data on building damage usually can be obtained from post-disaster damage assessment reports, flood insurance claims or disaster assistance data, and flood control studies. Particularly in areas that have experienced little or no serious flooding in recent history, a Hazus-MH flood analysis can yield valuable information about the potential for flood damage and loss (Figure 510-2). For best results, the building/structure inventory data bases in Hazus-MH should be augmented with local input.

HAZUS MH
EARTHQUAKE • WIND • FLOOD

Hazus-MH is a software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. It can be a great help in the Step 5 vulnerability assessment.

Hazus-MH uses geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods, and earthquakes on populations.

Copies of Hazus-MH are available at no charge from the FEMA Distribution Center. Users can request that a 60-day trial/evaluation copy of ESRI's ArcGIS software be sent with Hazus-MH. Users should be familiar with GIS software. Hazus training is available at FEMA's Emergency Management Institute and elsewhere. Information is at http://www.fema.gov/hazus/.

Figure 510-2. About Hazus-MH.

(d) 5 points, if the assessment describes areas within the floodplain that provide natural functions, such as wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species.

Along with flood protection, comprehensive floodplain management planning should review the unique natural features, natural areas, and other environmental and aesthetic attributes that may be present in the floodplain. Protecting and preserving these natural and beneficial floodplain functions yield flood protection benefits and also help integrate floodplain management efforts with other community goals and objectives. This section should also review existing natural floodplain functions plans, such as those credited under Section 511.c.

(e) 7 points, if the assessment includes a description of development, redevelopment, and population trends and a discussion of what the future brings for development and redevelopment in the community, the watershed, and natural resource areas.

(f) 8 points, if the assessment includes a description of the impact of the future flooding conditions described in Step 4(c) on people, property, and natural floodplain functions.

Step 6. Set goals

The goals should set the context for the subsequent review of floodplain management activities and drafting of the action plan (Figure 510-3). They should incorporate or be consistent with other community goals for the affected areas. A multi-hazard mitigation plan should have goals that address all the major hazards that face the community.

Credit Points for FMP Step 6

The points for this step are provided if the plan includes a statement of the goals of the community's floodplain management or hazard mitigation program. The goals must address all flood-related problems identified in Step 5. (Maximum credit: 2 points)

Step 7. Review possible activities

At this step, the plan reviews different activities that could prevent or reduce the severity of the problems described in Step 5. This is a systematic review of a wide range of activities to ensure that all possible measures are explored, not just the traditional approaches of flood control, acquisition, and regulation of land use. The review, including the pros and cons of each activity, must be included in the plan document. Figure 510-4 lists some of the types of activities that could be reviewed under each of the six credited categories.

NOTE: *This review is separate from Step 8, the selection of projects and activities to pursue. It includes activities that may not be selected and explains why some activities may be appropriate for the community and its flooding conditions and why some may not be appropriate.*

The range of activities should be evaluated for each area affected. While some of them may be quickly eliminated as inappropriate, most deserve careful consideration, especially to ensure full understanding of their costs and benefits.

St. Tammany Parish, Louisiana, Multi-Hazard Mitigation Plan

1. Protect the lives and health of the Parish's residents from the dangers of natural hazards.
2. Ensure that public services and critical facilities operate during and after a disaster.
3. Ensure that adequate evacuation routes, streets, utilities and public and emergency communications are maintained and available during and after a disaster.
4. Protect homes and businesses from damage.
5. Use new infrastructure and development planning to reduce the impact of natural hazards.
6. Give special attention to repetitively flooded areas.

Gurnee, Illinois, Flood Mitigation Plan

1. Protect existing properties
   a. Use the most effective approaches to protect buildings from flooding, including acquisition or relocation where warranted.
   b. Enact and enforce regulatory measures that ensure that new development will not increase flood threats to existing properties.
   c. Use appropriate measures to mitigate against the danger and damage posed by other natural hazards.
2. Protect health and safety
   a. Advise everyone of the safety and health precautions to take against flooding and other natural hazards.
   b. Improve traffic circulation, during floods and at other times.
   c. Improve water quality and habitat.
   d. Do something about the mosquitoes.
3. Improve the quality of life in Gurnee.
   a. Preserve and improve the downtown core of businesses and services.
   b. Ensure that current owners can maintain and improve their properties.
   c. Use acquisition programs to expand open space and recreational opportunities.
   d. Maintain an attractive riverfront and other public open spaces.
4. Ensure that public funds are used in the most efficient manner.
   a. Prioritize mitigation projects, starting with those sites facing the greatest threat to life, health, and property.
   b. Utilize public funding to protect public services and critical facilities.
   c. Utilize public funding for those projects on private property where the benefits exceed the costs.
   d. Maximize the use of outside sources of funding.
   e. Maximize owner participation in mitigation efforts to protect their own properties.
   f. Encourage property-owner self-protection measures.

Figure 510-3. Two examples of communities' statements of their goals.

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

   - Floodplain mapping and data
   - Open space preservation
   - Floodplain regulations
   - Erosion setbacks
   - Planning and zoning
   - Stormwater management
   - Drainage system maintenance
   - Building codes

2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.

   - Relocation
   - Acquisition
   - Building elevation
   - Retrofitting
   - Sewer backup protection
   - Insurance

3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.

   - Wetlands protection
   - Erosion and sediment control
   - Natural area preservation
   - Natural area restoration
   - Water quality improvement
   - Coastal barrier protection
   - Environmental corridors
   - Natural functions protection

4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

   - Hazard threat recognition
   - Hazard warning
   - Hazard response operations
   - Critical facilities protection
   - Health and safety maintenance
   - Post-disaster mitigation actions

5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.

   - Reservoirs
   - Levees/floodwalls
   - Diversions
   - Channel modifications
   - Storm drain improvements

6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

   - Map information
   - Outreach projects
   - Real estate disclosure
   - Library
   - Technical assistance
   - Environmental education

Figure 510-4. Categories of floodplain management activities.

Credit Points for FMP Step 7

The credit for this step is the total of the following points based on which floodplain management or hazard mitigation activities are reviewed in the plan. (Maximum credit: 35 points)

This step must describe those activities that were considered. There is no credit for simply listing the various types of projects under each credited category. For each activity, there must be a discussion of why the activity is or is not appropriate for the community and its flood problems.

For an activity that is determined to be appropriate,

- The discussion must also include community's capability to fund and implement the activity.
- If an activity is currently being implemented, the plan must note if it is achieving expectations and, if not, whether it should be modified.
- If the plan is an update of a previously credited plan, each activity recommended by the previous plan must be discussed, along with the status of implementation.

The discussion of each activity needs to be detailed enough to be useful to the lay reader.

Section (a) is required for any credit under this step.

(a) 5 points, if the plan reviews preventive activities, such as zoning, stormwater management regulations, building codes, subdivision ordinances, and preservation of open space, and the effectiveness of current regulatory and preventive standards and programs. (REQUIRED) For this credit, the review must include a discussion of the community's

  - Comprehensive or land use plan,
  - Building code,
  - Zoning ordinance,
  - Floodplain management regulations,
  - Subdivision ordinance, and
  - Stormwater management regulations.

  The discussion must review

  - How these tools can reduce future flood losses,
  - The current standards in the community's plans and regulations, and
  - Whether the community should adopt or revise such plans and regulations in light of the Step 5 problem assessment and the goals set in Step 6.

(b) 5 points, if the plan reviews whether the community's floodplain management regulatory standards are sufficient for current and future conditions, as discussed under Steps 4(c) and 5(f).

(c) 5 points, if the plan reviews property protection activities, such as acquisition, retrofitting, and flood insurance;

(d) 5 points, if the plan reviews activities to protect the natural and beneficial functions of the floodplain, such as wetlands protection;

(e) 5 points, if the plan reviews emergency services activities, such as warning and sandbagging;

(f) 5 points, if the plan reviews structural projects, such as levees, reservoirs, and channel modifications; and

(g) 5 points, if the plan reviews public information activities, such as outreach projects and environmental education programs.

Step 8. Draft an action plan

After the review of alternatives during Step 7, an action plan is drafted (Step 8) that selects and specifies those activities appropriate to the community's resources, hazards, and vulnerable properties. The community should strive for a balanced program, selecting measures from more than one category of floodplain management activity. In every case, the community should implement preventive activities both to keep its flood problems from getting worse and also to protect new construction from the effects of natural hazards.

There is no requirement that a floodplain management plan identify expensive or massive structural flood control projects. The plan must include activities that the community can be assured will be implemented through its own resources. If outside funding support is needed for some projects, the funding sources should be identified and researched to ensure that the projects are eligible and the community has a chance of receiving the funds. Many of the activities could receive CRS credit once they are implemented.

Note that 50% of the maximum credit for this planning step is a prerequisite for Class 4 or better communities.

Credit Points for FMP Step 8

The credit points are based on the range of actions that are recommended in the plan, subject to the criteria listed below. (Maximum credit: 60 points)

- For each recommendation, the action plan must identify
    - Who is responsible for implementing the action,
    - When it will be done, and
    - How it will be funded.

"When it will be done" can be specified in terms of a date, a set period of time after another action is complete, after the next flood, etc. "How it will be funded" could state that funding will be dependent on a grant, provided the project is eligible for the grant program.

- The actions must be prioritized. When prioritizing mitigation actions, the planners need to consider the benefits that would result from the mitigation actions and projects versus the cost of those actions. Note that this is not a requirement for a cost-benefit analysis for every action item. However, an economic evaluation is essential for selecting one or more actions from among many competing ones.
- There must be an action item for each goal in Step 6. An example of this is in Figure 510-5.
- Credit is provided for a recommendation on floodplain regulations, provided it recommends adopting or continuing a regulatory standard that exceeds the minimum requirements of the National Flood Insurance Program (NFIP). Simply continuing to meet the minimum criteria of the NFIP is not credited as an action item to improve the community's floodplain management program.
- If the plan calls for acquiring properties, there must be a discussion of how the project(s) will be managed and how the land will be used after it is acquired.
- When a multi-jurisdictional plan is prepared, it must have action items from at least two of the six categories that directly benefit each community seeking CRS credit.
- To qualify as a multi-hazard mitigation plan, the plan must include a "process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate" (44 *CFR* §201.6(c)(4)(ii)). The action items that relate to preventive activities should clarify how this is done. For example, an action item could recommend that the next time the zoning ordinance is revised, flood and landslide hazard areas be considered when determining allowable uses.

(a) 45 points, depending on how many categories are covered by the action items:

(1) 10 points, if the action plan includes flood-related recommendations for activities from two of the six categories credited in Step 7; OR

(2) 20 points, if the action plan includes flood-related recommendations for activities from three of the six categories credited in Step 7; OR

(3) 30 points, if the action plan includes flood-related recommendations for activities from four of the six categories credited in Step 7; OR

(4) 45 points, if the action plan includes flood-related recommendations for activities from five of the six categories credited in Step 7.

Table 9-1. Action Items, Goals, and Recommendations

Action Item	Goal 1. Protect critical facilities and utilities	Goal 2. Protect lives and health	Goal 3. Protect homes, businesses, and schools	Goal 4. Minimize the costs to the City and property owners	Goal 5. Ensure that new construction supports these goals	Chapter – Recommendation	Deadline
9.2. Administrative Action Items							
1. *Plan* adoption	X	X	X	X	X		5/31/07
2. Monitoring and reporting	X	X	X	X	X		9/30 each year
3. Community Rating System	X	X	X	X	X	4-3, 6-5, 7-3, 8-1 - 8-8	CRS visit
9.3. Program Action Items							
4. Levee improvements	X	X	X	X		4-1	Ongoing
5. Drainage improvements	X	X	X	X		4-2	8/31/08
6. Drainage system maintenance	X	X	X			4-3	CRS visit
7. Property protection funding	X	X	X	X		5-2, 5-3	8/31/07
8. Regulatory review	X		X		X	6-5	CRS visit
9. NFIP administration	X	X	X		X	6-2	After CAC
10. CFMs	X	X	X		X	6-2, 6-3	8/31/07
11. BCEGS	X	X	X		X	6-4	5/31/07
12. Flood response plan	X	X	X			7-1 – 7-4	Ongoing
9.4. Public Information Action Items							
13. Annual mailing		X	X		X	8-1, 8-2, 8-7, 8-8	Each Spring
14. Technical references		X	X		X	8-4, 8-5	CRS visit
15. Public information projects		X	X		X	4-4, 5-1, 6-1, 6-6, 7-4, 8-1 – 8-8	Ongoing
16. Public information messages		X	X		X	4-4, 5-1, 6-1, 6-6, 7-4, 8-1 – 8-8	Ongoing

This table relates the 16 action items to the 5 goals of this Plan. The goals are stated in full on pages 3-6 and 9-1. The table also shows the relation between the action items and the recommendations at the end of chapters 4 – 8. For example action item 8, Regulatory Review, implements recommendation 6-5 at the end of chapter 6. The reviews need to be completed in time for the CRS verification visit, which will be in the second half of 2007.

Figure 510-5. An excerpt from the City of Gretna, Louisiana's *Flood Hazard Mitigation Plan.*

(b) 10 additional points are provided if the action plan establishes or revises post-disaster redevelopment and mitigation policies and procedures. These policies and procedures should account for the expected damage from a base flood or other disaster. For example, the action plan should identify the areas likely to be worst hit and the policies should determine whether they will be rebuilt if substantially damaged. Post-disaster mitigation procedures should assign responsibilities for public information, code enforcement, planning, and other efforts that encourage, mandate, and/or fund loss reduction activities.

Note that Activity 330 (Outreach Projects) provides credit for public information materials developed for use during and after a flood (Flood Response Preparations (FRP)). Preparation of those materials should be done when the other post-disaster policies and procedures are prepared.

(c) 5 additional points are provided if the plan includes action items (other than public information activities) to mitigate the effects of the other natural hazards identified in the hazard assessment (Step 4, item (d)).

Step 9. Adopt the plan

The points for this step are provided if the plan and later amendments are officially adopted by the community's governing body. The plan must be an official plan of the community, not an internal staff proposal. "Adopted" means that there is a resolution or other formal document that is voted on by the community's governing body. A note in the minutes or passage via a consent agenda is not credited.

When a multi-jurisdictional plan is prepared, it must be adopted by the governing body of each community seeking CRS or multi-hazard mitigation plan credit.

Step 10. Implement, evaluate, and revise

To be useful, planning must be ongoing and plans must be dynamic. The plan should not sit on a shelf gathering dust once it is completed. Therefore, the community must have an evaluation and update process.

For CRS credit, plans must be implemented. No plan is perfect. As implementation proceeds, flaws will be discovered and changes will be needed. Not only can hazard conditions change but also goals and objectives may change. If a community is hit by a tornado, for example, the short-term action items may be changed to focus attention on the newly damaged areas in the SFHA.

Changes should be made in the action plan when opportunities arise to add new activities or complete some items ahead of schedule. The plan should also be revised if it is found that some activities cannot be completed on the original timetable. At a minimum, these types of changes must be made at the required 5-year update.

The key to this step is the annual evaluation report on progress in implementing the plan. Not only are annual evaluations required with the community's annual recertification, but also the process of conducting an annual evaluation gives the community a framework for

monitoring the plan's effectiveness and the community's progress in implementing it. Failure to submit the evaluation report with the community's annual recertification will result in loss of the planning credit (i.e., FMP = 0). This can cause a Category C repetitive loss community to revert to a Class 10.

Credit Points for FMP Step 10

The credit for this step is the total of the following points, based on how the community monitors and evaluates its plan. (Maximum credit: 26 points)

- The plan document must describe how, when, and by whom the plan will be monitored, evaluated, and revised**.** It is recommended that these items be included in the adoption resolution as well.
- An annual evaluation report on progress towards plan implementation must be prepared at least once each year and submitted with the community's annual CRS recertification. The report must be submitted to the governing body, released to the media, and made available to the public.
- If a community receives credit as a result of participation in a multi-jurisdictional plan that includes action items for each community, the annual evaluation report must cover those action items. This can be done either by a multi-jurisdictional planning committee or through separate submittals by each community. However, a community will not receive credit if it did not participate in the meeting at which the annual report was prepared. Therefore, the submittal needs to show who participated in the preparation of the report.
- The community must update the plan at least every five years. The update is due by October 1, five years after the plan was adopted (see next section).
- Step 10(b) provides credit if the planning committee does the evaluation and revision. If the committee does not continue to meet and report or if the committee membership no longer meets the credit criteria in Step 2(a), the community will not keep the committee credits under Steps 1(b) or 2(a).

(a) 2 points, if the community has procedures for monitoring implementation, reviewing progress, and recommending revisions to the plan in an annual evaluation report. The report must be submitted to the governing body, released to the media, and made available to the public. (REQUIRED)

(b) 24 points, if the annual evaluation report is prepared by the same planning committee that prepared the plan that is credited in Step 2(a) or by a successor committee with a similar membership that was created to replace the planning committee and charged with monitoring and evaluating implementation of the plan. The points are based on how frequently the committee meets, since more frequent meetings yield more progress toward implementing the plan. The committee must continue to meet the representation, quorum, and other criteria that determined the credit points under Step 2(a).

(1) 6 points, if the committee meets only once a year.

(2) 12 points, if the committee meets twice a year.

(3) 24 points, if the committee meets at least quarterly.

Five-year Update

The community must submit a copy of its plan update at least every five years. The plan update will be reviewed for CRS credit according to the *Coordinator's Manual* currently in effect, not the version used when the community originally requested this credit. The update must include the following steps:

(a) Steps 1 and 2: If the original planning process included a committee, then in order to keep the credit provided under Step 1(b) or Step 2(a), the update must be conducted by a committee that meets the criteria identified in those steps.

(b) Step 2: If the original planning process received credit for a public meeting credited under Step 2, item (c), then to keep this credit the community must also conduct a public meeting that reviews and receives comments on the draft update.

(c) Step 3, item (a): The update must include a review of new studies, reports, and technical information and of the community's needs, goals, and plans for the area that have been published since the plan was prepared.

(d) Steps 4 and 5: The hazard and problem assessments must be reviewed and brought up to date. The assessments must account for

- New floodplain or hazard mapping,
- Annexation of flood-prone areas,
- Additional repetitive loss properties,
- Completed mitigation projects,
- Increased development in the floodplain or watershed,
- New flood control projects,
- Lack of maintenance of flood control projects,
- Major floods or other disasters that occurred since the plan was adopted, and
- Any other change in flooding conditions and/or development exposed to flooding or the other hazards covered in the plan.

(e) Step 6: The original plan's goals must be reviewed to determine if they are still appropriate, given the revisions to Steps 4 and 5.

(f) Step 8: The action plan must be revised to account for projects that have been completed, dropped, or changed and for changes in the hazard and problem assessments, as appropriate.

(g) Step 9: The update must be adopted by the community's governing body.

An annual evaluation report that includes these steps may qualify as the five-year update (but may not qualify as an update for a multi-hazard mitigation plan).

Impact Adjustment for FMP

rFMP is a ratio that reflects how much of the community's flood hazard areas are covered by the floodplain management plan. Note that for a hazard mitigation plan to qualify, all of the community's flood hazards must be covered.

rFMP = EITHER

1.0, if the plan covers all of the community's known flood hazard areas. "Known flood hazard areas" means the SFHA shown on the FIRM, repetitive loss areas, areas not mapped on the FIRM that have been flooded in the past, and surface flooding identified in existing studies (see Step 4)

OR

0.25, if the planning covers either all of the community's repetitive loss areas or at least 25% of the community's known flood hazard areas.

Documentation for FMP Provided by the Community

(1) With the submittal of the plan or the five-year update to the plan,

(a) A copy of the plan or updated plan to be credited. This can be digital, a hard copy, or a link to a website with the full document. Either the plan is marked, or a separate document is provided, to show where each credited step and sub-step appears. There is a checklist that can be used to do this, available at www.CRSresources.org/500.

(b) [For Step 1(b) credit for a committee of staff from different departments] The plan or a separate document must show which department representatives implement, or have expertise in, which of the six categories of mitigation measures.

(c) [For Step 1(c) credit] A copy of the resolution or other official action taken by the governing body to create or recognize the planning process as specified in Step 1. For Step 2(a) credit for a planning committee, the resolution or action must identify the committee's membership.

(d) [For Step 2(a) credit for a planning committee] The names of the committee members, their titles, and their represented organizations must be listed in the plan. The community may submit separate materials, such as meeting minutes and sign-in sheets, to document meeting attendance.

(e) For Step 2(b), (c), or (d) credit for public meetings] Copies of the publicity for the public meetings. The notices of the meetings should be in the form of letters to floodplain residents, a notice sent to all residents, or a newspaper article or advertisement. An inconspicuous legal notice appearing in the classified section of the newspaper is not sufficient for CRS credit. If very few residents are affected, as may be the case for a plan that addresses only a repetitive loss area, a written record that the residents were called would be sufficient documentation.

(f) [For Step 3(a) credit for reviewing existing studies, reports, and technical information] The plan must note where the information from the studies and reports was used, e.g., with quotations or footnotes. The plan also needs to include a list of all the documents reviewed. This is usually done in a reference section or at the end of each chapter.

(g) [For Step 3(b) credit for coordination with other agencies and organizations] A record of the contacts and meetings. Acceptable records include letters that cover the items needed for coordination, copies of any responses that were received, follow-up memos from the meetings, notes from telephone conversations, and e-mails. These items are usually not included as a part of the plan document.

(h) A copy of the resolution or other formal adoption action by the governing body as specified in Step 9. The resolution should identify the implementation responsibilities, describe the evaluation and revision procedures, and call for the five-year update (or adopt by reference such language that may be in the plan document).

(2) With each annual recertification,

(a) A copy of the annual evaluation report as specified in Step 10. The report must review each action item, describe what was implemented (or not implemented), and recommend changes to the action plan as appropriate. If not in the evaluation report document, the recertification submittal must also include the minutes of the committee meeting(s) (if getting credit for Step 10(b)) and a description of how the report was submitted to the governing body, released to the media, and made available to the public.

NOTE: *Failure to submit the floodplain management plan's evaluation report with the annual recertification or the five-year update will result in loss of the planning credit (i.e., FMP = 0). Loss of credit for this activity may cause a repetitive loss Category C community to revert to a Class 10.*

512.b. Repetitive loss area analysis (RLAA)

The maximum credit for this element is 140 points.

A repetitive loss area analysis is a detailed mitigation plan for a repetitive loss area. It provides more specific guidance on how to reduce damage from repetitive flooding than a community-wide floodplain management or hazard mitigation plan. Before beginning the RLAA process, the community must review its repetitive loss list to determine if any properties have been mitigated or incorrectly assigned to the community. Once the list is reviewed and the necessary updates approved as per Section 502, the remaining unmitigated repetitive loss properties will form the basis for the RLAA. Mapping repetitive loss areas is discussed in Section 503.

As with a floodplain management plan, CRS credit is dependent upon the community's following an appropriate process. The five steps for an area analysis are less involved than

the 10-step floodplain management planning process, but the analysis must evaluate each building in the repetitive loss area(s).

A community may receive credit for both a floodplain management plan and repetitive loss area analyses. Area analyses may be conducted during floodplain management planning or a floodplain management plan may identify areas needing analyses, which are conducted after the plan is adopted. For CRS credit, a separate analysis must be prepared for each repetitive loss area and made available to residents of those areas.

Additional guidance and suggestions for conducting an area analysis can be found in Chapter 7 of *Reducing Damage from Localized Flooding*, FEMA-511.

Credit Criteria for RLAA

(1) Communities with one or more repetitive loss properties on FEMA's list must have at least one repetitive loss area delineated in accordance with the criteria in Section 503. The area(s) must include at least one of the properties on FEMA's repetitive loss list.

An exception to this criterion is made for communities that have no historic repetitive flood claims, but are nevertheless working to reduce repetitive flooding. These communities may prepare area analyses for areas that have been repetitively flooded. The analyses must describe and map the repetitive flooding problem (including all past flood insurance claims, if any) and meet all the following credit criteria. If there are multiple areas, they must not be contiguous. Communities using this approach may receive 20 credit points per area.

(2) An area analyses must have been prepared and adopted for each repetitive loss area in the community. The analyses must meet the following criteria:

(a) The repetitive loss areas must be mapped as described in Section 503.a.

(b) If the community does not conduct an analysis of all the areas, it will be reflected through the impact adjustment. A Category C community must prepare analyses for all of its repetitive loss areas if it wants to use RLAA to meet its repetitive loss planning prerequisite (see Section 502).

(c) A five-step process must be followed. Although all five steps must be completed, steps 2–4 do not have to be done in the order listed. For example, the planners may want to contact agencies and organizations to see if they have useful data (Step 2) after the site visit is conducted (Step 3).

Step 1. Advise all the properties in the repetitive loss areas that the analysis will be conducted and request their input on the hazard and recommended actions. The notice (or any public document) cannot identify which properties are on FEMA's repetitive loss list (see the box on flood insurance data and the Privacy Act). There are no restrictions on publicizing what properties are in repetitive loss AREAS that have more than one property and there are no restrictions on publishing aggregate data, such as how many properties received claims or the average value of those claims. Community planning staff may share insurance claims information with the owner of the property, but may not make it available to anyone else.

The Privacy Act

Flood insurance data about private property, including repetitive loss properties, are protected under the Privacy Act. Personally identifiable Information such as the names or addresses of specific properties, whether they are covered by flood insurance or not, whether they have received flood insurance claims, or the amounts of such claims may not be released outside of local government agencies or to the public or used for solicitation or other purposes. Such information should be marked "For internal use only. Protected by the Privacy Act of 1974."

General or aggregated information, such as total claims paid for a community or an area or data not connected to a particular property may be made public.

- The notice can be sent to owners OR residents at the community's discretion, as long as a representative of each property is notified.
- The notice cannot be done via a newspaper or newsletter notice or article.
- The notice must advise the recipients when and how copies of the draft report can be obtained and ask for their comments on the draft.

Step 2. Contact agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding. The agencies or organizations must be identified in the analysis report.

Step 3. Visit each building in the repetitive loss area and collect basic data.

- The site visit must collect data sufficient to do a preliminary determination of the cause of the repetitive flooding and of the mitigation measures that would be appropriate. This usually includes a review of drainage patterns around the building, the condition of the structure, and the condition and type of foundation.
- The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street.
- Floor elevations or historical flood levels are not required, but can be very helpful where available.
- The date for each building's insurance claim can help identify the cause of flooding (e.g., rainfall or overbank flooding) and the amount of the claim can help determine the amount of damage. Note that, every year, each repetitive loss community is provided with a list of its historic insurance claims. This includes single-claim properties. Non-repetitive-loss communities that elect to do an RLAA may request these data from their ISO/CRS Specialist.
- More information on appropriate data can be found in *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA-551.

Step 4. Review alternative approaches and determine whether any property protection measures or drainage improvements are feasible. The review must look at all of the property protection measures listed in Figures 360-1 and 510-4 that are appropriate for the types of buildings affected. A review that looks only at drainage or structural flood control project alternatives is not sufficient.

Step 5. Document the findings. A separate analysis must be conducted for each area. In general, separate reports are preferred for each area, but in cases in which several areas have similar building and flooding characteristics and similar mitigation measures are appropriate, the analyses can be assembled into a single report. Each report must include

- A summary of the process that was followed, including how the property owners were involved;
- The problem statement with a map of the area affected. The statement and map may show individual properties or parcels, but cannot show which ones are on FEMA's repetitive loss list;
- A list or table showing basic information for each building, such as address, foundation type, condition, and appropriate mitigation measures. This list cannot include insurance data, such as how many claims have been paid for that property. If the property owners responded to a survey, the survey responses may be included (unless the community promised confidentiality);
- The alternative approaches that were reviewed; and
- Action items that include
    - Who is responsible for implementing the action,
    - When it will be done, and
    - How it will be funded.

  "When it will be done" can be expressed in terms of a date, a set period of time after another action is complete, after the next flood, etc. "How it will be funded" could state that funding will be dependent upon receiving a grant, provided that one or more suitable grant programs are specified to which application(s) for funding will be made.

(3) The repetitive loss area analysis report(s) must be submitted to the community's governing body and made available to the media and the public. If private or sensitive information (such as names or street addresses) is included in the report, then a summary report(s) must be prepared for the governing body, committees, media, and the public. The complete repetitive loss area analysis report(s) must be adopted by the community's governing body or by an office that has been delegated approval authority by the community's governing body.

(4) The community must prepare an annual evaluation report for its area analyses.

- The report must review each action item, describe what was implemented (or not implemented), and recommend changes to the action items as appropriate.
- One annual report can cover some or all of the area analyses that were prepared.
- The report must be made available to the media and the public (including the property owners and residents of the repetitive loss areas).
- The report is submitted with the community's annual recertification.

(5) The community must update its repetitive loss area analyses in time for each CRS cycle verification visit.

- The update must review the flooding and building conditions as well as any changes to FEMA's repetitive loss list, to determine whether the number of buildings on the list or other circumstances have changed, and revise the mapping and action items accordingly.
- The update can be a new report or an addendum to the existing report.
- An annual evaluation report that reviews and updates the 5-step process may qualify as the area analysis update.
- The update can qualify as the annual evaluation report for the year it was prepared.
- The update must be made available to the media and the public (including the property owners and residents of the repetitive loss areas).
- If the repetitive flooding problem has been mitigated, the appropriate documentation must be submitted in order to remove the properties from FEMA's repetitive loss list (see Section 501).
- Any changes to an adopted area analysis must be approved following the same process as approval of the original analysis.

If, during the area analysis or annual reviews, the community finds that the flood risk to one or more repetitive loss properties has been mitigated, FEMA must be notified by submitting an AW-501, as described in Section 501.

Credit Points for RLAA

RLAA = 140

The maximum credit for this element is 140 points. A community can obtain the maximum only if it prepares and adopts repetitive loss area analyses for all its repetitive loss areas. This is factored in through the impact adjustment.

Impact Adjustment for RLAA

rRLAA is the ratio of the number of buildings covered by credited area analyses to the total number of buildings in the community's repetitive loss areas. See Sections 301–303 on calculating an impact adjustment.

$$rRLAA = \frac{bAA}{bRLA}$$, where

bAA = the number of buildings addressed in credited area analyses, and

bRLA = the number of buildings in the community's repetitive loss areas

Documentation for RLAA Provided by the Community

(1) At each verification visit,

(a) A copy of each repetitive loss area analysis report or update of an earlier report that the community wants credited (see Step 5).

(b) Documentation showing how the owners or residents of the areas were notified (see Step 1).

(c) Documentation showing how the analysis was made available to the media and the public.

(d) A copy of the resolution or other formal action by the governing body that adopts the area analysis or accepts changes in subsequent updates.

(2) With the annual recertification,

(a) A copy of the annual evaluation report (Section 512.b, credit criterion (4)). If not in the evaluation report, the recertification submittal must also document how the evaluation report and update were made available to the media and the public.

NOTE: *Failure to submit the area analysis' evaluation report with the annual recertification or the update at the next cycle verification visit will result in loss of the credit (i.e., RLAA = 0). Loss of credit for this activity may cause a repetitive loss Category C community to revert to a Class 10.*

512.c. Natural floodplain functions plan (NFP)

The maximum credit for this element is 100 points.

NFP credit is provided for adopting plans that protect one or more natural functions within the community's floodplain. Examples include

- A habitat conservation plan that explains and recommends actions to protect rare, threatened, or endangered aquatic or riparian species.
- A habitat protection or restoration plan that identifies critical habitat within the floodplain, actions to protect remaining habitat, and/or actions to restore fully functioning habitat. Frequently this will result in the preservation and/or restoration of riparian habitat that is necessary for water-dependent species.
- A "green infrastructure plan" that identifies open space corridors or connected networks of wetlands, woodlands, wildlife habitats, wilderness, and other areas that support native species, maintain natural ecological processes, and/or sustain air and water resources (for credit, the corridors or networks must include some floodplains).
- A plan or section of a comprehensive or other community plan that includes an inventory of the ecological attributes of the watershed and/or the floodplain and recommends appropriate actions for protecting them, provided that the recommendations are implemented through a mechanism such as a development regulation, development order, grant program, or capital improvement plan.

NOTE: *Element NFOS2, (section 2 of the natural floodplain functions open space credit under Activity 420 (Open Space Preservation)), provides bonus credit for open space parcels that are designated in a plan to protect natural functions. A plan that receives NFP credit qualifies parcels for this extra open space credit.*

Credit Criteria for NFP

(1) For all plans:

(a) The plan may cover more than one community, but it must identify the natural floodplain functions present within the community and have an impact on those functions within the community seeking credit.

(b) The plan must be adopted. If the plan is not a community plan adopted by the community's governing body, it must be adopted by the appropriate regional agency.

(c) The plan must be updated at least once every 10 years. The update must include a review of any changes to conditions as well as progress made since the original plan was prepared. Any changes to the adopted plan must be approved by the original adopting agency.

(d) The plan must include an inventory of the species and/or habitat present within the floodplain and action items for protecting one or more identified species of interest and natural floodplain functions. The action items must describe who is responsible for implementing the action, how it will be funded, and when it will be done.

General policy statements with no means of implementation are not considered action items.

(e) There is no credit for a plan that addresses water quality issues prepared pursuant to a requirement for an NPDES (National Pollution Discharge Elimination System) permit. Plans to improve drainage, stormwater storage, or channel bank erosion may be credited under Activity 450 (Stormwater Management) or Activity 540 (Drainage System Maintenance). Plans that are produced as a requirement for a development permit are not credited.

(2) For NFP1: A plan for NFP1 credit must include a comprehensive inventory of the natural floodplain habitat within the community. It must identify areas that warrant protection or preservation in order to maintain fully functioning habitat for the species of interest. Where threatened or endangered species are present, each species must be addressed and a restoration plan must be included.

(3) For NFP2: This sub-element credits other plans that meet the credit criteria listed in (1), but that do not address the entire SFHA or all of the species present. These could be single-issue or single-species plans or plans that cover only one area of the community's floodplain.

Credit Points for NFP

NFP = EITHER

NFP1 = 100 points, for a plan, or combination of plans, that meets credit criteria (1) and (2) and covers the entire SFHA within a community

OR

NFP2 = 15 x the number of plans that meet credit criterion (1), up to four plans (60 points maximum)

Impact Adjustment for NFP

There is no impact adjustment for this element. The NFP1 plan must cover the entire community or all of the community's SFHA. Each NFP2 plan receives 15 points regardless of the extent of the area covered.

Documentation for NFP Provided by the Community

(1) At each verification visit,

(a) A copy of each natural floodplain functions plan or update to a plan that the community wants credited.

(b) A copy of the resolution or other formal adoption action.

513 Credit Calculation

c510 = (FMP x rFMP) + (RLAA x rRLAA) + NFP, where

FMP = the total of the credit points for the 10 steps in Section 512.a

514 For More Information

a. Additional information, reference materials, checklists, and examples can be found at www.CRSresources.org/500.

b. Hazus-MH is a risk assessment software program that is described in Figure 510-2. Copies are available free from FEMA. Users need to be familiar with operating GIS software. Training is also available. More information is available at www.fema.gov/hazus/.

c. Contact state or regional planning, water resources, natural resources, environmental protection, state hazard mitigation, or NFIP coordinating agencies for information on state and federal agencies that can help prepare a floodplain management plan.

d. The following publications discuss the floodplain management planning process and the variety of measures that should be examined. They can be found on the websites noted.

FEMA has a series of "how-to guides" on planning, to help communities meet the multi-hazard mitigation planning criteria. They can be found at www.fema.gov/vi/media-library/collections/6.

Getting Started: Building Support for Mitigation Planning (FEMA-386-1) covers planning Phase I and CRS planning Steps 1–3.

Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA-386-2) covers planning Phase II and CRS planning Steps 4–5.

Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies (FEMA-386-3) covers planning Phase III and CRS planning Steps 6–8.

Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA-386-4) covers planning Phase IV and CRS planning Steps 9–10.

Integrating Manmade Hazards into Mitigation Planning, FEMA-386-7.

Reducing Damage from Localized Flooding: A Guide for Communities, FEMA-511 (2005). Also available at www.fema.gov/library/viewRecord.do?id=1448.

Planning for Post Disaster Recovery and Reconstruction, American Planning Association (APA) Planning Advisory Service, 346 pages, APA Report # 483/484, FEMA-421 (1998). www.fema.gov/library/viewRecord.do?id=1558.

Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability, 43 pages, FEMA-364, 2000. Also available for downloading at http://www.fema.gov/media-library/assets/documents/2110?id=1541.

Reducing Losses in High Risk Flood Hazard Areas—A Guidebook for Local Officials, FEMA-116, 1987. Also available for downloading at www.fema.gov/library/viewRecord.do?id=1508.

"Mitigation Benefit Cost (BCA) Toolkit." This is FEMA's BCA software, used to perform benefit-cost analyses for applications to FEMA's mitigation grant programs. It and its supporting documentation are available for download from www.fema.gov/media-library/assets/documents/92923. More information can be obtained by calling FEMA's toll-free BC Hotline at 1-855-540-6744 or emailing bchelpline@dhs.gov.

e. *Hazard Mitigation: Integrating Best Practices into Planning*, James C. Schwab (ed.) (2010) is published by the American Planning Association as Planning Advisory Service No. 560. Available for $60 from https://www.planning.org/research/hazards/.

f. The Corps of Engineers can also provide technical information and advice to communities interested in preparing a comprehensive floodplain management plan. Requests for assistance should be submitted to the Flood Plain Management Services Coordinator at the appropriate District Office of the Corps. Corps offices can be found at http://www.usace.army.mil/Locations.aspx.

g. The following publications can help with a repetitive loss area analysis.

Selecting Appropriate Mitigation Measures for Floodprone Structures, FEMA-551.

Reducing Damage from Localized Flooding: A Guide for Communities, FEMA-511 (2005).

Flood Proofing: How to Evaluate Your Options, U.S. Army Corps of Engineers (1994). Download at http://www.usace.army.mil/Missions/CivilWorks/ProjectPlanning/nfpc.aspx. Click on "NFPC Publications" and scroll down to find the title.

515 Related Activities under the Community Rating System

- A floodplain management plan should be a blueprint for ALL of a community's public information and floodplain management activities. Planning Step 7 should review all ongoing and possible activities and Step 8 should identify which should continue, which should change, and what new ones should be initiated.
- The CRS Community Self Assessment in Section 240 can help with the hazard and problem analyses in FMP Steps 4 and 5.
- Activities 330 (Outreach Projects) and 370 (Flood Insurance Promotion) provide credit for having a committee that meets criteria very similar to those of the committee in FMP Step 2. The same committee can fulfill all activities' credit criteria.
- The credit for natural floodplain functions open space (NFOS) under Activity 420 (Open Space Preservation) can be increased if the open space parcels are identified in a natural floodplain functions plan (NFP).
- A repetitive loss area analysis (RLAA) can identify projects and priorities for mitigation activities that can receive bonus credit under Activities 520 (Acquisition and Relocation) and 530 (Flood Protection).
- A multi-hazard mitigation plan that meets FEMA planning criteria is a prerequisite for FEMA funding for projects that can be credited under Activities 520 (Acquisition and Relocation) and 530 (Flood Protection).



National Flood Insurance Program
Community Rating System

Addendum to the 2017 *CRS Coordinator's Manual*

2021

FEMA

CONTENTS

Page

Foreword A-1
What Becomes Effective in 2021 ..... A-2
How to Use the 2021 Addendum A-4

Section 116.a, Natural Floodplain Functions A-5
Summary A-5
Revised Subsection on Threatened and Endangered Species A-5

Section 211 ..... A-10
Summary A-10
New Prerequisite for Class 9 ..... A-10
New Prerequisite for Class 8 ..... A-11
Updated Prerequisite for Class 6 ..... A-11
Clarifications, Updates, and Corrections A-12

Section 230, Verification A-14
Summary A-14
Updates and Clarifications A-14

Section 301, Public Information A-15
Summary A-15
Expanded Guidance on Construction Certificates A-15
Related Updates and Corrections A-25

Section 310, Elevation Certificates A-26
Summary A-26
Revision of Activity 310 ..... A-27
Revised Approach to Elevation and Other Certificates A-29
Related Updates and Corrections A-33

Activity 370 (Flood Insurance Promotion) A-34
Summary A-34
Increased Credit for a Flood Insurance Coverage Plan and for Technical Assistance A-36
New Credit for Flood Insurance Brochures, Meetings, Continuing Education A-37

Section 403, Impact Adjustment Map A-41
Correction A-41

Section 404, Sea Level Rise A-42
Summary A-42
Updates to Sea Level Rise Projections A-42

Page

Activity 420 (Open Space Preservation) A-44
Corrections A-44

Activity 430 (Higher Regulatory Standards) A-45
Summary A-45
Discontinuation of state-mandated standards—SMS A-45
Related Updates and Corrections A-45

Activity 450 (Stormwater Management) A-46
Summary A-46
Focus on Community Jurisdiction for Stormwater Management A-46
Related Updates and Corrections A-48

Section 501, The Repetitive Loss List A-50
Summary A-50
Updates and Clarifications A-50

Section 510, Floodplain Management Planning A-51
Summary A-51
Credit Points and Opportunities Increase A-51
Species Assessments Qualify for Natural Functions Plan A-52
New Credit for a Substantial Damage Management Plan A-54
Related Updates and Clarifications A-61

Activity 610 (Flood Warning and Response) A-62
Summary A-62
Updates and Clarifications A-62

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FOREWORD

The Community Rating System (CRS) is a national program developed by the Federal Emergency Management Agency (FEMA). The *CRS Coordinator's Manual* is the guidebook for the CRS. The *Coordinator's Manual* spells out the credits and credit criteria for community activities and programs that go above and beyond the minimum requirements for participation in FEMA's National Flood Insurance Program. The *Coordinator's Manual* explains how the CRS operates, how credits are calculated, and what documentation is required, and also acts as guidance for communities in enhancing their flood loss reduction and resource protection activities.

From time to time, the *Coordinator's Manual* is revised, to respond to improvements in floodplain management and insurance practice, advances in technology, input from communities and other program stakeholders, and other factors. These changes ensure that the CRS continues to encourage, support, and recognize communities for ongoing efforts to minimize flood losses and protect floodplain resources. Revisions normally take place every three years and are issued in the form of a new edition of the *Coordinator's Manual*.

This *Addendum to the 2017 CRS Coordinator's Manual* is being issued by FEMA in lieu of producing a fully revised edition at this time. The Addendum, effective January 1, 2021, accompanies and becomes part of the 2017 edition of the *Coordinator's Manual*. With the issuance of this Addendum, FEMA incorporates into the existing CRS guidance some material that officially changes, adds to, or clarifies the CRS program. This includes new prerequisites for advancing in CRS class as well as new opportunities for communities to earn CRS credit for protecting threatened and endangered species, mitigating substantial damage, and promoting flood insurance.

The current *Coordinator's Manual,* issued in 2017, accompanied by this Addendum, will remain in effect until a new edition is released. Therefore, the expiration date on the 2017 *Coordinator's Manual* can be disregarded. Both documents can be downloaded from the FEMA website.

What Becomes Effective in 2021

The most significant changes taking place with the release of this Addendum are four new opportunities for communities to earn CRS credit, and two new prerequisites—one for attaining CRS Class 9 and one for Class 8.

Credit Opportunities

- Under Activity 370 (Flood Insurance Promotion), the credit for a flood insurance coverage plan (element CP) is increased, as is that for providing technical assistance (element TA). Three new elements are introduced, providing credit for distributing flood insurance information (element FIB), for holding insurance-related town hall meetings (element FIM), and for a state requirement for continuing education for flood insurance agents (element SCE).
- Under Activity 510 (Floodplain Management Planning), credit is made available for developing a floodplain species assessment in addition to, or as an alternative to, a natural functions plan (element NFP).
- A new creditable element is added under Activity 510 (Floodplain Management Planning) for communities that develop a plan for managing substantial damage properties within their jurisdictions (element SDP).
- Under Activity 610 (Flood Warning and Response), communities can receive credit for incorporating into their flood response operations plans specific measures for implementing substantial damage assessments after a flood (elements FRO2 and FRO5).

Class Prerequisites

- As a prerequisite to achieving CRS Class 9, communities must develop a plan for managing floodplain-related construction certificates (including Elevation Certificates) within their communities and must maintain each year a 90% accuracy rate for those construction certificates.
- As a prerequisite for achieving CRS Class 8, communities must adopt and enforce at least one foot of freeboard for residential buildings in all numbered zones of the Special Flood Hazard Area (SFHA).

Clarifications

- With the addition of construction certificate management procedures (element CCMP) as a prerequisite to achieving CRS Class 9, the background information and discussion about Elevation Certificates in Section 300 and Section 310 have been re-organized. Although some new material has been added, most of what appears in the Section 300 entry, below, is not new but previously appeared in the *Coordinator's Manual* in Section 310 instead of Section 300. Clarifications have been added to help communities develop a plan for managing floodplain-related construction certificates, and to explain that a community must maintain a 90% accuracy rate for its construction certificates every year.
- The CRS approach to crediting stormwater management regulations (element SMR) and watershed master plans (element WMP) under Activity 450 (Stormwater Management) is being modified with this Addendum. Beginning in 2021, the CRS focus is shifting from watershed-wide management to a focus on managing the area within the community's jurisdiction, i.e., what the community itself has authority to manage. This is reflected in the entries below by some changes in terminology and by modifications to the impact adjustments for elements SMR and WMP.
- Some typographical errors and confusing language have been corrected.

How to Use the 2021 Addendum to the 2017 *CRS Coordinator's Manual*

This Addendum material is presented in an order that corresponds to the 2017 *Coordinator's Manual*. Only those sections of the *Coordinator's Manual* that are being changed appear in this Addendum. Each section begins with a short summary of the changes for that section. This is followed by a series of bulleted entries that identify the section or subsection and page number in the 2017 *Coordinator's Manual* at which the change is to be incorporated. Significant changes in each section are listed first, followed by more minor corrections, if any, most of which are needed to make other parts of the *Coordinator's Manual* consistent with the new language (such as re-numbering where a new subsection has been inserted, or a implementing a change in terminology). Those portions of the 2017 *Coordinator's Manual* that are not included in this Addendum remain unchanged. The Index and Appendices have not been updated.

For the convenience of communities, the new inserts and the replacement language are presented mostly as one or more full paragraphs, rather than as word-by-word changes. This makes it possible for the community to more easily incorporate the new material into whatever format it uses.

Addendum to

Section 116 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

The discussion in Section 116 about the importance of protecting natural floodplain functions is expanded to place more emphasis on threatened and endangered species. Some new paragraphs are added and some of the rest has been re-organized slightly. For simplicity, the entire subsection Section 116.a is replaced with the language below. There are no changes to Section 116.b or 116.c.

Revised Subsection Focuses on Threatened and Endangered Species

◆ On page 110-12, the entire subsection 116.a is replaced with this revised material:

116.a. Natural Floodplain Functions and Threatened and Endangered Species

Floodplains in riverine and coastal areas perform natural functions that cannot be replicated elsewhere. The CRS provides special credit for community activities that protect and/or restore natural floodplain functions, even though some of the activities may not directly reduce flood losses to insurable buildings. There are many reasons to protect floodplains in their natural state.

When kept open and free of development, floodplains provide the necessary flood water conveyance and flood water storage needed by a river or coastal system. When a floodplain is allowed to perform its natural function, flood velocities and peak flows are reduced downstream. Natural floodplains reduce wind and wave impacts and their vegetation stabilizes soils during flooding.

Floodplains in their natural state provide many beneficial functions beyond flood reduction. Water quality is improved in areas where natural cover acts as a filter for runoff and overbank flows; sediment loads and impurities are also minimized. Natural floodplains moderate water temperature, reducing the possibility of adverse impacts on aquatic plants and animals.

Floodplains can act as recharge areas for groundwater and reduce the frequency and duration of low flows of surface water. Floodplains and coastal areas provide habitat—especially breeding and feeding areas—for diverse species of flora and fauna, some of which cannot live anywhere else, and some of which have been identified as needing special protection because their numbers are dwindling. Ways in which the CRS supports the protection of threatened and endangered species and their critical habitat are discussed at the end of this subsection.

Some Natural Functions of Floodplains

WATER RESOURCES

Natural Flood and Erosion Control

- Provide flood storage and conveyance
- Reduce flood velocities
- Reduce peak flows
- Reduce sedimentation

Water Quality Maintenance

- Filter nutrients and impurities from runoff
- Process organic wastes
- Moderate temperature fluctuations

Groundwater Recharge

- Promote infiltration and aquifer recharge
- Reduce frequency and duration of low surface flows

BIOLOGICAL RESOURCES

Biological Productivity

- Rich alluvial soils promote vegetative growth
- Maintain biodiversity
- Maintain integrity of ecosystems

Fish and Wildlife Habitats

- Provide breeding and feeding grounds
- Create and enhance waterfowl habitat
- Protect habitats for rare and endangered species

– *A Unified National Program for Floodplain Management*
FEMA-248 (1994)

Credit for Protecting Natural Floodplain Functions

The CRS encourages state, local and private 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 other public and private activities that preserve and protect natural and beneficial floodplain functions. Credits for doing this are found in the following activities:

- Activity 320 (Map Information Service)—Credits advising people about areas that should be protected because of their natural floodplain functions.
- Activity 330 (Outreach Projects)—Credit is provided for outreach projects that include descriptions of the natural functions of the community's floodplains.
- Activity 350 (Flood Protection Information)—Credit points are available for a website that provides detailed information about local areas that should be protected for their natural floodplain functions and how they can be protected.
- Activity 420 (Open Space Preservation)—Extra credit is provided for open space areas that are preserved in their natural state; have been restored to a condition approximating their pre-development natural state; or have been designated as worthy of preservation for their natural benefits, such as being designated in a habitat conservation plan.
- Activity 430 (Higher Regulatory Standards)—Regulations that protect natural areas during development or that protect water quality are credited.

- Activity 440 (Flood Data Maintenance)—Adding layers to the community's geographic information system (GIS) with natural floodplain functions (e.g., wetlands, designated riparian habitat, flood water storage areas) is credited.
- Activity 450 (Stormwater Management)—Erosion and sediment control, water quality, and low-impact development techniques minimize the impacts of new development. These measures are credited, along with regulations that require the maintenance of natural flow regimes.
- Activity 510 (Floodplain Management Planning)—Extra credit is provided for plans that address the natural resources of floodplains and recommend ways to protect them.
- Activities 520 (Acquisition and Relocation), 530 (Flood Protection), and 540 (Drainage System Maintenance)—Measures such as capital improvement programs and drainage improvement projects can reduce flood losses. No such programs or projects can be credited unless a thorough environmental review is conducted and documented.

A community that wants to explore what it can do under the CRS activities listed above could start by preparing a natural functions plan (described and credited under Activity 510 (Floodplain Management Planning)). That will help to identify the existing and desired natural functions and to generate recommendations for how to preserve and increase those functions.

Credit for Protecting Threatened and Endangered Species

As noted in the previous section, floodplains and coastal areas can serve as habitat for many animals and plants. One group of animals and plants deserving special protection are threatened and endangered species. Because of their declining numbers, these species have been listed by the U.S. Fish & Wildlife Service or the National Marine Fisheries Service as needing protection under the provisions of the Endangered Species Act. They "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people" (Endangered Species Act of 1973 (16 *U.S.C.* § 1531 *et seq*.)). In addition, many states maintain their own lists of species that are considered threatened, endangered, or "of concern."

More and more, floodplain managers are recognizing the close relationship between protection of flood-prone property and protection of threatened and endangered species. Many good floodplain management practices, such as keeping wetlands, stream banks, and beaches in their undisturbed natural condition, also support the protection of habitats that are essential for the survival of many threatened and endangered species.

Supporting the conservation and recovery of threatened and endangered species is a worthy goal in itself and also is called for under the Endangered Species Act. Section 7 of the Act gives all federal agencies a responsibility to use their authorities in support of the Act. Many states and communities have made protection of threatened and endangered species one of their own priorities.

The CRS encourages and credits actions that further the conservation and recovery of threatened and endangered species under the following activities.

- Activity 320 (Map Information Service)—This activity credits providing information about areas that have been designated as critical habitat, can serve as breeding grounds, or otherwise support threatened and endangered species.

- Activity 330 (Outreach Projects)—Outreach projects and programs for public information receive credit for messages on protecting threatened and endangered species that live in the area, such as explaining fishing restrictions or keeping pets on leashes.

- Activity 350 (Flood Protection Information)—Having materials on protecting local species in the local public library and on the community's website is credited.

- Activity 420 (Open Space Preservation)—Preserving open space in the floodplain helps many species. Bonus credit is provided if the open space is in its natural state and even more credit if it has been designated as critical habitat for a threatened or endangered species. Other credits that help species include preserving open space on eroding shorelines, offering incentives to developers to keep the floodplain open, zoning flood-prone areas for large lot sizes to preserve low density uses, and preserving stream banks and shorelines in their natural state.

- Activity 430 (Higher Regulatory Standards)—As an alternative to keeping floodplains open, this activity credits regulations that protect habitat when floodplains are developed. These include prohibiting filling in the floodplain and regulating development in areas subject to coastal erosion (which often are essential areas for many species, such as shore birds and sea turtles).

- Activity 440 (Flood Data Maintenance)—Including maps of the range and habitat for threatened and endangered species in the community's GIS is credited because it provides important information to GIS users, such as permit officials and highway planners, who need to take protection of these areas into account.

- Activity 450 (Stormwater Management)—Protecting and improving water quality and maintaining more consistent flows over time help many aquatic species and are credited by regulations that require new developments to use low impact development techniques, require control of the volume of runoff, or develop an overall plan for the watershed that addresses threatened and endangered species.

- Activity 510 (Floodplain Management Planning)—In addition to crediting inclusion of natural floodplain functions in a floodplain management or hazard mitigation plan, this activity has a separate element for plans that address protecting natural floodplain functions and a new credit for preparing and implementing a floodplain species assessment.

- Activities 520 (Acquisition and Relocation) and 530 (Flood Protection)—The prerequisite environmental and historic preservation certification process can identify opportunities for reuse of the sites to support the conservation and recovery of threatened and endangered species.

- Activity 540 (Drainage System Maintenance)—This activity encourages communities to regulate dumping in streams and to develop habitat-friendly approaches to clearing debris in drainageways.

A community that wants to explore what it can do under these activities could start with reviewing *CRS Credit for Habitat Protection* and preparing a Floodplain Species Assessment, which is credited under Activity 510 (Floodplain Management Planning). More information on these and on protecting threatened and endangered species and habitat in general can be found in Section 514.

Addendum to

Section 211 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

A new prerequisite to achieving Class 9 is introduced, requiring communities to develop a plan for managing floodplain-related construction certificates (including an annual 90% accuracy rate). A new prerequisite for achieving Class 8 is introduced, requiring communities to adopt and enforce freeboard for residential buildings in their SFHAs. The earlier Class 6 prerequisite—meeting the Class 9 prerequisites—is changed to require all Class 6 communities to meet the Class 8 prerequisites, including the freeboard requirement.

New Prerequisite for Class 9

◆ On page 210-1, under the Class 9 prerequisites, subsection (3) is replaced with the following:

(3) The community must

(a) Maintain all required floodplain-related construction certificates as described in Section 301.b for all buildings constructed, substantially improved, and/or reconstructed due to substantial damage in the Special Flood Hazard Area (SHFA) after the community applies for CRS credit.

(b) Achieve 90% accuracy on its floodplain-related construction certificates during its annual review. This is explained in Section 301.e.

(c) Receive credit for construction certificate management procedures (element CCMP) under Activity 310 (Elevation Certificates).

◆ On page 210-2, under the Class 9 prerequisites, the first sentence of subsection (5) is replaced with this sentence:

The community must maintain in force flood insurance policies for insurable buildings owned by the community and located in the SFHA shown on the community's Flood Insurance Rate Map (FIRM).

New Prerequisite for Class 8

◆ On page 210-4, a new subsection is inserted:

211.b. Class 8 Prerequisites

(1) The community must meet all the Class 9 prerequisites.

(2) The community must adopt and enforce at least a 1-foot freeboard requirement (including machinery or equipment) for all residential buildings constructed, substantially improved, and/or reconstructed due to substantial damage throughout its SFHA where base flood elevations have been determined on its currently effective FIRM or in its Flood Insurance Study (FIS), except those areas that receive open space credit under Activity 420 (Open Space Preservation).

The Class 8 prerequisite can be met through the enforcement of local ordinances or building codes, and/or state building codes, provided the freeboard standard applies to all residential buildings, whether single-family, multi-family, or manufactured. This includes the replacement of manufactured homes in pre-FIRM manufactured home parks.

The ordinance or building code must require that machinery or equipment be elevated to at least 1 foot above the base flood elevation for buildings newly constructed, substantially improved, and/or reconstructed due to substantial damage. This requirement includes machinery and equipment placed within attached garages and/or within enclosures below elevated buildings, with the exception of utility meters and equipment specifically designed to withstand inundation according to the standards of the International Residential Codes and the NFIP. The Class 8 freeboard prerequisite will be met provided that attached garages and enclosures below elevated buildings meet the minimum requirements of the NFIP (elevated to the base flood elevation or having proper openings).

Communities that enforce an adopted freeboard standard that meets the Class 8 prerequisite will be provided with freeboard (element FRB) credit under Activity 430 (Higher Regulatory Standards). Credit will be evaluated at the next CRS verification visit or next modification.

Updated Prerequisite for Class 6

◆ Under **Class 6 Prerequisites** on page 210-4, subsection (1) replaced with this:

(1) The community must meet all the Class 8 prerequisites.

Clarifications, Updates, and Corrections

◆ Under **Class 6 Prerequisites** on page 210-4, subsection 211.b is re-numbered to read:

211.c. Class 6 Prerequisites

◆ Under **Class 4 Prerequisites** on page 210-4, subsection 211.c is re-numbered to read:

211.d. Class 4 Prerequisites

◆ Under **Class 4 Prerequisites** where it continues on page 210-5, two typographical errors are corrected in subsection (3)(a)(ii) and in (3)(b). The replacement language reads:

(ii) The community must receive at least 700 points (after the impact adjustment) under the other elements of Activity 430 and under Sections 422.a, f, and g under Activity 420 (Open Space Preservation).

(b) Activity 450 (Stormwater Management)—The community must receive the following credits for its watershed management plan(s) (WMP) under Section 452.b:

◆ Under **Class 4 Prerequisites** where it continues on page 210-5, the fifth bullet of subsection (4) is clarified to read:

○ 450—Managing the volume of stormwater runoff (SMR, DS bonus credit),

◆ Under **Class 1 Prerequisites** on page 210-6, subsection 211.d is re-numbered to read:

211.e. Class 1 Prerequisites

◆ Under **Class 1 Prerequisites** where it continues on page 210-7, subsection 4(a)(i) is replaced with the following to clarify the scoring:

(i) The community must be enforcing regulations that discourage development in the floodplain. This is demonstrated by receiving a combined total of at least 150 points (before the impact adjustment) from open space incentives (OSI) in Section 422.e and development limitations (DL) in Section 432.a.

◆ Under **214.a. Modification Criteria** where it continues on page 210-14, a new subsection (7) is inserted, and the existing subsection is re-labelled (8). The replacement segment for the top of page 210-14 is this:

(4) If a community is modifying an activity previously applied for, its submittal must include documentation for both the new elements of the activity and those that were previously credited, if they are still being implemented.

(5) The ISO/CRS Specialist verifies only the activity(ies) being modified and reviews the rest at the next cycle verification visit. There are two exceptions to this, as noted under (6) and (7), below.

(6) The ISO/CRS Specialist will automatically update the community's credit points for

(a) The community's BCEGS classification (a Class 6 and Class 4 prerequisite and credited in Section 432(h));

(b) The community's credit for the state dam safety credit (Section 632.a); and

(c) The county growth adjustment (Section 710). If the growth adjustment is changed, the total points for all affected activities in the 400 series will reflect the new factor.

(d) If the community's repetitive loss category has changed since the previous cycle verification, the community must comply with Section 502.a, as applicable.

(7) A community that submits a modification that would result in a class change must meet the pertinent class prerequisites in effect at the time of the modification, as listed in the *Coordinator's Manual* and *Addendum* in effect at the time or the modification request. These prerequisites are in addition to the requirement for the additional credit points needed for a class increase.

(8) The community's entire program is verified with a verification visit under the following circumstances:

(a) If the modification will result in a two-class improvement, or

(b) If the *Coordinator's Manual* has substantially changed most of the rest of the community's credits.

In these situations, the verification visit counts as a cycle verification visit and the community's cycle schedule starts over.

Addendum to

Section 230 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

The revised procedures for collecting and reviewing construction certificates for CRS credit in Section 301 and under Activity 310 result in a slight change in the process followed by the CRS for verifying a community's credit. Accordingly, two changes are introduced in Section 230, Verification.

Updates and Clarifications

◆ Under **Preparation** on pages 230-7 and 230-8, the language is revised to reflect the new procedure for reviewing construction certificates. The two paragraphs are replaced with this single paragraph:

> **Preparation**
> The documentation that is needed for the verification visit is listed in the "Documentation Provided by the Community" section for each element or activity. The ISO/CRS Specialist will send a list of typical documentation with the meeting confirmation letter. Other documentation is collected during the visit and either reviewed then or taken by the ISO/CRS Specialist to review later.

◆ Under **Verification Thresholds** on page 230-9, the list of bullets is revised to reflect the new procedure for reviewing construction certificates. The three bullets are replaced with these two:

- Floodplain and stormwater management regulations in the 400 series: 80%; and
- All others: 50%.

Addendum to

Section 301 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

To provide better guidance for communities in managing the various construction certificates that are needed to mitigate flood damage and also receive CRS credit, a new Section 301 is created by relocating guidance from Sections 311.a, b, and c of the 2017 *Coordinator's Manual*, and revising and expanding that guidance. The figures in this new section have been relocated from the 2017 edition of Section 311 and renumbered.

Expanded Guidance on Construction Certificates

◆ On page 300-4, a new Section 301 is inserted:

301 Construction Certificate Requirements

The National Flood Insurance Program (NFIP) requires that participating communities maintain a record of the elevation of the lowest floor of any new building or substantial improvement built in the SFHA (see the *Code of Federal Regulations* (44 *CFR* §60.3(b)(5)(iii))). In 44 *CFR* §59.22(a)(9)(iii), the NFIP also requires that communities make their elevation and related building information available for public inspection and flood insurance rating.

Participation in the CRS requires that, in addition to the NFIP requirements, communities obtain other floodplain-related construction certifications and ensure that they are filled out completely and correctly. This should be done as soon as construction is complete, preferably by someone who is familiar with the NFIP, and before the certificate of occupancy or certificate of use is issued. It is vital to get accurate certifications filed while the community still has authority to get corrections made.

Accurate and readily available data on a building's flood zone, elevation, and other construction information are essential to insurance agents for processing an application for a flood insurance policy. Such information not only contributes to accurate insurance rating but also helps determine whether buildings are compliant with NFIP requirements.

Therefore, a prerequisite for participation in the CRS is that communities obtain, review, correct, and maintain all these certificates; make them available to the public; and have written procedures for this process, as described in Section 310.

301.a. CRS Participation Requirement

The community is required to maintain "finished-construction" Elevation Certificates and all other required floodplain-related construction certificates (see Section 301.b) on all buildings in the community's Special Flood Hazard Area (SFHA) that are constructed, substantially improved, and/or reconstructed due to substantial damage after the community applies for CRS credit. Communities must review the certificates and make sure at least 90% of them are correct according to the verification process. Written procedures for the management of construction certificates (see Activity 310), are required as well, and must meet the credit criteria in Section 312.a.

Those few NFIP communities that have no SFHA may still receive credit for this activity since credit is for having written procedures in place on how to handle construction certificates once they are obtained from property owners or developers. Communities should remember, however, that a CRS community with no SFHA that either subsequently receives a FIRM from FEMA that delineates areas of SFHA or annexes an area with an SFHA must begin maintaining construction certificates on the date of the FIRM or annexation or it will lose its credit.

Some communities require floodplain-related construction certificates for new buildings in flood-prone areas that are outside the SFHA but are regulated by the community. The CRS encourages this as a good floodplain management practice. However, because the certificates are not used in flood insurance rating, there is no requirement under this activity that certificates for buildings outside the SFHA be maintained or submitted for review.

The four specific participation requirements are these:

(1) The community must maintain the completed construction certificates listed in Section 301.b, Required Floodplain-related Construction Certificates, for all insurable buildings constructed, substantially improved, and/or reconstructed due to substantial damage in the SFHA every year and must supply these certificates annually as prescribed by the CRS (see Section 301.e, Construction Certificate Verification). "Buildings" are defined in Section 302.a.

(2) The community must review all its required construction certificates to ensure that they are complete and that the information is correct. This is described in in Section 301.c, Construction Certificate Checklists and Section 301.d, Getting Correct Construction Certificates. At least 90% of the certificates must be correct at each annual review in order for the community to remain in the CRS.

(3) The community must make copies of construction certificates readily available to anyone upon request. All participating communities must be able to retrieve the certificates, including those from projects whose permit files may have been archived or discarded.

(4) The community must have written procedures for the management of its floodplain-related construction certificates that includes a description for how the community implements requirements (1), (2), and (3), and following the criteria listed in Section 312.a.

301.b. Required Floodplain-related Construction Certificates

Under this activity a community is REQUIRED TO EMPLOY ALL FIVE OF THE FOLLOWING where appropriate. For CRS purposes, therefore, "construction certificates" means all required floodplain-related certificates listed in this sub-section that apply to the community's situation (e.g., inland communities will not have use for a V zone design certification).

- All new buildings or substantial improvement built in the SFHA must have a record showing that the lowest floor is at or above the base flood elevation, using the **FEMA Elevation Certificate** (FEMA Form 086-0-33).
- Floodproofed non-residential buildings require **FEMA's Floodproofing Certificate for Non-Residential Structures** (FEMA Form 086-0-34). A separate Elevation Certificate is not needed for these buildings. The 2015 Floodproofing Certificate requires elevations based on finished construction.
- A **V Zone design certificate** is required for all buildings constructed, substantially improved, and/or reconstructed due to substantial damage in coastal high hazard areas (V Zones and coastal A Zones, where credited) after the community's first verification visit under the 2013 edition of the *Coordinator's Manual*.
- A sample V Zone design certificate is shown in Figure 301-1. Communities with alternative forms or certifications may submit them to their ISO/CRS Specialists to see if they meet this activity's criteria.
- Communities that have received a residential basement floodproofing exception must use **FEMA's Residential Basement Floodproofing Certificate** (FEMA Form 086-0-24) where applicable.
- When engineered flood openings are installed in the foundation of a building, an **engineered opening certification** must be attached to the Elevation Certificate. The International Code Council® Evaluation Service (ICC-ES) produces reports for engineered flood openings, and individual certifications also can be done provided that they cover all required items. Engineered opening certifications are required for all buildings constructed, substantially improved, or reconstructed due to substantial damage, since the community's first verification visit under the 2013 *Coordinator's Manual*.

Copies of the FEMA Elevation Certificate and the FEMA Floodproofing Certificate can be downloaded from FEMA's website. Instructions are included with the forms.

For new construction, only the current FEMA forms are acceptable. A community may receive credit by transferring data from other forms onto a FEMA certificate.

NOTE: *The most recent Elevation Certificate form was published by FEMA on February 21, 2020 (expiration date November 30, 2022). Even though it is unchanged from the previous one, this newer form must be used by anyone who signs and dates the form on or after February 21, 2020.*

V ZONE DESIGN CERTIFICATE

Name_____ Policy Number (Insurance Co. Use)_____

Building Address of Other Description_____

Permit No._____ City_____ State_____ Zip Code_____

SECTION I: Flood Insurance Rate Map (FIRM) Information

Community No._____ Panel No._____ Suffix_ FIRM Date_____ FIRM Zone(s)_____

SECTION II: Elevation Information Used for Design

[NOTE: This section documents the elevations/depths used or specified in the design – it does not document surveyed elevations and is not equivalent to the as-built elevations required to be submitted during or after construction.]

1. FIRM Base Flood Elevation (BFE) ..... _____ feet*
2. Community's Design Flood Elevation (DFE) ..... _____ feet*
3. Elevation of the Bottom of Lowest Horizontal Structure Member ..... _____ feet*
4. Elevation of Lowest Adjacent Grade ..... _____ feet*
5. Depth of Anticipated Scour/Erosion used for Foundation Design ..... _____ feet
6. Embedment Depth of Pilings of Foundation Below Lowest Adjacent Grade ..... _____ feet

* Indicate elevation datum used in 1-4: ☐ NGVD29 ☐ NAVD88 ☐ Other_____

SECTION III: V Zone Design Certification Statement

I certify that: (1) I have developed or reviewed the structural design, plans, and specifications for construction of the above-referenced building and (2) that the design and methods of construction specified to be used are in accordance with accepted standards of practice** for meeting the following provisions:

- The bottom of the lowest horizontal structural member of the lowest floor (excluding piles and columns) is elevated to or above the BFE.
- The pile and column foundation and structure attached thereto is anchored to resist flotation, collapse, and lateral movement due to the effects of the wind and water loads acting simultaneously on all building components. Water loading values used are those associated with the base flood***. Wind loading values used are those required by the applicable State or local building code. The potential for scour and erosion at the foundation has been anticipated for conditions associated with the base flood, including wave action.

SECTION IV: Breakaway Wall Design Certification Statement

[NOTE. This section must be certified by a registered engineer or architect when breakaway walls are designed to have a resistance of more than 20 psf (0.96 kN/m2) determined using allowable stress design]

I certify that: (1) I have developed or reviewed the structural design, plans, and specifications for construction of breakaway walls to be constructed under the above-referenced building and (2) that the design and methods of construction specified to be used are in accordance with accepted standards of practice** for meeting the following provisions:

- Breakaway wall collapse shall result from a water load less than that which would occur during the base flood***.
- The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (see Section III).

SECTION V: Certification and Seal

This certification is to be signed and sealed by a registered professional engineer or architect authorized by law to certify structural designs. I certify the V Zone Design Certification Statement (Section III) and _____ the Breakaway Wall Design Certification Statement (Section IV, check if applicable).

Certifier's Name _____ License Number_____

Title_____ Company Name_____

Address_____

City_____ State_____ Zip Code_____

Signature_____ Date_____ Telephone_____

Note: The V Zone design certificate is not a substitute for the NFIP Elevation Certificate (see Fact Sheet No. 1.4, *Lowest Floor Elevation*), which is required to certify as-built elevations needed for flood insurance rating.

Figure 301-1. A sample V Zone design certificate (from FEMA's *Home Builder's Guide to Coastal Construction*, Technical Fact Sheet No. 1.5).

301.c. Construction Certificate Checklists

As noted in Section 301.a, the community must review its required construction certificates to ensure that the information is correct and must meet a 90% accuracy threshold in doing so. The CRS Resource Specialist collects all certificates the community is required to submit and checks them for specific items. The CRS checklist for the 2006, 2009, 2012, 2015 and 2019 Elevation Certificate forms is shown in Figure 301-2. The CRS Resource Specialist can provide a form with the checklist items highlighted as well as similar checklists for earlier versions of the FEMA forms. Checklists for the Floodproofing Certificate, V Zone design certificate, and the Residential Basement Floodproofing Certificate can be obtained from the ISO/CRS Specialist.

If any of the items on the checklist are not completed or are incorrect, that certificate will count against the 90% accuracy requirement as explained in Section 301.e.

Note that, although Item A6. of the instructions to the Elevation Certificate form requires photos of the structure, the photos are only required for purchasing flood insurance. Photos are not required for the community's permit records nor are they required for CRS credit. However, a community that does have them is encouraged to submit them with its certificates because they can contribute to understanding the building's construction. In addition, photos are encouraged and credited as part of the three inspections for regulations administration credit (element RA) in Section 432.q.

301.d. Getting Correct Construction Certificates

It is the community's responsibility to ensure that the construction certificates it maintains have been completed correctly. Certificates provided by surveyors must be proofread and corrected if errors or omissions are found. Although the surveyed elevations are likely to be correct, it is not unusual for surveyors to enter the wrong FIRM date or diagram number or to leave some entries blank in Section C of the Elevation Certificate form.

One way in which communities have improved the quality of their Elevation Certificates is by completing Sections A and B at the time of the permit application. The partially completed form then is given to the applicant or to the surveyor, who then can focus on completing the surveyed information in Section C. This has been shown to reduce many of the more common errors.

For certificates with omitted or incorrect checklist items, the community has these options:

(1) For any inaccurate or incomplete information in Section C2 of an Elevation Certificate, the local official should request a new certificate.

(2) If incomplete or inaccurate information is found in the other sections, the local official can do the following. As a general rule, and as law in some states, the local official should not mark up a signed and sealed form.

- The forms may be returned to the surveyor with instructions on what needs to be changed or corrected;

SECTION A—PROPERTY INFORMATION

A2 and A3 Complete street address or property description. In either case, the city, state, and zip code must be listed.

A4 Building Use: must be filled in and accurately identifies the use of the building.

A6 Photographs: Photographs are not required for CRS credit. However, they are required for writing a flood insurance policy and they can be very helpful for compliance records.

A7 Building diagram number.

A8 a), b), and c) Enclosure and crawl space information for buildings that are diagram 6, 7, 8, or 9.

A9 a), b), and c) Attached garage information. If there is no attached garage, enter "N/A" in all three spaces. If there is an attached garage and there are no openings, the correct entry is "zero," even if the garage is above the BFE.

A8 and A9 If the square footage of the crawlspace or garage is larger than the square inches of the openings AND "(d) Engineered flood openings" is checked "yes," then there must be a certification by a registered design professional or a copy of the ICC Evaluation Service report.

SECTION B—FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1 NFIP community name/community number.
B4 Map AND panel number.
B5 Panel number and suffix.
B7 FIRM panel effective/revised date.
B8 Flood zone(s) in which the building is located.
B9 Base flood elevation(s).
B10 The source of the base flood elevation data or base flood depth entered in B9.
B11 The elevation datum used for the base flood elevation in B9.

SECTION C—BUILDING ELEVATION INFORMATION (when a survey is required)

C1 Basis for building elevations: Note: "Finished construction" must be checked unless the building is still under construction. The ISO/CRS Specialist will not review Elevation Certificates for buildings still under construction, unless requested to by the community.

C2 Elevations. The vertical datum and datum used for entries a) through h) must be completed. Items a) through g) must have an entry.
Elevation items a), f), and g) must be recorded on every certificate. If an item does not apply, enter "N/A" in the fields where no data are being supplied.
Items b) and c) must be completed with an elevation if they are applicable and if that letter appears on the diagram on pages 7−9 of the instructions.

If there is an attached garage, an elevation must be entered for item d), otherwise the entry is "N/A." If there is machinery and/or equipment that service the building, an elevation must be entered for item e), otherwise the entry is "N/A."

Figure 301-2. CRS Checklist for the 2006, 2009, 2012, 2015, and 2019 FEMA Elevation Certificate forms.

SECTION D—CERTIFICATION BY A REGISTERED DESIGN PROFESSIONAL

Certifier's name and license number

Certifier's signature

Date

If there is a signature and/or date in the box, there does not have to be a separate signature or date on the line.

SECTION E—BUILDING ELEVATION INFORMATION (when a survey is not required in a Zone AO or a Zone A without a base flood elevation)

E1 a) and b) Enter the difference between the top of the bottom floor and the highest and lowest adjacent grade.

E2 For Building Diagrams 6–-9 with openings, enter the difference between the top of the next higher floor and the highest adjacent grade.

E3 Enter the difference between the top of the garage slab and the highest adjacent grade.

E4 Enter the difference between the top of the platform for machinery or equipment and the highest adjacent grade.

Note: If Section E is used, then Sections F or G must be completed.

SECTION F—PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

This section is used if Section E is completed by the owner or owner's representative. If used, this section must include the property owner's or representative's name in the first line and the signature in the third line.

SECTION G—COMMUNITY INFORMATION

If G1 or G2 is checked, then the first and third lines after G10 (the local official's name and signature) must be completed.

NOTE: If a local official authorized by law to complete an Elevation Certificate fills out ALL the information (including elevation data), then G8, G9, and the signature block must be completed.

Figure 301-2 (cont.). CRS Checklist for the 2006, 2009, 2012, 2015, and 2019 FEMA Elevation Certificate forms.

- The local official can prepare a separate memo with the correct information and attach the memo to the form (see Figure 301-3). When the certificate is provided to an inquirer, the memo must be included with it; or
- For Elevation Certificates, the local official can note the changes or corrections in Section G.

[Community letterhead]

Memo of Review for Correctness and Completion

The attached FEMA Elevation Certificate has been reviewed by this office.
The items noted below are not correct on the attached form and should read as entered on this page.

****BUILDING ADDRESS MUST BE ENTERED****
****MUST BE SIGNED AND DATED****

SECTION A - PROPERTY INFORMATION	For Insurance Company Use:
A1. Building Owner's Name	Policy Number
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.	Company NAIC Number
City State ZIP Code	

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):
- a) Square footage of crawlspace or enclosure(s) _____ sq ft
- b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____
- c) Total net area of flood openings in A8.b _____ sq in
- d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:
- a) Square footage of attached garage _____ sq ft
- b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____
- c) Total net area of flood openings in A9.b _____ sq in
- d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use base flood depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date: ☐ CBRS ☐ OPA

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.

Local Official's Name	Title
Community Name	Telephone
Signature	Date
Comments	

Figure 301-3. An example of a cover sheet for a correction to an Elevation Certificate. Some communities use a correction form like this when an error or omission is found that can be corrected by the local official. It is stapled to the certificate that is made available to inquirers. Note that the community assumes responsibility for the accuracy of the changes it makes. This form must include the address of the building and be signed and dated. A copy may be obtained from the ISO/CRS Specialist.

301.e. Construction Certificate Verification

Each year at its annual recertification date, a community must submit the following:

(1) A list of all permits (the "Permit List") issued for new buildings constructed, substantially improved, and/or reconstructed due to substantial damage in the SFHA since the previous recertification due date (February 1, May 1, August 1, or October 15) or since the date the community applied to the CRS, whichever is later. The list must include the address of each building; the use of each building (e.g., residential, non-residential, or other term used in Section A4 of the FEMA Elevation Certificate); FIRM zone (AE, A, VE, etc.); whether it is a new building, a substantial improvement, or a reconstruction due to substantial damage; the date of the permit; and whether the permit is final.

(2) Copies of all required construction certificates as described in Section 301.b for all new buildings, substantial improvements, and/or reconstructions due to substantial damage in the SFHA that have been collected since the previous recertification due date, or the date of the community's initial application to the CRS, whichever is later. All certificates are to be submitted to the CRS Resource Specialist.

(3) If the community is applying for or receiving credit for regulating areas outside the SFHA, it must let its CRS Resource Specialist know. The community will then be advised whether the list of permits and copies of certificates in (1) and (2), above, should include properties in those non-SFHA areas.

Elevation Certificates Completed by the Community

Elevation Certificates can be completed by a local official who is authorized by law or ordinance to administer the community's floodplain management program, provided that the original surveyed elevations in Section C were obtained by a registered design professional.

A community can transfer data from a surveying project to the FEMA Elevation Certificate form if it can demonstrate that the source of the data was appropriate and if the source is described in Section G of the certificate.

The Permit List and certificates can be provided in paper or digital format, although digital format is preferred. Communities are encouraged to scan paper certificates at 300 dpi grayscale (no color). The fillable pdf versions of the certificates are preferred, for easier processing. If the community maintains digital copies of building permit records, digital copies of the certificates should be separated from the rest of the file so that they can easily be collected to meet this requirement. Individual certificate files, identified by address, should be submitted if at all possible. The community may charge inquirers a reasonable fee to cover the cost of copying the certificates.

For this credit, certificates are not needed for accessory structures; non-substantial improvements; or non-buildings such as fill, fences, swimming pools, cell towers, etc. Nor are certificates needed for properties outside the SFHA (except as noted in Section 301.e(3), above). If certificates are needed to verify credit under another activity, they should be submitted with that activity's documentation.

NOTE: *It is acceptable to show permits issued for buildings that do not yet have finished-construction certificates because construction has not been completed. It is also acceptable to have certificates for buildings that are not on the current Permit List because the permits were issued before the previous recertification's due date. A community should ensure that this is communicated to the CRS Resource Specialist.*

The CRS Resource Specialist should be notified if there have been no new buildings, substantial improvements, or reconstructions due to substantial damage in the SFHA since the last submittal.

The CRS Resource Specialist will review the certificates in accordance with the checklist and provide feedback to the community. For continued participation in the CRS, at least 90% of the community's certificates must be correct, i.e., have no errors on them (a missing certificate counts as an error). If less than 90% of the certificates pass, the community must correct them to maintain CRS participation. A community is given two chances (the initial submittal plus one opportunity to make corrections) to submit the proper certificates to achieve 90% accuracy.

A community's fulfillment of its construction certificate management requirement for achieving Class 9 is based on the review of certificates on the community's annual recertification due date: it is not part of the cycle verification process. During the year of a community's cycle verification, the required construction certificates will be reviewed by the CRS Resource Specialist in the same manner and at the same time as the community's recertification review, with one difference: only the Permit List and required certificates need to be submitted to the CRS Resource Specialist for that year's review. The rest of the documentation needed for recertification will be submitted and reviewed according to the cycle verification process (see Section 230). Separating the two processes during a verification year keeps the community's reporting period and due date for construction certificates the same from year to year.

If a community needs to make corrections to its Permit List and/or construction certificates, the reporting dates do not change. The list and certificates will be reviewed again at the next recertification due date. If a community cannot achieve the 90% accuracy requirement, it will lose its participation in the CRS at the effective date of the next *Flood Insurance Manual*.

Related Updates and Corrections

◆ On page 300-4, Section 301 is renumbered so that its title is replaced with this:

302 Impact Adjustments for Buildings

◆ On page 300-4, Section 301.a is renumbered so its title is replaced with this:

302.a. Definition of "Building"

◆ On page 300-5, Section 301.b is renumbered so its title is replaced with this:

302.b. Pre- and Post-FIRM buildings

◆ On page 300-5, Section 302 is renumbered so that its title is replaced with this:

303 Impact Adjustment Ratio

◆ On page 300-5, Example 302-1 is renumbered so its title is replaced with this:

Example 303-1.

◆ On page 300-6, Table 302-1 is renumbered so that its title is replaced with this:

Table 303-1. Impact adjustments for buildings.

◆ On page 300-6, section 302.a is renumbered so that its heading is replaced with this:

303.a. Counting Buildings

◆ On page 300-7, section 302.b is renumbered so that its heading is replaced with this:

303.b. bSF (buildings in the SFHA)

Addendum to

Section 310 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

As noted above, much of the background material from Section 311 was moved to the new Section 301. What remains has been re-organized slightly.

To better reflect the scope of the community's responsibility in applying construction standards to mitigate flood losses, the element EC is renamed CCMP, for construction certificate management procedures. A new Section 312.a is inserted as explanation.

◆ In the **Summary** box on page 310-1, Section 312.a is revised to read:

> **a. Construction certificate management procedures (CCMP)**: 38 points for a community's having written procedures that document how the community collects, reviews, corrects, maintains, and makes available to all inquirers the Federal Emergency Management Agency (FEMA) Elevation Certificates, FEMA Floodproofing Certificates, V-Zone design certificates, engineered openings certifications, and FEMA Residential Basement Floodproofing Certificates required for buildings built in the Special Flood Hazard Area (SFHA) after the date of application to the Community Rating System (CRS). All communities must receive credit for this element.

◆ In the **Summary** box on page 310-1, the Credit Criteria are replaced with this simplified revision:

> **Credit Criteria**
> Each element has a separate section describing its credit criteria.

◆ In the **Summary** on page 310-1, the Impact Adjustment section is replaced with this revision, which reflects the re-naming of element EC to CCMP:

> **Impact Adjustment**
> There is no impact adjustment for CCMP. The credit for ECPO and ECPR is adjusted based on the number of post-FIRM and pre-FIRM buildings in the community.

Revision of Activity 310

◆ Under **310 ELEVATION CERTIFICATE MANAGEMENT** on page 310-2, the introductory paragraph and all of **311 Background** are replaced with the following:

310 CONSTRUCTION CERTIFICATE MANAGEMENT

The OBJECTIVE of this activity is to maintain correct floodplain-related construction certificates—Federal Emergency Management Agency (FEMA) Elevation Certificates, FEMA Floodproofing Certificates, V-Zone design certificates, engineered openings certifications, and FEMA Residential Basement Floodproofing Certifications—for new and substantially improved buildings in the Special Flood Hazard Area (SFHA) as well as for development that existed before the community joined the CRS. This activity also addresses how a community provides for the management of certificates when development occurs.

311 Background

Because most building data are recorded on FEMA Elevation Certificates, Activity 310 is called "Elevation Certificates," but the discussion and criteria cover all other required floodplain-related construction certifications as well, as listed in Section 301.b.

The construction of new buildings, the substantial improvement of existing buildings, and the reconstruction of buildings due to substantial damage in the SFHA all require diligent oversight by a community. Comprehensive procedures that cover the collection, review, processing, maintenance, and public accessibility of all required certificates are essential to effective floodplain management. Unclear direction on when to require certain certificates, who performs inspections, who conducts reviews, or how certificates are stored for future use can result in mis-rated insurance policies as well as possible NFIP non-compliance. Casual procedures also result in inconsistent, missing, and lost permit documentation. Therefore, a community that participates in the CRS is required to create and update written management procedures for the handling of its floodplain-related construction certificates.

A prerequisite for reaching Class 9 in the CRS is maintaining required construction certificates from the date of a community's CRS application forward. This helps ensure appropriate development practices once a community joins CRS, but usually development already exists in the SFHA when the community joins the CRS. Accurate elevation and other data about those buildings, and whether they were built pre-FIRM or post-FIRM, are important for compliance and insurance purposes.

This activity provides credit to communities that create written procedures on how required floodplain-related construction certificates are obtained, reviewed, corrected, maintained, and made available to the public. Credit is also provided under this activity for complete and accurate Elevation Certificates on pre-FIRM and post-FIRM buildings.

◆ Beginning on page 310-2, portions of Section 311.a have been moved to new Section 301. Section 311.a is replaced with this revised subsection:

311.a. Activity Description

The maximum credit for Activity 310 is 116 points.

Credit is provided if the community creates written procedures that address the collection, review, correction, and maintenance of FEMA Elevation Certificates, FEMA Floodproofing Certificates, V-Zone design certificates, engineered openings certifications, and FEMA Residential Basement Floodproofing Certificates required for new buildings, substantially improved buildings, or buildings reconstructed due to substantial damage in the SFHA (see Section 301.b) after the community's initial date of application for the CRS. The procedures must describe how the community will make the construction certificates available to any inquirer. The community must review the certificates to ensure a minimum 90% accuracy.

Credit is also provided if the required construction certificates are obtained and correct for pre-FIRM and post-FIRM buildings in the SFHA. For CRS purposes, copies of these certificates may have been obtained recently or may have been part of the community's permit archive system. The certificates must be for "finished construction" and kept on FEMA forms. Elevation data for pre-FIRM or post-FIRM buildings can be entered on the current FEMA forms rather than on the form in effect at the time the building was built.

◆ On pages 310-5 through 310-11, subsections 312.b and 312.c are replaced with new subsections as follows:

311.b. Activity Impact Adjustment

There is no impact adjustment for CCMP. The impact adjustment ratios for ECPO and ECPO are included in the calculations for those two elements.

311.c. Credit Verification

For CCMP credit, the community must submit a copy of its current written procedures on how required construction certificates are obtained, reviewed, maintained, and made available to the public. If the community has all the items addressed in Section 312.a, Credit Criteria, credit will be given. Failure to have all items will result in no credit.

For ECPO and ECPR credit, the community must send its ISO/CRS Specialist a copy of the required construction certifications for all new buildings, substantial improvements, and reconstructions due to substantial damage in the SFHA during the appropriate time period (pre-FIRM or post-FIRM) since the last cycle verification visit. The information to be included is listed in Section 312.a, Documentation for ECPO [and ECPR] Provided by the Community.

The community also must submit the total number of buildings built during the pertinent time period (pre-FIRM or post-FIRM), along with the total number of construction certificates submitted for credit.

The Insurance Services Office, Inc., (ISO) will review the certificates in accordance with the checklist and current sampling procedures and provide feedback to the community. The community's credit for ECPO and ECPR is based on this first review. For example, if the community has 20 certificates but only 12 have no problems listed on the checklist, the community's credit will be

$$\text{ECPO} = 48 \times \frac{12}{20} = 28.80 \text{ points}$$

The credit for ECPO and ECPR is based on the first review of certificates submitted for the verification visit. It will not change after the community makes the needed corrections, but it can be rescored at the next visit based on a review of the next batch of certificates.

The certificates for ECPO and ECPR do not need to meet the 90% accuracy threshold. If there are problems on any certificates, the score is applied for the correct certificates and those that had problems can be corrected for the next cycle verification. There is no opportunity to increase the credit for the verification visit. The number of pre- and post-FIRM buildings is relatively static, unless there has been a map change or annexation in the SFHA since the previous verification. In those instances, the entire element will be re-evaluated and likely would be re-scored.

At each annual recertification date, the community again must provide a permit list, showing all buildings in the SFHA that are new, substantially improved, or reconstructed due to substantial damage during the previous year, along with copies of the required construction certificates for those buildings. These are reviewed and feedback given to the community. This review determines compliance with the Class 9 prerequisite. This is discussed in detail in Section 301. Annual verification of ECPO or ECPR is not required.

Revised Approach to Elevation and Other Certificates

◆ Under **312.a, Maintaining Elevation Certificates** on pages 310-12 and 312-13, the entire subsection is replaced with this:

312.a. Construction certificate management procedures (CCMP)

Credit for this element is 38 points.

CCMP credit is provided if the community maintains written procedures for the collection, review, correction, maintenance, and public accessibility of the required floodplain-related construction certificates (listed in Section 301.b) after the date of its application to the CRS.

If no buildings have been built or substantially improved in the SFHA since the CRS application date, the community can still receive credit for this element. The CRS prefers to see no buildings in the floodplain rather than provide credit for having records on those that have been built.

All communities are required to receive credit under this element in order to continue participation in the CRS (Class 9 prerequisite).

Credit Criteria for CCMP

(1) The procedures must be in writing, approved by the head of the department(s) that oversees the staff and duties included in the procedures, and updated when needed. The procedures must include the following:

(a) A description of **what types of construction certificates are required** by the community. The certificates required by FEMA and the CRS are listed in Section 301.b, but not all certificates are applicable to all communities, so the community needs to provide a list of which certifications are required within its jurisdiction.

(b) A description of **when the construction certificates are required** by the community. The written procedures must specify the points during the permitting process at which the various certificates are required to be submitted, along with the community requirements for obtaining a complete and correct finished-construction certificates before a certificate of occupancy is issued. For communities that do not issue certificates of occupancy, there must be an explanation that finished-construction certificates are required before a permit is finalized.

(c) A description of **what department or office collects** the required certificates and at what point this is done during the permitting process. A brief discussion should include how a certificate is processed through the permitting system.

(d) A description of **what department or office reviews** the required certificates and at what point this is done during the permitting process. Details must be included on who reviews the certificates (titles are acceptable), what their qualifications are (e.g., CFM or NFIP training), and at what point in the permitting process reviews are done.

(e) A description of **how the certificates are corrected**. The written procedures must give details on who specifically works with the certifier and how the process works. Attention must be given to how corrected certificates are relayed back to the professional who originally certified the form(s) so that future errors are minimized, and to the current property owner, because the error may affect the insurance rating of the building.

(f) A description of **how and where the certificates are maintained** by the community. Details must be included on whether certificates are stored as hard copies or digitally (or other), how soon they are filed/stored/archived after they are processed, where they are filed/stored/archived, any data backup procedures, and whether certificates for new development are stored differently than certificates on older buildings.

(g) A description of **how the certificates are made available to inquirers**. There must be an explanation of which department or office handles the request and the timeliness (and costs, if any) of fulfilling requests. If a community receives credit for having certificates from before it applied to the CRS, it must be able to retrieve those certificates, including those from projects whose permit files may have been archived or discarded.

(h) If a community requires certificates for development outside of the SFHA, this should be addressed appropriately in the written procedures.

Credit Points for CCMP

CCMP = 38 points for maintaining written procedures that address the collection, review, correction, maintenance, and the public accessibility of the required floodplain-related construction certifications

Impact Adjustment for CCMP

There is no impact adjustment because communities must require, review, and maintain copies of required construction certificates on ALL new construction and substantial improvement. There is no credit under this activity if the written procedures do not cover all required credit criteria.

Documentation for CCMP Provided by the Community

(1) At each verification visit,

(a) The written procedures, including the signature/approval of the appropriate department head, describing how the community requires, reviews, corrects, maintains, and provides copies of construction certificates to inquirers as outlined in the credit criteria section for CCMP.

◆ Under **Credit Criteria for ECPO** on page 310-14, the one-sentence criterion is replaced by the following new criteria:

Credit Criteria for ECPO

(1) The community must maintain all required construction certificates described in Section 301.b for all buildings in the SFHA that have been newly constructed, substantially improved, or reconstructed due to substantial damage during the period credited. “Buildings” are defined in Section 302.a.

(2) The community must review the certificates to ensure that they are complete and that the information is correct, and make copies of the certificates readily available to anyone upon request, following the process described in the community’s construction certificate management procedures required in Section 312.a. See also Section 301.c, Construction Certificate Checklists and Section 301.d, Getting Correct Construction Certificates.

◆ Under **Credit Criteria for ECPR** on page 310-15, the one-sentence criterion is replaced with the following new criteria:

Credit Criteria for ECPR

(1) The community must maintain all required construction certificates described in Section 301.b for all buildings in the SFHA that have been newly constructed, substantially improved, or reconstructed due to substantial damage during the period credited. "Buildings" are defined in Section 302.a.

(2) The community must review the certificates to ensure that they are complete and that the information is correct, and make copies of the certificates readily available to anyone upon request, following the process described in the community's construction certificate management procedures required in Section 312.a. See also Section 301.c, Construction Certificate Checklists and Section 301.d, Getting Correct Construction Certificates.

◆ The calculation formula for Activity 310 on page 310-17 is replaced with this:

313 Credit Calculation

c310 = cCCMP + cECPO + cECPR, where

cCCMP = the verified credit for the element CCMP based on whether the written procedures met all criteria,

cECPO = ECPO x rECPO, and

cECPR = ECPR x rECPR

◆ In **Example 313-1** on page 310-17 the illustration of the scoring process is replaced with the following:

Example 313-1.

A community has had Elevation Certificates to submit at each recertification due date since its previous cycle. The community is required to produce written procedures covering all the required credit criteria. The ISO/CRS Specialist has determined the procedures have met all criteria.

cCCMP = 38

The community has correct Elevation Certificates for 10 of its 22 post-FIRM buildings. As discussed above, rECPO = 0.45.

cECPO = 48 x 0.45 = 21.60

The community has Elevation Certificates for 122 of its 250 pre-FIRM buildings. As discussed above, rECPR = 0.49.

cECPR = 30 x 0.49 = 14.70

c310 = cEC + cECPO + cECPR

c310 = 38 + 21.60 + 14.70 = 74.30, which is rounded to 74

Related Updates and Corrections

◆ Because element EC is changed to CCMP, reference to EC in the first bullet of Example 220.c-1 on page 220-3 is also changed:

Example 220.c-1.

The elements and their acronyms in Activity 310 (Elevation Certificates) are

- CCMP, credit for construction certificate management procedures;

◆ On page 220-4, in the paragraph below the bulleted list, reference to EC is eliminated. The replacement paragraph reads:

A community need not apply for all of the elements in an activity in order to receive credit points for the activity. However, in some cases, one element may be required in order to obtain any credit. For example, MI1 is a prerequisite for any Activity 320 credit. These requirements are shown in the "Credit Criteria" section of the activity or element.

Addendum to

Activity 370 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

The maximum credit points for a flood insurance coverage improvement plan (element CP) and for providing technical assistance on flood insurance (element TA) are increased. Three new creditable elements are introduced: providing credit for distributing flood insurance information (element FIB), for holding insurance-related town hall meetings (element FIM), and for a state requirement for continuing education for flood insurance agents (element SCE).

◆ In the **Summary** box on page 370-1, the credit points and elements sections are revised, and three new elements are added, to read:

Maximum credit: 220 points

372 Elements

a. **Flood insurance coverage assessment (FIA):** Up to 15 points for assessing the community's current level of coverage and identifying shortcomings.

b. **Coverage improvement plan (CP):** Up to 30 points for a plan prepared by a committee that has representation from local insurance agents.

c. **Coverage improvement plan implementation (CPI):** Up to 60 points for implementing the projects in the CP plan.

d. **Technical assistance (TA):** Up to 35 points for providing advice about flood insurance.

e. **Flood insurance brochures (FIB)**: Up to 25 points for including flood insurance information with building permits or other direct distribution.

f. **Flood insurance meeting (FIM)**: Up to 40 points for a community town hall meeting or open house to promote flood insurance.

g. **State-required continuing education (SCE)**: Up to 15 points for a state requirement for continuing education on flood insurance for insurance agents.

◆ Section 371.a, beginning on page 370-3, is replaced with new language through which the credit points for a coverage improvement plan—CP and for technical assistance—TA are increased, and the three new elements are summarized. The new Section 371.a appears below.

371.a. Activity Description

The maximum credit for this activity is 220 points.

As noted under Activity 330 (Outreach Projects), one of the most effective ways to get a message across is to have it tailored to local audiences and repeated by different sources. This activity credits a similar approach to improve flood insurance coverage in a community.

This activity provides credit for a three-step process that allows communities to assess their own needs and receive credit for improving their coverage:

Step 1. Flood insurance coverage assessment (FIA). This element provides credit for assessing the community's current level of coverage and identifying shortcomings. The maximum credit for FIA is 15 points.

Step 2. Coverage improvement plan (CP). The plan is prepared by a committee that has representation from local insurance agents. The maximum credit for CP is 30 points.

Step 3. Implementation of the coverage improvement plan (CPI), Flood insurance brochures (FIB), and Flood insurance meeting (FIM)). The plan's projects are implemented. The maximum credit for CPI is 60 points, FIM is 25 points, and FIB is 40 points.

Credit for the three steps or elements is provided incrementally. That is, a community first prepares an assessment and circulates it for review and may request credit for that step in element FIA (Section 372.a). If the community then decides to proceed with a coverage improvement plan, credit is provided for that step in element CP when the plan is submitted to the governing body (Section 372.b). Finally, implementing the projects described in the coverage improvement plan is credited in element CPI (Section 371.c).

Credit is also available under this activity for technical assistance (element TA), i.e., providing advice about flood insurance similar to the flood protection assistance service credited under Activity 360 (Flood Protection Assistance). The maximum TA credit is 35 points.

Credit is available for flood insurance projects that are credited in element CP and element CPI that involve handing a flood insurance brochure directly to people (element FIB in Section 371.d), and for flood insurance open houses or town hall meetings at which one-on-one flood insurance advice is provided (element FIM in Section 371.e). Credit for FIB and FIM are provided, as appropriate, with CPI.

Credit is also available to a community under element SCE when the state requires that insurance agents receive continuing education credit on flood insurance.

Increased Credit for Elements CP and TA

◆ Under **Coverage Improvement Plan** on page 370-6, the credit points for CP are increased by replacing the first paragraph with this sentence:

372.b. Coverage improvement plan (CP)

The maximum credit for this element is 30 points.

◆ Under **Credit Criteria for CP** when it continues onto page 370-9, a new alternative is introduced by inserting a new subsection (7):

(7) Additional credit is available when the committee in credit criterion (2) includes two or more insurance agents (and comprises at least six people) and at least one agent is an Associate in National Flood Insurance (ANFI™). The insurance agents must participate in all meetings.

◆ Under **Credit Points for CP** on page 370-9, the points are revised with this replacement:

Credit Points for CP

CP = 15 points, for the development of the coverage improvement plan, plus 15, if two local insurance agents participate on the committee and at least one is an Associate in National Flood Insurance (ANFI™)

More information on the ANFI® certificate can be found at http://www.aicpcu.org/anfi.

◆ Under **Technical Assistance** on page 370-12, the credit is increased by replacing the first paragraph with this sentence:

372.d. Technical assistance (TA)

The maximum credit for this element is 35 points.

◆ Under **372.d Technical assistance (TA)** on page 370-12, a typographical error is corrected by replacing the second paragraph with this:

This credit is separate from FIA, CP, and CPI. The community does not need to prepare a flood insurance assessment or coverage improvement plan for this credit. However, the coverage improvement plan should discuss providing this technical assistance as a way to encourage people to purchase, maintain, or improve their coverage. If the service is credited under TA, it cannot also be credited as a CPI or OP project.

◆ Under **Credit Points for TA** on page 370-13, the formula is revised to reflect the increased credit. The new formula is this:

TA = the total of the following:

20, for providing the technical assistance service,

plus

15, if the service is provided by an Associate in National Flood Insurance (ANFI™)

New Credit for Flood Insurance Brochures and Meetings and State-required Continuing Education

◆ On page 370-13, three new credit elements are added by inserting the following:

372.e. Flood insurance brochures (FIB)

The maximum credit for this element is 25 points.

FIB credit is provided when the community distributes flood insurance brochures to residents and property owners.

This credit is additional credit with CP, and CPI. If the brochure is credited under FIB, it cannot also be credited as an OP project.

Credit Criteria for FIB

(1) The community must be receiving CP and CPI credit. Element FIB provides additional credit for implementing a project described in the CP.

(2) If the distribution of brochures is done by including them with issued permits, then the brochures must be included with all building permits issued throughout the community.

(3) If the distribution takes the form of a mailing to all residents, then the brochure must be specifically related to flood insurance and must be mailed at least annually to all residents of the SFHA, at a minimum. Messages about flood insurance that are included in other documents do not qualify for this credit.

(4) Records of the brochure distribution must be kept and provided for credit documentation.

Credit Points for FIB

FIB = the total of the following: 15, for providing a flood insurance brochure along with every building permit issued throughout the community, and 10, for annually mailing a flood insurance brochure at least to all residents of the SFHA.

Documentation for FIB Provided by the Community

(1) At each verification visit,

  (a) A copy of the brochure.

  (b) A description of when and how the brochure is provided.

(2) With the annual recertification,

  (a) Same as above.

372.f. Flood insurance meeting (FIM)

The maximum credit for this element is 40 points.

Credit Criteria for FIM

(1) The community must be receiving CP and CPI credit. FIM is additional credit for plan implementation of a project described in the credited coverage plan.

(2) The townhall meeting or open house must be for the specific purpose of the promotion, education, and assistance with flood insurance. Other public information may be provided at the event.

(3) The townhall meeting or open house must be promoted to all community residents and property owners

(4) The townhall meeting or open house must be held at least once a year.

(5) Additional credit is provided if a representative of the State Insurance Commissioner's office participates each year in the townhall meeting or open house. Participation means the Insurance Commissioner attends the event or sends a representative, and he or she engages with attendees by speaking or being accessible to answer insurance questions.

Credit Points for FIM

FIM = the total of the following:

20, for an annual townhall meeting or open house about flood insurance,

plus

20, if the State Insurance Commissioner's office participated

Documentation for FIM Provided by the Community

(1) At each verification visit,

(a) A copy of publicity of the meeting or open house and a copy of a sign-in sheet from the townhall meeting or open house.

(b) Documentation of the involvement of the State Insurance Commissioner.

(2) With the annual recertification,

(a) [Same as above.]

372.g. State-required continuing education (SCE)

The maximum credit for this element is 15 points.

SCE credit is provided to all communities within a state where insurance agents are required by the state to obtain continuing education credits for flood insurance.

Credit Criteria for SCE

(1) The community must be receiving CP credit.

Credit Points for SCE

SCE = EITHER

7 points, if the state mandates an initial three continuing education credits in flood insurance and a renewal course at least every four years,

OR

15 points, if the state mandates continuing education credits in flood insurance at every license renewal for insurance agents

Documentation for SCE Provided by the Community

(1) At each verification visit,

(a) A copy of or link to the state statue or state order that requires continuing education.

◆ Under **374 Credit Calculation** on page 370-13, the formula is revised to include the new elements:

c370 = FIA + CP + CPI + TA + FIB + FIM + SCE

Addendum to

Section 403 of the *CRS Coordinator's Manual*, 2017 Edition

Correction

- Table 403-1 under Section **403 Impact Adjustment Map**, on page 400-7 shows that an impact adjustment is applied to the scoring for problem site maintenance, element PSM, under Activity 540 (Drainage System Maintenance). The element PSM is removed from the table. There is no impact adjustment for PSM.

Addendum to

Section 404 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

This section is revised slightly to explain that the CRS uses the National Climate Assessment's sea level rise projections and data, and to provide a formula for applying a multiplier to certain regulatory elements when a community takes sea level rise into account.

Updates to Sea Level Rise Projections

◆ Section **404 Sea Level Rise Projections and the CRS**, on pages 400-14 and 400-15, is replaced with this updated material:

404 Sea Level Rise Projections and the CRS

The CRS incorporates the consideration of sea level rise into a number of elements, including element HHS credit for higher study standards under Activity 410 (Flood Hazard Mapping); CEOS credit for coastal erosion open space under Activity 420 (Open Space Preservation); CAZ credit for Coastal A Zones under Activity 430 (Higher Regulatory Standards); and WMP credit for a watershed master plan under Activity 450 (Stormwater Management). Including sea level rise in WMP is required for coastal communities to meet the Class 4 prerequisite, and HSS and CAZ credit with future-conditions hydrology is a Class 1 prerequisite. CRS prerequisites are described in Section 211.

Recognizing that (1) there is uncertainty inherent in estimating future sea levels, and (2) the accuracy of the models continues to improve, the CRS has adopted a "best available data" baseline for crediting community efforts to address sea level rise.

In alignment with 13 federal agencies, the CRS defers to the Congressionally mandated National Climate Assessments produced by the U.S. Global Change Research Program to determine a baseline. These reports are accessible at https://www.globalchange.gov/what-we-do/assessment.

Because sea levels are changing at different rates in different parts of the country, global projections must be adjusted to take local conditions into consideration. To do this, the CRS uses and recommends the U.S. Army Corps of Engineers' "Sea-Level Change Curve Calculator," an online-tool available at https://coast.noaa.gov/digitalcoast/tools/curve.html. The CRS anticipates that findings from future National Climate Assessments will be

incorporated into the Sea-Level Change Curve Calculator. If not, then the CRS will provide further guidance to communities, as needed.

For information, outreach, and planning elements (including those under Activities 410, 450, and 510) and meeting CRS Class prerequisites, the community must project out at least to the year 2100 using the intermediate-high projection from the latest-available National Climate Assessment projection at the time of its planning process.

For regulatory elements (Activities 420 and 430), credit is awarded on a graduated scale based on comparing the projected sea levels the community uses for these elements to the most recent National Climate Assessment intermediate-high projection for 2100 at the time of the verification visit. This formula updates how the "CFSL" variable in 420 CEOS and 430 CAZ is calculated.

$$CFSL = 1.5 \times \frac{\text{Community projection}}{\text{Baseline projection}}$$, where

Community projection = the projected future sea level used by the community for the credited element in units of height,

and

Baseline projection = the intermediate-high projection of future sea level from the latest National Climate Assessment at the time of the community's verification visit, localized for 2100 in units of height.

The maximum value for CFSL = 1.5

Addendum to

Activity 420 of the *CRS Coordinator's Manual*, 2017 Edition

Corrections

◆ In Section **421. Activity Description** on page 420-2, a typographical error in the number of maximum points is corrected. The new line reads:

> **421.a. Activity Description**
>
> The maximum credit for Activity 420 is 2,870 points.

◆ In **Example 422.b-1** on page 420-13, a typographical error in the calculation is corrected. The new line reads:

$$rDR = \frac{aDR}{aSFHA} = \frac{55.30}{504.40} = 0.11$$

Addendum to

Activity 430 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

To simplify scoring and documentation, state-mandated standards are being eliminated as a separate creditable element of the CRS. Communities will continue to receive credit for all state standards (building codes, freeboard, stormwater, etc.) under other elements and activities in the CRS. As a result of this change, references to element SMS at other locations in the *Coordinator's Manual* are eliminated.

Discontinuation of State-mandated Standards (element SMS)

- In the **Summary** box on page 430-1, under Credit Elements, item (p) State-mandated regulatory standards, is deleted. Item (q) is re-labeled. The last element in the list is therefore:

  p. Regulations administration (RA): Up to 67 points for having trained staff and administrative procedures that meet specified standards.

- Sub-section **430.p, State-mandated standards (SMS)**, beginning on page 430-53, is deleted.

Related Updates and Corrections

- Because element SMS is discontinued, references to SMS on the following pages are deleted:

  430-4 (**Impact Adjustment**), 430-60 **(Credit Calculation**), and 430-61 (**Example**)

- Sub-section **430.q, Regulations administration,** on page 430-55, is re-labeled to read:

  430.p. Regulations administration

Addendum to

Activity 450 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

Some language for element SMR—stormwater management regulations—is revised to focus the credit on the area over which the community has jurisdiction, instead of on the entire watershed, which usually extends outside the community.

Focus on Community's Jurisdiction for Stormwater Management

◆ In the **Summary** box on page 450-1, the Impact Adjustment description is revised to narrow the focus to the community's jurisdiction:

> **Impact Adjustment**
> The credit points for SMR and WMP are adjusted by ratios reflecting the proportion of the community affected by the regulations or the plan. There is no impact adjustment for elements ESC or WQ.

◆ Under **452.a Stormwater Management Regulations** on page 450-4, the first sentence of the second paragraph is revised to narrow the focus to the community's jurisdiction. The new paragraph reads as follows:

> SMR credits the regulations used by the community to manage runoff from future development onsite. SMR credit is provided if new development is required to prevent or reduce the increase in runoff that results from urbanization. SMR credit is only provided for regulation of runoff from a 10-year storm or larger. Additional credit is available if the community addresses larger storms and controls the total volume of runoff from new development.

◆ Under **Credit Criteria for SMR** on page 450-5, criterion (1) is replaced with the following to focus on the community's jurisdiction:

> (1) A portion of the community must be subject to a regulation that requires the peak runoff from new development to be no greater than the runoff from the site in its pre-development condition.

◆ Under ***Credit Points for DS***, where it continues on page 450-8, a sentence is added to the first paragraph to clarify the calculation. The replacement paragraph is as follows:

The regulations must require pre- and post-development hydrology calculations and post-development runoff must be limited to pre-development levels at the site boundary (credit criterion (5)). The standard used may be peak flow, volume, or a combination of the two. If the volume of runoff is controlled by retaining the runoff on site, infiltrating the runoff, or ensuring that the volume of runoff during all storms greater than half of the 2-year event remains constant, the credit is increased by 50%. If the modified rational method is used to design detention facilities for areas larger than one acre, the total credit for DS is reduced by 50%.

◆ The subsection **Impact Adjustment for SMR**, on page 450-11, is revised to reflect a focus on the community's jurisdiction. The entire subsection is replaced with the following:

Impact Adjustment for SMR

The impact adjustment for SMR is based on the area of the community that is regulated by the SMR regulations (aSMR) and the total area of the community (aW). See Sections 402 and 403 on calculating an impact adjustment.

In order to determine aSMR when the regulations are not uniform throughout the community, the community must prepare an impact adjustment map (see Section 403.d) and calculate the area of the community and the area subject to each of the regulations. The base map for the impact adjustment map should be a map that shows the entire community and where each set of regulations is in effect within the community. The total area of the community is represented by aW.

Many very large communities regulate stormwater only in portions of their jurisdictions. With appropriate documentation, parts of the community may be excluded from aW if, because of their ownership, they are unlikely to be developed. Such areas could be national forests, state parks, Tribal lands, or privately owned land dedicated to open space use.

Communities are encouraged to cooperate with adjacent communities to manage stormwater. If a community only has regulatory jurisdiction over a portion of its watersheds, it cannot ensure that properties will be safe from increased runoff in the future, because of upstream development. However, if upstream communities also manage future development, either independently or through county-wide or watershed regulations, all communities can benefit.

If the community does not regulate development throughout the entire community and wants an impact adjustment ratio greater than 0.15, it must develop an impact adjustment map to determine the areas required to calculate rSMR for each area with creditable regulations.

rSMR = $\frac{\text{aSMR}}{\text{aW}}$, where

aSMR = the area subject to stormwater management regulation,

and

aW = the area of the community

If the total calculated impact adjustment is less than 0.15, or the community does not prepare an impact adjustment map, then rSMR = 0.15.

Example 452.a-6.
A community regulates all watersheds within its corporate limits. Therefore, 1.0 is used for rSMR.

Related Updates and Corrections

◆ Under **Documentation for SMR Provided by the Community** on page 450-13, item (d) is eliminated and item (e) is re-labeled and revised to reflect the focus on the community's jurisdiction. The last two items of documentation now read:

(c) Drainage reports that demonstrate enforcement of the regulations. The ISO/CRS Specialist determines how many records are needed for a representative sample.

(d) If the community has varying regulatory standards within its jurisdiction, an impact adjustment map showing community boundaries and the calculated areas to which the different stormwater management regulations are applied.

◆ Under **452.b Watershed Master Plan** on page 450-14, the second and third paragraphs are revised to focus on the community's jurisdiction:

WMP credit is provided if the community implements measures to reduce stormwater flooding through an adopted watershed master plan. Credit is also provided for watershed master plans that

- Evaluate future conditions and long-duration storms,
- Evaluate the impact of sea level rise and climate change,
- Identify wetlands and natural areas,
- Address the protection of natural channels, and
- Provide a dedicated funding source for implementing the plan.

The objective of watershed master planning is to provide the community with a tool it can use to make decisions that will reduce the increased flooding from future conditions that include new development, redevelopment, and the impact of climate change and sea level rise, throughout a watershed or community. Although there is no doubt that stormwater management regulations reduce the future flood threat from a developing area, a watershed master plan goes much further in locating and dealing with existing problems and identifying potential future problems. An understanding of the watershed's behavior is necessary to ensure that established or enhanced stormwater management regulations requiring onsite control will prevent flood damage due to future development.

◆ Under **Credit Criteria for WMP** on page 450-15, paragraph (2) is revised to eliminate SMR credit as a prerequisite to receiving WMP credit. The replacement text reads:

(2) The community must have adopted a plan to address all flooding issues identified for at least the 10-year storm in addition to the 25-year event. Management of a 2-year storm is also recommended.

◆ Under **Impact Adjustment for WMP** on page 450-17, the subsection is replaced by the following, eliminating the requirement for a correlation between the impact adjustment map for SMR and that for WMP:

Impact Adjustment for WMP
The impact adjustment map for WMP is prepared, and the affected areas are calculated in the same manner as for SMR in Section 452.a.

$$rWMP = \frac{aWMP}{aW}, \quad \text{where}$$

aWMP = the area covered by a watershed master plan

If the total calculated impact adjustment is less than 0.15 or the community does not prepare an impact adjustment map, then rWMP = 0.15.

◆ Under **Documentation for WMP Provided by the Community** on page 450-18, item (vii) is eliminated and item (vi) is replaced with the following:

(vi) The impact adjustment map.

Addendum to

Section 501 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

In Section 501 a few changes are made to update statistics and to reflect alterations to the procedures by which communities obtain repetitive loss data.

Updates and Clarifications

◆ Under **501.a Repetitive Losses** on page 500-3, both paragraphs are updated and clarified by substituting these two paragraphs:

> Repetitive loss properties are those properties for which two or more claims of more than $1,000 have been paid by the National Flood Insurance Program (NFIP) within any 10-year period since 1978 (e.g., two claims during the periods 1978–1987, 1979–1988, etc.). Other definitions of "repetitive," such as those found in flood damage prevention ordinances, may not be used to determine the number of repetitive loss properties in a participating CRS community.
>
> Over $12 billion have been paid to repetitive loss properties, about one-fourth of all NFIP payments since 1978. Although the NFIP has resulted in over 50 years of successful floodplain management, and many of these structures are no longer insured, repetitive loss properties are still a drain on the NFIP.

◆ Under **501.b The Repetitive Loss List** on page 500-3, the third paragraph is replaced with this one, which updates the source from which data are obtained:

> Each year, communities can obtain updated data by contacting the appropriate FEMA Regional Office. This data reflects the community's previously submitted changes, new properties that have been added as a result of recent floods, and changes resulting from other communities' updates. Except during cycle verification and as specified in Section 502.b, a community is not required under the CRS to respond to each year's new list. However, the list can be a valuable planning tool and source of information about the location and extent of flooding within the community. Communities are encouraged to submit any known updates every year.

Addendum to

Section 510 of the *CRS Coordinator's Manual*, 2017 Edition

Summary

The total credit available under Section 510 is increased, and new opportunities are provided for earning credit. The options for obtaining credit for a plan that protects natural floodplain functions (element NFP) are expanded to make an assessment of threatened and endangered species creditable. New credit is made available in the form of a new element, SDP (for substantial damage management plan), for communities that devise written procedures for addressing issues related to the risk of substantial damage to buildings in their jurisdictions.

Credit Points and Opportunities Increase

◆ In the **Summary** box on page 510-1, the credit points are increased to read:

Maximum credit: 762 points

◆ In the **Summary** box on page 510-1, paragraph c. is revised to embrace a floodplain species plan and a new paragraph d. is added to incorporate the new element SDP. The replacement paragraphs are as follows:

c. **Natural floodplain functions plan (NFP)**: 100 points for adopting plans that protect one or more natural functions within the community's Special Flood Hazard Area. Within NFP is credit for a floodplain species assessment and for a floodplain species plan.

d. **Substantial damage management plan (SDP)**: Up to 140 points for a community plan to prepare for substantial damage estimates and determinations after a flood.

◆ In Section **512.a. Floodplain management planning** on page 510-4, the credit points are increased to read:

512.a. Floodplain management planning (FMP)

The maximum credit for this element is 762 points.

Species Assessments Qualify for Natural Functions Plan

The options for earning credit for a natural functions plan are being expanded to specifically provide that a species assessment can qualify as protecting natural floodplain functions. This is done by adding two new sub-elements, FSA and FSP (FSA for floodplain species assessment and FSP for floodplain species plan).

◆ Under **Section 512.c, Natural Floodplain Functions Plan** on page 510-35, a fifth bullet is added and the note that follows it is updated:

- A floodplain species assessment that identifies the threatened and endangered species that have range or critical habitat within the community and a floodplain species plan that recommends actions to support conservation or recovery of those species.

NOTE: *Element NFOS2, (section 2 of the natural floodplain functions open space credit under Activity 420 (Open Space Preservation)), provides bonus credit for open space parcels that are designated in a plan to protect natural functions. A plan that receives NFP or FSP credit qualifies parcels for this extra open space credit.*

◆ Under **Credit Criteria for NFP**, where it continues onto page 510-36, descriptions of the species assessment criteria are inserted. The three subsections that follow, **Credit Points for NFP** as well as **Impact Adjustment for NFP** and **Documentation for NFP Provided by the Community** are also updated to include the new sub-elements. The substitute language is as follows:

(4) For FSA: This sub-element credits a floodplain species assessment that identifies all threatened and endangered species that have been listed or proposed for listing by the U.S. Fish & Wildlife Service or by the National Marine Fisheries Service and that have range or critical habitat anywhere within the community, relates their locations to the floodplain, and reviews current and feasible conservation and recovery actions that could receive CRS credit. The draft document must be circulated to federal, state, and private organizations that have expertise in protecting threatened and endangered species. A floodplain species assessment must meet credit criteria (1)(a), (c), and (e).

(5) For FSP: This sub-element credits taking another step after a floodplain species assessment: a plan that revises the floodplain species assessment and adds action items based on the comments and input from the reviewers to make a plan of action. Credit for FSA is a prerequisite for FSP credit.

A plan for FSP credit must meet all of credit criterion (1) with the following exception: a plan for FSP credit (criterion (1)(d)) is not required to include an inventory of all threatened and endangered species but may focus instead on selected species, based on the comments and recommendations of the reviewers of the FSA-credited assessment.

The community must also prepare and submit an annual evaluation report that meets the credit criteria of a floodplain management plan in Section 512.a, Step 10.

Additional guidance for preparing assessments and plans for FSA and FSP credit is listed in Section 514.e.

Credit Points for NFP

NFP = the total of the following, up to the maximum of 100 points:

NFP1 = 100 points, for a plan, or combination of plans, that meets credit criteria (1) and (2) and covers the entire SFHA within a community

NFP2 = 15 x the number of plans that meet credit criterion (1), up to four plans (60 points maximum)

FSA = 15 points for preparing and circulating a floodplain species assessment

FSP = 85 points for preparing and adopting a floodplain species plan

Impact Adjustment for NFP

There is no impact adjustment for this element. The NFP1 plan must cover the entire community or all of the community's SFHAs. Each NFP2 plan receives 15 points regardless of the extent of the area covered.

The assessment for FSA credit must start with an inventory of all threatened and endangered species that have range or critical habitat anywhere in the community. For the action plan that qualifies for FSP credit, however, that list may be trimmed down to focus on selected species or areas. Thus, no impact adjustment is needed for either of these sub-elements.

Documentation for NFP Provided by the Community

(1) At each verification visit,

(a) A copy of each plan, assessment, or update that the community wants credited.

(b) A copy of the resolution or other formal adoption action for each plan credited under NFP or FSP.

(2) With the annual recertification,

(a) A copy of the FSP annual evaluation report (Section 512.c, credit criterion (5)). The recertification submittal must also document how the evaluation report and update were made available to the media and the public, if this information is not included in the evaluation report.

New Credit for a Substantial Damage Management Plan

◆ The new creditable element for a plan for managing substantial damage is inserted at the end of Section 512.c on page 510-36. The insert reads:

512.d. Substantial Damage Management Plan (SDP)

The maximum credit for this element is 140 points.

A management plan for substantial damage within the community is a detailed community plan, developed before a flood or other hazardous event, that describes the community's process for evaluating damage to buildings and addressing those that have been substantially damaged, as required by the NFIP. A management plan for substantial damage to properties outlines community responsibilities, identifies available data about buildings in the SFHA, describes the community's approach to damage estimation, and lists the steps the community will take if buildings are determined to be substantially damaged. CRS credit for a such a plan is provided in element SDP.

NOTE: *The CRS encourages communities to frame their management of substantial damage issues within the context of all potential sources of damage to structures (tornado, earthquake, hurricane, wildfire, etc.). Further, the definition of "substantial damage" used by the CRS specifies" damage of any origin" (see definitions box). Some of the language in this section is flood-specific, but the discussion is intended to apply to any hazardous event that could result in losses and/or damage.*

As with a floodplain management plan (element FPM), CRS credit is dependent upon the community's following an appropriate process. Both the steps for developing a substantial damage management plan and the content of the plan are important for CRS credit.

A committee is not required to develop a management plan for substantial damage; however, if it does so, the plan should be developed with participation of the community CRS Coordinator, the community floodplain administrator, and the building department.

A community may receive CRS credit for element FMP, a repetitive loss area analysis (element RLAA), and element SDP. A community need not have any repetitive loss properties on FEMA's list to receive SDP credit.

Addressing substantial damage after a flood or other hazardous event that can damage buildings is a requirement of a community's participation in the NFIP. This activity credits plans and actions that a community takes before a flood or other hazard-caused event to educate officials and departments, to obtain and utilize as much building data as is available for making estimates, and to ensure NFIP compliance. Although the NFIP does require that a community address substantial damage caused by any hazard, the substantial damage management plan and process for the CRS focuses on floods.

Three levels of SDP credit are available. The basic credit is 40 points for the development of a substantial damage management plan. An additional 50 points are available if FEMA's

Substantial Damage Estimator is pre-populated for all properties with the potential to be substantially damaged. Another 50 points are provided for communities that consider pre-flood mitigation alternatives.

Additional guidance for the development of a substantial damage management plan is available from the ISO/CRS Specialist.

Credit Criteria for SDP

(1) The substantial damage management plan must be developed using a definition of substantial damage that meets or exceeds the NFIP definition of substantial damage (see box at right).

(2) If a community is receiving credit for cumulative substantial improvement (element CSI) under Activity 430 (Higher Regulatory Standards), then the substantial damage management plan must reference the community's cumulative substantial damage definition credited under CSI and describe the community's process for tracking cumulative substantial improvements. If a community is receiving credit for having a lower threshold for substantial improvement (element LSI), then the definition of lower substantial improvement must be referenced.

Some Definitions

Substantial damage—As defined in 44 C*FR* 59.1 of the NFIP regulations, substantial damage is

> Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damage condition would equal or exceed 50% of the market value of the building before the damage occurred.

Substantial improvement is

> Any reconstruction, rehabilitation, addition, or other improvement to a building, the cost of which equals or exceeds 50% of the market value of the building before the start of construction of the improvement.

NOTE: *Some ordinances may include the repair of flood damage as an "improvement" (reconstruction) to the building.*

(3) The plan must be the outcome of the following six-step planning process. All steps are required, but 2–5 do not have to be done in the order listed.

Step 1. Assess the community's vulnerability to substantial damage. This step requires the review of all buildings in the SFHA to determine those that are likely to be substantially damaged. The plan document for this step must include

(a) The definitions of substantial damage and substantial improvement and the delineation of a lower damage threshold, as adopted in the community's floodplain management regulations, community-adopted building code, and/or state building code. This must include any provisions for cumulative substantial damage, substantial improvement, or a lower threshold, if adopted.

(b) A description of substantial damage and substantial improvement determinations previously made by the community.

(c) A list and map of SFHA properties with buildings that have the potential to be substantially damaged. This could be all the buildings in the SFHA or a subset of SFHA buildings. At a minimum, the list should include

- Properties with buildings that are (or are suspected to be) below the base flood elevation.

- Properties within a repetitive loss area (identified per Section 502.c).
- Properties for which substantial damage estimates have previously been provided to the community after a federally declared disaster.
- Any buildings that could meet the cumulative substantial improvement definition, if applicable.

(d) A description of other building or flood factors that the community considered during the assessment. This could be an adopted procedure for tracking cumulative damage and/or improvements, or a community-determined flood zone not depicted on the FIRM.

(e) A general description of buildings on the potential substantial damage list, such as the proportion of residential and non-residential. Other information should be included, such as type of structure (single family, manufactured home, multi-family, etc.).

The list of properties that could be substantially damaged can be included in a document that is separate from the management plan (e.g., a spreadsheet or database developed for Step 4).

Steps to Develop a Substantial Damage Management Plan

1. Assess vulnerability
2. Assemble a team
3. Identify post-event actions
4. Build a database
5. Identify pre-event actions
6. Plan implementation & updates

Steps 2 through 5 may be done in any order.

An annual evaluation report is required.

Step 2. Identify the community's team for the management of substantial damage to properties. A committee is not required for the development of the management plan, but a team would be helpful for all the steps.

Although the community floodplain administrator is responsible for ensuring that flood damage estimates are obtained after a flood and that substantial damage determinations are made when the definition of substantial damage is met, other personnel or departments may need to be involved with post-event efforts. In addition to the community floodplain administrator, the community should build a team that

(a) Includes the department or office responsible for issuing permits for post-event repairs, and the department or office that tracks CSI, if applicable;

(b) Includes sufficient additional personnel for the substantial damage work effort after a major flood or other event. Note that the post-event work effort may be reduced depending on the pre-event work (see Step 4); and

(c) Is able to consider other personnel resources, such as the State NFIP Coordinator and/or FEMA post-disaster resources.

Step 3. Identify the post-event efforts related to substantial damage. For this step, the community should contact the State NFIP Coordinator to obtain any

substantial damage guides or templates that have been developed by the state for communities. The community plan must include

(a) Post-event coordination and communication efforts. For example,

- Meetings of the substantial damage management team and training for all team members,
- Assigned areas of responsibility for team members (for any or all steps),
- Determinations of whether interim permit procedures are needed,
- Communication with elected official, and
- Communication with property owners.
- (b) Damage estimate and substantial damage determination procedures, such as
- The conduct of damage inspections of floodplain buildings,
- Making damage estimates for each damaged floodplain building,
- Establishing a market value for each damaged floodplain building,
- Making substantial damage determinations,
- Making substantial improvement determinations,
- Establishing an appeal process for substantial damage/substantial improvement determinations, and
- Issuing damage determination letters.

(c) Post-substantial damage determination procedures for compliance, such as

- Enforcing permitting for repairs and mitigation compliance; and
- Providing periodic updates to the State NFIP Coordinator and the FEMA Regional Office (or disaster office, if applicable).

Step 4. Build a property database for substantial damage estimates. In Step 1, a list of properties that could be substantially damaged was prepared. This step requires developing a database for that list that includes the building, building value, and flood information.

(a) A basic substantial damage property database is required for SDP credit. Data regarding the building such as the property identification number, building type (residential/non-residential), foundation type, and the number of stories should be included. The fair market value of the building can be obtained from assessor's data. If available, lowest floor and/or first floor elevation should be added.

Communities with CSI credit may reference other databases or documentation for tracking cumulative substantial improvements, but all buildings identified in Step 1 must be included in a database.

Communities may not include in the substantial damage database any NFIP repetitive loss or claims data that are protected by the federal Privacy Act. The NFIP information provided to the community (through an Information Sharing and Access Agreement, known as an ISAA) is protected by the Privacy Act. The database can note which properties are included in a "repetitive loss area" (see Section 503).

Unknown data and desired data should be discussed in the plan. It is understood that the database may be expanded or otherwise improved for the annual evaluation report or at the time of a required update. Other building or property information, such as market value information, should be included as available.

(b) [Optional and for SDP2 credit] Pre-populate the FEMA Substantial Damage Estimator database. For guidance on using and pre-populating the Substantial Damage Estimator, see Section 514, For More Information, on page 510-37.

Step 5. Identify actions the community can take to address potential substantial damage.

(a) The substantial damage management plan must include at least one action the community will take to educate the community about substantial damage/substantial improvement and the requirements of the NFIP or the CRS. Some examples include

- Annual substantial damage training for the substantial damage management team members;
- Substantial damage and substantial improvement public information (newsletters, social media, information at kiosks);
- Handouts for property owners; and
- Communication with elected officials about community responsibilities regarding substantial damage, and if applicable about CSI. (This may be sharing the annual evaluation report with the elected officials.)

(b) [Optional and for SDP3 credit] Consider mitigation alternatives for areas of the community in which buildings have the potential to be substantially damaged. The best options for properties with a high risk of flooding are mitigation actions (buyout, elevation, floodproofing) taken before the next flood. The second-best approach is taking mitigation steps after the next flood.

SDP3 credit is provided when each appropriate mitigation alternative is identified for each neighborhood, area, or other segment of the list of properties identified in Step 1. This is beyond the level of detail included in multi-hazard mitigation plans. The plan must review alternate approaches and determine whether any property protection measures are feasible. The review

must examine appropriate measures for the types of buildings affected, including

- Relocation,
- Acquisition,
- Building elevation, and
- Retrofitting.

A review that looks only at drainage or structural flood control project alternatives is not sufficient. For each neighborhood, area, or subset, the review must also consider potential local, state, and federal funding sources.

Step 6. Determine implementation steps and procedures for updating the plan. The plan must

(a) Provide for an annual evaluation report. The plan document must describe who will prepare the annual evaluation and when (see credit criterion 4).

(b) Be shared with the elected officials, along with the evaluation reports. The implementation steps must describe the options for communicating the substantial damage management plan with the elected officials (see credit criterion 5).

(c) Propose an update process for the substantial damage management plan and/or schedule. Consideration should be given to updates to the plan any time it is used after a flood or other hazardous event.

(d) Note, in the implementation section, any steps that must be taken to adhere to the Privacy Act or any state or community privacy requirements.

(4) The community must prepare an annual evaluation report for its substantial damage management plan. The report must review the pre-event action items, describe what was implemented (or not implemented), and recommend changes to the action items as appropriate. It should highlight any flood damage that occurred since the development of the plan or since the previous annual evaluation. Updated substantial damage management plans can meet the annual evaluation requirement.

The annual evaluation report or an updated substantial damage management plan should note any changes to the community's regulations that affect substantial damage or substantial improvement (e.g., the definition of cumulative substantial damage or substantial improvement).

(5) The substantial damage management plan and the annual evaluation report must be submitted to the community's governing body. If private or sensitive information (such as names or street addresses) is included in the report, then a summary report(s) must be prepared for the governing body, committees, media, and the public.

(6) The community must provide its latest update or revision to its substantial damage management plan in time for each CRS cycle verification visit. The update or revision must include a review of each of the six planning steps.

(7) The substantial damage management plan must be made available to the State NFIP Coordinator and the FEMA Regional Office, if requested.

Credit Points for SDP

SDP = SDP1 + SDP2 + SDP3, up to the maximum of 140

SDP1 = 40 points, for a substantial damage management plan

SDP2, = 50 points, if FEMA's Substantial Damage Estimator is pre-populated

SDP3 = 50 points, if pre-event mitigation alternatives are considered

Impact Adjustment for SDP

There is no impact adjustment for SDP credit.

Documentation for SDP Provided by the Community

(1) At each verification visit,

(a) A copy of the substantial damage management plan (see Section 512.d) or, if the community is already receiving credit for a plan, a copy of the latest update or revision to the plan (see Step 6).

(b) A description of when and how the substantial damage management plan was shared with local officials.

(2) With the annual recertification,

(a) A copy of the annual evaluation report (or updated substantial damage management plan) and the date that it was shared with the elected officials.

NOTE: *Failure to submit the evaluation report for the substantial damage management plan with the annual recertification or the update at the next cycle verification visit will result in loss of the credit (i.e., SDP = 0).*

Related Updates and Clarifications

◆ Under **Credit Points for FMP Step 5** on page 510-16, subsection (b) is clarified by replacing it with this:

(b) 25 points, if the plan includes a description of the impacts that the hazards identified in the hazard assessment (Step 4) have on the features listed below:

(1) 10 points, for life safety and public health (e.g., the need for warning and evacuating residents and visitors and considering health hazards to individuals from flood waters and mold).

(2) 5 points, for critical facilities and infrastructure.

(3) 5 points, for the community's economy and major employers.

(4) 5 points, for the number and types of affected buildings (e.g., residential, commercial, industrial, with or without basements, etc.). For this credit, the assessment must include an inventory of all buildings owned by the community that are located in flood-prone areas and that identifies which buildings are insured for flood damage.

◆ Under **For More Information** on page 510-37, new sources for information about floodplain species and about substantial damage are inserted as follows:

e. Guidance, website links, and examples of floodplain species assessments can be obtained from a community's ISO/CRS Specialist.

f. *Substantial Improvement/Substantial Damage Desk Reference* (FEMA P-758) (2010) offers guidance on substantial damage provisions and management at the federal, state, and local levels, and discusses the variations among many building codes.

g. Explanations for working with the Substantial Damage Estimator can be found in *Substantial Damage Estimator User Manual and Field Workbook* (FEMA P-784) (2017).

h. Guidance on populating the Substantial Damage Estimator and using community data can be found in FEMA's *Substantial Damage Estimator Best Practices* (2017).

i. FEMA's Key Topics Bulletin, *Mitigation Planning and the Community Rating System* (2018), aligns the CRS planning process with the required hazard mitigation planning.

j. FEMA's Emergency Management Institute (EMI) offers independent and online training on substantial damage and substantial improvement. The course numbers and names are listed below. The State NFIP Coordinator may also offer training for communities.

Preparing for Post-Disaster Responsibilities (G0194.4)

Advanced Floodplain Management Concepts III (G0284)

Substantial Improvement/Substantial Damage (G0284.5)

Using the Substantial Damage Estimator 2.0 Tool (IS0284)

Substantial Damage Estimation for Floodplain Administrators (IS0285).

Addendum to
Activity 610 (Flood Warning and Response) of the *CRS Coordinator's Manual*, 2017 Edition

Summary

The changes to Activity 610 are clarifications to the language in the *Coordinator's Manual*, inserts to account for updated technology, and additions to incorporate a community's management of substantial damage assessments and post-disaster teams.

Updates and Clarifications

◆ Under **611 Background** on page 610-2, the second paragraph is clarified with this replacement:

> The National Weather Service (NWS) issues specific flood warnings for many locations along major rivers and coastlines. A community's ability to receive notifications 24 hours a day and 365 days a year is crucial to using such warnings. Many communities have their own flood threat recognition systems to enable advance identification of floods on smaller rivers and streams. The full benefit of early flood warning is only realized if the community disseminates the warning to the general public and to critical facilities and has a flood warning and response plan that includes appropriate tasks, such as directing evacuation, sandbagging, moving building contents above flood levels, performing damage assessments to provide data for community databases on cumulative damage and substantial improvements, and procedures for post-flood permitting and recovery.

◆ Under **611.b Activity Credit Criteria**, where the section continues on page 610-5, subsections (a) and (b) are replaced with the following:

(a) Describe the methods and warning devices used to disseminate emergency warnings to the general public that are credited under EWD. Studies have shown that flood damage can be reduced by 30% if people have 24 hours of warning during which to prepare for an event;

(b) Include specific flood response actions that are taken at the different flood levels or flash-flood-impact areas that are credited under FRO. This correlates the identified flood levels with emergency evacuation/rescue planning tasks, such as 1-foot depth—evacuate foot traffic; 2- or 3-feet depth—high-water vehicles only; 4- to 6-foot depth—boat evacuation; over 9 feet—helicopter evacuations on call; and

◆ Under **611.b Activity Credit Criteria**, where the section continues on page 610-6, subsections (d)(v) and (vi) are replaced with the language below, and a new subsection (vii) is added:

(v) The community must provide verification that the community participated in a drill/exercise or an actual activation of the plan within the past 12 months. This can be in the form of an after-action report/improvement plan or a similar "lessons-learned" report.

(vi) If EWD credit was provided for a warning system or systems, then the community must provide verification that the community tested those systems within the past 12 months. For EWD9 credit, the community must verify the facilities within its jurisdiction that meet this criterion.

(vii) If credit was provided for FRO4 in the parent plan, the community must provide verification of the special-needs population within its jurisdiction.

◆ Under **611.b Activity Credit Criteria**, where the section continues on page 610-7, the fourth sentence in subsection (6) is clarified. Subsection (6) is replaced with this:

(6) There must be at least one exercise and evaluation of the flood warning and response plan each year that is compliant with the National Incident Management System (NIMS). This process is described in the Homeland Security Exercise Evaluation Program. The exercise can be for a flood, levee failure, dam failure, or hurricane. This criterion can be met if the plan is implemented in response to an actual flood-related event or threat of a levee failure. In either case, there must be an evaluation of the performance of the plan and recommendations for needed change, as is usually documented in an after-action report/ improvement plan. This criterion is part of the national emergency preparedness cycle.

◆ Under **Documentation for FTR Provided by the Community** on page 610-10, subsections (1)(iv) and (v) are replaced with the following:

(iv) A description of the flood threat recognition system. The description must identify the rivers, streams, and coastal floodplains for which flood stage forecasts are prepared and each forecast point. If the community has its own gage system, such as an ALERT system, the description must include the locations of the stream and precipitation gages. For communities whose states have a web-based flood alert system or portal, the URL to the website and other information needed to gain access.

(v) If the community has its own gage system, such as an ALERT system, a copy of the maintenance procedures for the system and records showing that the system is being maintained. This also applies to any other interoperable flood sensors that the community owns and operates, such as those purchased through the Department of Homeland Security's Flood Apex Program.

◆ Under **612.c Flood Response Operations** on page 610-15, the fourth paragraph, beginning "Flood warning and response . . ." is updated with this paragraph:

Flood warning and response planning must identify every opportunity to prevent loss of life and property damage during a flood. Using information from the flood inundation maps, the planning team should think about how flooding would occur—what areas will be affected and when. The team may refer to a database of repetitive loss structures or a tracking system for cumulative substantial improvement and/or substantial damage. This may include pre-populating FEMA's Substantial Damage Estimator with local data. Through this brainstorming, the team can decide what actions, resources, and training will be needed. The office of the State NFIP Coordinator may be included in training and recovery procedures.

◆ Under **Credit Criteria for FRO** on page 610-16, subsection (3) is replaced with the following, to incorporate a community's focus on substantial damage assessment:

(3) Bonus credit is provided under FRO5 if there is a list of the personnel, equipment, facilities, supplies, and other resources needed to complete each task. For full credit the list must identify what is available within the community and what is needed from private suppliers or other jurisdictions.

◆ Under **Credit Points for FRO** on page 610-17, the formula for FRO2 is revised to distinguish between estimates of needed personnel and time required and to account for a disaster response team. The formulae for FRO3 and FRO4 are unchanged. The new formula for FRO2 reads:

Credit Points for FRO

FRO2 = the sum of the following:

(a) 5 points, for identified flood response tasks and responsible staff,

(b) 5 points, for an estimate of the number of personnel needed for each task,

(c) 5 points, for an estimate of the time required for each response task,

(d) 10 points, for damage assessment tasks that are tied into a cumulative damage/improvement tracking system,

(e) 5 points, for identification of a floodplain management disaster response team,

(f) 5 points, for a list of equipment and supplies expected to be needed and how they will be obtained

◆ Under **Credit Points for FRO** where it continues page 610-18, the formulae for FRO5 and FRO6 are revised for clarification:

FRO5 = the sum of the following, up to 15 points:

(a) 5 points, if the plan includes instructions for an evacuation plan that addresses critical facilities, homes, and businesses, with instructions for when and how returning evacuees can reoccupy in compliance with the community's SFHA permitting policies;

(b) 5 points, if the plan includes instructions for substantial damage assessment procedures within the SFHA that are made before issuance of a permit during the recovery phase; and

(c) 5 points, if the plan includes instructions for implementing the community hazard mitigation plan's identified flood loss mitigation measures on community and private properties.

FRO6 = Up to 20 points, if the plan identifies actions that support property protection measures that are carried out in both the response and recovery phases.

◆ In **Example 612.c-1** on page 610-18, the paragraph for FRO5 is revised to account for substantial damage assessments:

FRO5 Instructions for the return of evacuees to affected areas are also in the plan, including credential instructions and area security assignments. Substantial damage assessments are prescribed before repair permits can be issued. [10 points, partial credit under FRO5]

APPENDIX B – FLOODPLAIN MANAGEMENT COMMITTEE GROUND RULES

COUNTY OF LOS ANGELES FLOODPLAIN MANAGEMENT PLAN (FMP) COMMITTEE CHARTER

FMP COMMITTEE GROUND RULES

The name of this organization shall be the Los Angeles County 2025 Floodplain Management Plan (FMP) Committee, hereafter referred to as the FMP Committee. The purpose of the FMP Committee shall be to:

- Serve as an advisory body to oversee the planning process.
- Provide guidance and leadership, and act as the point of contact for local governments and the various organizations that may be interested in this planning effort.
- Solicit a wide range of input into the planning process and advocate for public involvement.
- Educate all participants in floodplain management planning.

Members of the FMP Committee were selected to represent a cross-section of views and interests within the planning area. Through this inclusion of diverse interests, the FMP Committee will strive to strengthen the planning effort and build support for floodplain management activities across numerous stakeholder groups. A successful planning effort will result in the adoption and approval of the floodplain management plan to reduce adverse impacts of flooding in the planning area, through activities and strategies embraced by both elected officials and their constituents.

CHAIRPERSON AND VICE CHAIRPERSON

Patricia (Pat) Wood of Los Angeles County Public Works will serve as the chairperson. ***Anjero Asprer*** of Los Angeles County Public Works will serve as the alternate chairperson. The role of the chairperson is to:

- Ensure agendas are followed and meetings adjourn on-time
- Allow all members to be heard during discussions
- Moderate discussions between members with differing points of view
- Be a sounding board for staff in the preparation of agendas and how to best involve the full committee in work plan tasks.

The role of the alternate chairperson is to assume the duties of the chair when the chair is not able to attend a meeting or forum. The alternate chair will act as the designated alternate for the chairperson. The alternate chair will designate an alternate as described below, in the event she is serving as the chair. If neither the chair nor alternate chair can attend a scheduled meeting, the meeting will be re-scheduled to a date where one or both seats are able to attend.

QUORUM

A quorum for the FMP Committee will be 50 percent of the committee membership, and the chair or alternate chair must be present during the vote. There are 19 members on the FMP Committee, therefore 10 members denote a quorum.

ALTERNATES

Alternates may be designated for FMP Committee members, if desired. Designated alternates shall be considered official members of this committee. Alternates are welcome to attend any and all FMP scheduled meetings. They will receive copies of all meeting materials as well as meeting agendas and summaries to keep informed. FMP Committee members and alternates are interchangeable, and alternates will have full voting rights, but only when the primary FMP Committee member is not in attendance. Coordination of who attends scheduled FMP Committee meetings is the sole responsibility of the primary member and the designated alternate. FMP Committee members who choose to designate alternates shall notify the planning team no later than one week prior to the next scheduled FMP Committee meeting.

DECISION-MAKING

As the FMP Committee provides advice and guidance on the plan, it will reach its recommendations primarily through consensus. Consensus is defined as a recommendation that may not be ideal for each committee member, but every member can accept. If consensus cannot be reached, the FMP Committee members will vote to reach a ruling, with the majority of the votes deciding the vote.

Absent members may delegate their voting power to another member of the FMP Committee. Members may abstain from voting if they choose. Designated alternates for FMP Committee members are interchangeable and have full voting rights on behalf of the FMP Committee member. However, members and alternates get only one vote and there is only one vote given per organization (where multiple agency representatives attend the meeting). To vote by proxy, FMP Committee members must inform the planning team at least one week in advance.

The County may accept the direction of the FMP Committee or not, as it chooses. Meeting summaries will record minority dissent and that the FMP Committee chose to note such opinions in their final recommendations.

RECOMMENDATIONS

The committee's recommendations will be recorded in the meeting summaries and reflected in the plan as appropriate. The FMP Committee may also be asked to assist in public presentations of the plan and its recommendations.

STAFFING

The planning team for this project includes appropriate representatives from the Los Angeles County Public Works, along with contract consultant assistance provided by Burns & McDonnell, Inc. The planning team will schedule meetings, distribute agendas, prepare information/presentations for FMP Committee meetings, write meeting summaries, and generally seek to facilitate the FMP Committee's activities.

SPOKESPERSONS

Ideally the FMP Committee will present a united recommendation after considering the different viewpoints of its members, recognizing that each member might have made a somewhat different recommendation as an individual. To consistently represent the committee's united recommendations to participating organizations, the public, and the media, the committee spokesperson will be the Los Angeles County Public Works Public Information Officer. In the Public Information Officer's absence, the FMP Committee Chair will serve as the spokesperson.

In addition, each committee member has the responsibility to represent the FMP Committee's recommendation when speaking on plan-related issues. Any differing personal or organizational viewpoints should be clearly distinguished from the committee's work. Finally, committee members may need to assist with presentations given to governing bodies within the planning area as well as during public meetings or presentations.

MEETING DATES

Meetings will be either virtual or at Los Angeles County Public Works, 900 S. Fremont Avenue, Alhambra, CA 91803. The exact room may change due to availability and will be listed on the agenda for each meeting. Maps will be distributed as needed. Members of the FMP Committee may also participate via conference call. Conference call information will be sent with the calendar invitation and agenda at least two weeks prior to the meeting. Meetings will be open to the public and advertised as such with the location of the FMP Committee meeting publicly advertised on the project website.

ATTENDANCE

Participation of all FMP Committee members in meetings is important and members should make every effort to attend each meeting. If committee members cannot attend, they should inform the planning team before the meeting is conducted. Attendance will be addressed if a member or alternate misses two consecutive meetings. If a member of the FMP Committee needs to resign from the committee, and there is a designated alternate, the alternate will be asked to take his or her place on the FMP Committee as the primary member. As a new primary member, an alternate may be designated. If there is no designated alternate, the FMP Committee will seek to find a replacement FMP Committee member.

PUBLIC INVOLVEMENT

All FMP Committee meetings will be open to the public. Members of the public wishing to address the FMP Committee at a meeting may do so based on the protocol used by the County Board of Supervisors. For virtual meetings, the public may enter questions or comments into the chat.

Members of the public will have an opportunity to address the FMP Committee on items of interest which are within the subject matter jurisdiction of the FMP Committee. It is up to the FMP Committee to determine limits of time per person and overall length of time for public comment, based on the complexity of the agenda, items on the agenda and number of people wishing to speak. The time limit will typically be two to three minutes per person. Public members addressing the FMP Committee shall speak on topics relevant to floodplain planning or activities related to flooding. Any individual found to exhibit disruptive conduct may be removed from the meeting and prohibited from addressing the FMP Committee during public comment at future meetings.

ACCOMMODATIONS

Individuals requiring reasonable accommodations, interpretation services, and materials in other languages or in an alternate format may contact the Public Works coordinator at (626) 458-6131. Requests must be made one week in advance of the scheduled meeting date. Individuals with hearing or speech impairment may use California Relay Service 711.

The FMP COMMITTEE will strive to post meeting agendas on the floodplain management website two weeks prior to all scheduled meetings.

COURTESY

Committee members should treat each other with respect, listen to each other, work cooperatively, and allow all members to voice their opinions.

Floodplain Management Plan Committee Members and Alternates

Gov or Non-Gov	Committee Member	Department/Agenc	Alternate
Gov	Patricia Wood	PW Stormwater Engineering - CRS Coordinator	Joy Pipkin; Anjero Asprer Thu Win William Saunders
Gov	Loni Eazell	PW Emergency Management Group	Kevin Kim Angine Geragoosian
Gov	Tera Haramoto	PW Building & Safety	Jason Zhang Glenn Tong Joshua Felton Anthony Wong
Gov	Eden Berhan	PW Stormwater Maintenance	Ahmet Tatlilioglu
Gov	Kari Eskridge	PW Community Service & Government Relations Group	Nam Doan
Gov	Lisette Guzman	PW Community Service & Government Relations Group	Jocelyn Rivera-Olivas
Gov	Marcela Benavides	PW Stormwater Planning	Mark Beltran CJ Caluag Luis Garcia
Gov	Martin Araiza	PW Stormwater Engineering -Hydrology & Hydraulics	Gary Guo
Gov	Gina Natoli	LA County Dept. of Regional Planning	Thuy Hua
Gov	Mark Martinez	County Fire Department	Alex Villalta
Non-Gov	Samson Wong	City of LA Bureau of Engineering	Chang-Shien Lin (Chang Lin)
Non-Gov	Dorothy Wong	Altadena Town Council	
Non-Gov	Shannon Ggem	Malibu Lake Mountain Club	Evan Christensen
Non-Gov	John Blalock	Antelope Valley Resident	
Non-Gov	Mark Caddick	Antelope Valley Resident, Acton	
Non-Gov	Erica Frausto-Aguado	Red Cross of Greater Los Angeles	Timothy Dahlum Amanda Morita Mark Lim
Non-Gov	Salomon Miranda	CA Department of Water Resources	
Non-Gov	Dr. Stephen LaDochy	Cal State LA Meteorology	
Non-Gov	Debbie Sharpton	Environmental Restoration Group	
Non-Gov	Kevin Gaston	TreePeople Land Trust	

Presented in the table above are the Floodplain Management Committee primary members and their affiliation for the 2025 FMP update. Alternatives for each member are also listed in accordance with the adopted ground rules.

APPENDIX C – PUBLIC OUTREACH MATERIALS

FLOODPLAIN MANAGEMENT PLAN COMMITTEE MEETING AGENDAS, ATTENDANCE, AND SUMMARIES

County of Los Angeles
2025 Floodplain Management Plan Revision
1st Floodplain Management Plan (FMP) Meeting
Tuesday, May 28, 2024, 1:00 p.m. to 3:00 p.m.
Virtual Meeting

Introductions

- Group Introductions
- Review Agenda

Overview of Floodplain Management Plan

- Work plan
- Timeline
- Important milestones

The Floodplain Management Plan (FMP) Committee's Role

- FMP Committee's Purpose
- FMP Committee's Expectations
- FMP Committee's Organization
- FMP Committee's Charter

Plan Review

- Review Existing Floodplain Management Plan and other plans
- Discuss and Update Current Mission Statement:
    - Protect life, property, the economy and the environment of unincorporated Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards and thus enhance community resilience.
- Discuss and Update Current Plan Goals and Objectives (Page 2)

Public Outreach

- Survey Questionnaire and Approach (see attached)
- Discussion of Survey Questionnaire – FMP Committee Input
- Planning for Public Engagement Meetings
- Additional Outreach Capabilities (suggestions welcomed)
    - Websites
    - Press/media
    - Social Media

Next Committee Meeting

- Flood Management Plan Part 1 Draft
- Repetitive Loss Area Analysis (RLAA) Part 1 Draft
- Confirm Next Meeting Date (anticipated July)

Action Items and Next Steps

- Confirm Goals and Public Involvement Strategy
- Confirm FMP Committee Charter

Adjourn

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

Goals

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

Objectives

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

County of Los Angeles
2025 Floodplain Management Plan Revision
1st Floodplain Management Plan (FMP) Meeting
Tuesday, May 28, 2024, 1:00 p.m. to 3:00 p.m. PST
Virtual Meeting

Attendees	Organization	Type
Gina Natoli	LA County Dept of Regional Planning	Government
Tera Haramoto	PW Building & Safety	Government
Glenn Tong	PW Building & Safety	Government (Alternate)
Joshua Felton	PW Building & Safety	Government (Alternate)
Kari Eskridge	PW Community Government Relations Group	Government
Lisette Guzman	PW Community Government Relations Group	Government
Nam Doan	PW Community Government Relations Group	Government (Alternate)
Loni Eazell	PW Emergency Management Group	Government
Angine Geragoosian	PW Emergency Management Group	Government (Alternate)
Mark Martinez	County Fire Department	Government
Pat Wood	PW Stormwater Engineering – CRS Coordinator	Government
Anjero Asprer	PW Stormwater Engineering – CRS Coordinator	Government (Alternate)
Joy Pipkin	PW Stormwater Engineering – CRS Coordinator	Government (Alternate)
Gary (Yong) Guo	PW Stormwater Engineering – Hydrology & Hydraulics	Government (Alternate)
Eden Berhan	PW Stormwater Maintenance	Government
Marcela Benavides	PW Stormwater Planning	Government
CJ Caluag	PW Stormwater Planning	Government (Alternate)
John Blalock	Antelope Valley Resident	Non-Government
Timothy Dahlum	Red Cross of Greater Los Angeles	Non-Government (Alternate)
Debbie Sharpton	Environmental Restoration Group	Non-Government
Dorothy Wong	Altadena Town Council	Non-Government
Mark Caddick	Antelope Valley Resident, Acton	Non-Government
Samson Wong	City of LA Bureau of Engineering	Non-Government
Steve LaDochy	Cal State LA Meteorology	Non-Government
Michael Chen	PW Stormwater Engineering	Core Planning Team
Clark Decastro	PW Stormwater Engineering	Core Planning Team
Thu Win	PW Stormwater Engineering	Core Planning Team
Makenna Hobson	Burns & McDonnell	Core Planning Team
Michael Lurenana	Burns & McDonnell	Core Planning Team
David Pohl	Burns & McDonnell	Core Planning Team
Courtney Semlow	Craftwater	Core Planning Team
Esmeralda Garcia	MIG	Core Planning Team
Stephanie Pavon	MIG	Core Planning Team

Los Angeles County Public Works
2025 Floodplain Management Plan Revision – FMP Meeting #1
Meeting Summary Sheet – May 28, 2024 1:00 p.m. to 3:00 p.m. PST

Meeting Notes:

Welcome and Introductions

1. Pat Wood welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves. The quorum for the meeting was reached.

Agenda

1. David Pohl presented the agenda to provide guidance on what will be spoken about today.

Project Overview- PowerPoint Presentation

1. David Pohl presented a slide deck of the overview of the project which is attached. Key points include:
    a. What is the FMP?
    b. An overview of the Community Rating System (CRS) and that we should strive for a higher overall score and maintain the current Class 6 rating and 20% discount on insurance through the National Flood Insurance Program
    c. The steps for FMP Revision were summarized: 1) Organize Resources; 2) Risk Assessment; 3) Public Information/Public Outreach Strategy; 4) Goals and Objectives; 5) Plan Maintenance 6) Writing the Documents (FMP and RLAA); 7) Submit the Plan; and
    d. The Purpose of the FMP Committee and what they will review

Charter Contents- Word Document

1. David Pohl presented a draft of the Charter describing the ground rules for the FMP Committee. The Charter includes the Committee purpose, selection process, and general rules applicable to the FMP Committee.
    a. The roles of Chairperson and Vice Chairperson were described. Alternate and Vice Chairperson is the same.

    MOTION made by Pat Wood to approve Pat Wood as the Chairperson and seconded by Steve LaDochy. Motion passed with all votes in favor..

    MOTION made by Gina Natoli to approve Anjero Asper as the Vice Chairperson and seconded by Steve LaDochy. Motion passed with all votes in favor.

    b. A Quorum is composed of 10members of the Committee

c. Voting on the Charter will be next meeting. The draft Charter will be provided to the FMP Committee for review and input. The Charter will be discussed and voted on at the next FMP Committee Meeting.
d. There was a question asked whether all FMP Committee meetings are in accordance with the Brown Act and that Robert Rule are followed. All FMP Committee meetings, including this first meeting, are open to the public and the meeting information and agenda posted within 72-hours on the Public Works website.

Mission Statement- PowerPoint Presentation

1. Dave Pohl continued the presentation on the draft Mission Statement of the FMP.
2. Mission statement of the FMP is to "Protect life, property, the economy and the environment of unincorporated Los Angeles County by identifying and communicating risks and sustainable actions to reduce flood hazards and thus enhance community resilience."

MOTION made by Pat Wood to approve the Mission Statement and seconded by Debbie Sharpton. Motion passed with all votes in favor.

Goals and Objectives- PowerPoint Presentation

1. Dave Pohl continued the presentation of the draft Goals and Objectives of the FMP.
2. Goals:
    a. Originally presented Goals:
        i. Enhance community resilience to the impacts of flood hazards.
        ii. Protect life, safety, property and economy.
        iii. Communicate to residents and stakeholders what the flood risks are, based on best available data and science.
        iv. Increase resilience of infrastructure and critical facilities from flood hazards.
        v. Account for flood risk in land use and planning.
        vi. Preserve, enhance or restore the natural environment's floodplain functions.
        vii. Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.

    b. The Committee had a lively discussion on the focus of the FMP and key factors to consider such as the different land uses, development, and conditions within communities in rural areas of the County compared to more urbanizes area and linkage between flood risk management and water resource management. These discussion and inputs from the Committee resulted in the following suggested edits to the goals:

i. Enhance community resilience to the impacts of flood hazards while maximizing opportunities for local water supplies.
ii. ~~Protect life, safety, property and economy.~~ Removed as it was redundant with the mission statement.
iii. Communicate to residents and stakeholders what the flood risks are, based on best available data and science.
iv. Increase resilience of infrastructure and critical facilities from flood hazards.
v. Account for flood risk in land use and planning.
vi. Preserve, enhance or restore the natural environment's floodplain functions without increasing flood hazards.
vii. Encourage the development and implementation of long-term, cost-effective and environmentally sound flood hazard mitigation projects.

MOTION made by Pat Wood to approve the Goals as revised. Pat asked if there were any objections. None. Goals approved.

3. Objectives:
   a. Originally presented Objectives:
      i. Work cooperatively with public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
      ii. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
      iii. Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
      iv. Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.
      v. Consider open space land uses within known flood hazard areas.
      vi. Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.
      vii. Retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
      viii. Provide flood protection by maintaining flood control systems.
      ix. Sustain reliable local emergency operations and facilities during and after a flood event.
      x. Consider climate change implications in planning for flood and inundation hazards.
      xi. Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.
   b. After discussion and input from the Committee, the FMP Committee requested the following edits (in red) to the goals:

i. Work cooperatively with other public agencies with responsibility for flood protection, and with stakeholders in planning for flood and inundation hazards.
ii. Utilize best available data, science, and technologies to improve understanding of the location and potential impacts of flood hazards.
iii. Provide state, County and local agencies and stakeholders with updated information about flood hazards, vulnerabilities, and mitigation measures.
iv. ~~Discourage new development in known flood hazard areas or ensure that, if development occurs in those areas, it is done in a way to minimize flood risk.~~ Educate proponents of projects in known flood hazard areas about the potential flood risks and the need for mitigation measures to minimize flood risk
v. Consider open space land uses within known flood hazard areas.
vi. ~~Provide the highest degree of flood hazard protection at the least cost by working with environmentally friendly natural systems and by using prevention as the first priority.~~ Where feasible and cost effective, prioritize environmentally friendly natural systems when reducing flood risk.

c. In the interest of time, the remaining five objectives will be provided with these minutes for review and input by the FMP committee. The objective will be on the agenda for discussion and vote the next FMP Committee meeting.

Overview of Public Outreach Strategy

1. Stephanie and Esmerelda from MIG provided a brief overview of the outreach program and focused this discussion on the set of questions for the survey. An overview of the approach and type of questions were presented. The questions from the 2002 survey were used as the basis with some edits and placement in categories for clarity. Due to constraints on the remaining time for further discussion and input on the questionnaire, additional time for FMP Committee review and comment is provided. **Comments and edits to the questionnaire are requested by June 11th. Please send comments to Pat Wood or Anjero**
2. Stephanie and Esmerelda will be the contacts for public meetings

Questionnaire

1. Stephanie explained how the questionnaire was reorganized to address the following 4 themes:
    a. Assess knowledge
    b. Readiness
    c. Community perceptions and expectations
    d. Determine community needs to resources and tools
2. The highlights of the new changes to the questionnaire are as follows
    a. Organized by theme,
    b. Added a space for open comments,

   c. Looking to get more perspectives and larger response
3. The survey will be available on the web and through Public Works
4. There was a few comments from the FMP committee about vacant land, how the survey will be sent to properties without buildings, and that renters needed to be included. This was noted by MIG to be addressed in the survey revisions.

Action Items

1. The FMP committee should review provide input on:
   a. The Doodle Poll will be sent out in the next 2-weeks for the next meeting time and date. The date will be between **July 15-22nd**
   b. The Objectives- Send comments to Pat Wood/Anjero Asper before the next meetings and the revisions will be voted on next meeting
   c. The Charter- Send comments to Pat Wood/Anjero Asper before the next meetings and the revisions will be voted on next meeting
   d. The Survey Questions - Send comments to Pat Wood/ Anjero Asper before **June 11th**
   e. FMP Draft Part 1- Review the draft for the next meeting when we will be discussing and taking comments. Comments on this document are due on **July 25th**.
2. Burns & McDonnell will send out:
   a. A poll for the next meeting
   b. Meeting Minutes and Copy of Presentation
   c. Draft Charter
   d. Draft FMP Part 1
   e. FMP Milestones
   f. An Agenda for the next meeting which will include the project schedule, voting on the objectives, voting on the Charter, questions on the FMP Draft Part 1, public meetings scheduled and other public outreach activities

Meeting Adjourned at 3:00pm PST

County of Los Angeles
2025 Floodplain Management Plan Revision
2nd Floodplain Management Plan (FMP) Meeting
Between July 13th to 24th, 2024
Virtual Meeting

Introductions

- Group Introductions
- Review Agenda

Floodplain Management Plan – Finalize Objectives

- Review previous comments on Objectives 1-7
- Comments on Objectives 7-11

The Floodplain Management Plan (FMP) Committee's Charter

- Comments on FMP Committee's Charter

FMP Milestones

- Review of FMP Milestones Table
- Input on FMP Meetings

Public Outreach

- Status of Survey Questionnaire
- Public Engagement Meeting held at Malibou Lake Community
- Input on planned Public Engagement Meetings
- Additional Outreach Efforts

FMP & Repetitive Loss Area Analysis (RLAA) Part 1 – DRAFT

- Overview of FMP Part 1
- Overview of RLAA – Development of Repetitive Loss Areas
- Comments on FMP Part 1 – Draft
- Comments on RLAA Prat 1 – Draft

Critical Facilities & Infrastructure

- Review of Critical Facilities & Infrastructure identified in 2020 Update

Next Committee Meeting

- Flood Management Plan Part 1 Draft
- Repetitive Loss Area Analysis (RLAA) Part 1 Draft
- Confirm Next Meeting Date (anticipated July)

Action Items and Next Steps

Adjourn

County of Los Angeles
2025 Floodplain Management Plan Revision
2nd Floodplain Management Plan (FMP) Meeting
Wednesday, July 24, 2024, 10:00 a.m. to 12:00 p.m. PDT
Virtual Meeting

Attendees	Organization	Type
Ahmet Tatlilioglu	PW Stormwater Maintenance	Government
Gina Natoli	LA County Dept of Regional Planning	Government
Tera Haramoto	PW Building & Safety	Government
Glenn Tong	PW Building & Safety	Government (Alternate)
Kari Eskridge	PW Community Government Relations Group	Government
Loni Eazell	PW Emergency Management Group	Government
Angine Geragoosian	PW Emergency Management Group	Government (Alternate)
Mark Martinez	County Fire Department	Government
Alex Villalta	County Fire Department	Government
Pat Wood	PW Stormwater Engineering – CRS Coordinator	Government
Anjero Asprer	PW Stormwater Engineering – CRS Coordinator	Government (Alternate)
Gary (Yong) Guo	PW Stormwater Engineering – Hydrology & Hydraulics	Government (Alternate)
CJ Caluag	PW Stormwater Planning	Government (Alternate)
Jessie Wise	PW	Government
Timothy Dahlum	Red Cross of Greater Los Angeles	Non-Government (Alternate)
Dorothy Wong	Altadena Town Council	Non-Government
Mark Caddick	Antelope Valley Resident, Acton	Non-Government
Samson Wong	City of LA Bureau of Engineering	Non-Government
Thu Win	PW Stormwater Engineering	Core Planning Team
Makenna Hobson	Burns & McDonnell	Core Planning Team
David Pohl	Burns & McDonnell	Core Planning Team
Courtney Semlow	Craftwater	Core Planning Team
Stephanie Pavon	MIG	Core Planning Team

Meeting Notes:

Welcome and Introductions

1. Pat Wood welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves. The quorum for the meeting was reached.

Agenda

1. David Pohl presented the agenda to provide guidance on what will be spoken about today.

FMP Objectives Cont.- PowerPoint

1) David Pohl presented a slide deck that included the changes made to the objectives last meeting.
2) The committee was asked for their input on the remaining 5 objectives not covered in the last meeting. The following bullets represent the comments and the discussion on these objectives:
   a) **Objective #7**: Retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.
      i) The objective isn't clear about who would be purchasing structures, this would be property specific and the responsibility of the homeowner and/or the governmental agencies.
      ii) Although in most cases the private property owner would be responsible for retrofits, purchasing and relocation, the County may consider purchasing repetitive loss properties and converting these properties into open space.
      iii) The objective was modified as follows: Encourage and support efforts to retrofit, purchase and relocate structures in known flood hazard areas, especially those known to be repetitively damaged.

   b) **Objective #8**: Provide flood protection by maintaining flood control systems.
      i) No comments or issues raised. No changes made.

   c) **Objective # 9**: Sustain reliable local emergency operations and facilities during and after a flood event.
      i) Clarification needed on better defining what "sustain reliable local emergency operations mean." This may be clearer if it referred to "emergency response."
      ii) This objective should reference the Los Angeles County Emergency Response Plan.
      iii) The objective was modified as follows: "Implement flood response plan during and after a flood event."

   d) **Objective #10**: Consider climate change implications in planning for flood and inundation hazards.
      i) Include how new plans are evolving because of climate change and sustainability.
      ii) This is fairly broad because there are many different ways to combat climate change including the federal flood risk standard.
      iii) Suggested to remove the word implications to make it more direct
      iv) The objective was modified as follows: "Consider climate change in planning for flood and inundation hazards."

   e) **Objective #11**: Promote community resilience through education on flood risks, insurance and mitigation, and effective floodplain management regulation.
      i) Community education is very important especially in the mountainous portions of the Unincorporated County that where flooding and mud flow hazards may occur.

ii) No changes were suggested for this objective.

f) Overall comments on objectives: objective should include mention of green infrastructure as the new ordinances and design standards for green infrastructure reduce runoff and flooding.
   i) Recommended that this was added to **Objective #6**: Where feasible and cost effective, prioritize environmentally friendly natural systems including green infrastructure when reducing flood risk.

MOTION was made by Pat Wood to approve Objectives seconded by Loni Eazell. Motion passed with no votes for opposed.

Charter- Word Document

1. The charter was distributed and mentioned at the first FMP Meeting. FMP Committee members were asked to review the Charter and provided comments. No comments were received.
2. The document was presented and each section presented for comment and discussion.
3. There were no comments on the ground rules, chairperson/vice-chairperson, quorum, or alternates, decision-making, recommendations, staffing, spokespersons, meeting dates, attendance, public involvement, accommodations, or courtesy sections.
4. Committee was asked if there was any item they would like to go back to look at, no comments.

MOTION was made by Pat Wood to approve the Charter seconded by Gina Natoli. Motion passed with no votes opposed.

FMP Milestones/FMP Meetings- PowerPoint Presentation

1. A list of milestones and meeting dates was sent out. Anticipate up to six meetings corresponding to when the drafts are prepared. Materials will be sent out 2 weeks prior to the meeting. The timeline is dictated by when the plan needs to be completed.
2. The next meeting is proposed for the end of August/early September. A doodle poll will be sent out next week to allow committee members to response with available dates. A date and time will be selected based on the poll results in order to achieve a quorum.
3. David opened the floor to the committee to provide input.
4. There were no comments on the schedule.

Public Outreach

1. Community Floodplain Questionnaire.

a. Stephanie Pavón from MIG presented an update about responses to the Community Floodplain Questionnaire, which went live via a link on the webpage for Los Angeles County Public Works' Floodplain Management Plan 2025 Update on June 26, 2024, and will be available until August 30, 2024.
b. Stephanie discussed the current total responses and geography (by zip code) provided by respondents.
c. She also requested that committee members promote the survey to their neighbors, communities and networks in unincorporated Los Angeles County.

2. Malibou Lake Public meeting
    a. Stephanie from MIG discussed the outcomes of the public meeting held on July 18, 2024 in Malibou Lake. Public Works and project team staff attended to provide an introduction to community members about the FMP update plan, share resources related to flood preparedness and share upcoming opportunities for residents and community members to provide input into the process.
    b. The project team presented the map of the Malibou Lake Repetitive Loss Area (RLA), and participants were able to ask questions about their specific properties and use floodplain mapping software to determine hazards at their properties.
    c. MIG also provided tablets for participants to take the Community Flood Preparedness Questionnaire.
    d. Four community members came to the meeting.

3. Public Participation
    a. Stephanie introduced a timeline graphic shared at the public meeting which included the different types of activities during this update process where community members will be able to provide their comments and feedback. In addition to FMP and PPI committee meetings, the timeline graphic includes the timeframe for the community questionnaire, the proposed timeframe for public comment on the draft RLA and FMP documents, and public meetings to be held during the public comment period, scheduled for early 2025.
    b. Stephanie also discussed setting up the first PPI committee meeting, to begin the review process of the current Program for Public Information, looking at past messaging and outreach efforts. An earlier round of suggested dates in July did not receive enough responses from PPI members. MIG is proposing dates from August 8 through August 22 and will send out a doodle poll via email to PPI committee members and alternates.

4. Website Updates
    a. Anjero from LA County Public Works described updates made to the project website to include information related to this update, including an updated list of FMP committee members, the schedule of meetings, and links to resources.
    b. Feedback on this item included:
        i. Ensure committee members names are updated and accurate

ii. Ensure that during a google search for "LA County Floodplain Management Update" that results send people to the 2025 Update web page on the LA County Public Works website, and not the 2020 Update web page.
iii. Include a notice and link on the 2020 Update web page that directs users to the 2025 update web page.

c. Anjero mentioned that the IT team will update the Public Works website to ensure that the FMP Update 2025 web page falls into the top three search items via Google and other search engines.

d. Action items:

i. MIG will send the mailer flyer for the Community Flood Preparedness Questionnaire to FMP Committee members to share with their communities and networks.
ii. MIG will share a doodle poll with PPI Committee members and alternates to schedule a date for the first PPI meeting for August.

Floodplain Management Plan Part 1 and Repetitive Loss Area Analysis Part 1

1. The FMP committee had comments on the document that were sent in email prior to the meeting.
    a. Makenna Hobson from Burns & McDonnell went through the received comments and where they were changed so far in the document.
    b. The floor was open for comments on the document.
        i. There was a suggestion to add to the document the major bond issues that funded major flood control measures in LA County. These major bond issues in 1952, 1958, 1964 and 1970 also corresponded to major flood events.
        ii. It was also suggested to add a discussion on when the LA County Flood Control District was created and what areas of the unincorporated county were or not included.
        iii. The RLAA focuses on insured properties. Suggestion was to also include discussion of the risk to portions of properties that do not contain a structure and are not covered by insurance. Impacts may include flooding and mud slides.
        iv. FMP should include reference to complimentary plans that include Ready LA County and how the FMP compliments/coordinates with these plans. This includes coordination with Fire Protection Plans. Storm events after fires may result in greater flooding and mud slides. Response to emergencies and response coordination should be presented.
        v. Increases in population and development may add to flooding hazards and should be noted. For example, Altadena population has grown significantly.

c. The review period was extended another week to May 31 for additional comments from the committee.

Critical Facilities

1. The FMP committee was asked to provide input on the categories of critical facilities.
    a. There was a question on considering the developing LA Ready alerts. Make sure response connections are thought about with all the new plans coming together.
    b. Are Dams considered critical facilities? There is a separate section and discussion on dams and levees in the FMP. FEMA does not consider them as critical facilities. Suggest adding a reference to the dam section when introducing critical facilities.

MOTION made by Pat Wood to approve the Critical Facilities pending additions from the FMP Committee until July 31st seconded by Mark Caddick. Motion passed with no votes opposed.

Next Committee Meeting and Action Items

2. The FMP committee should review/provide input on:
    a. The Doodle Poll will be sent out in the next 2-weeks for the next meeting time and date. The date will be between **Late August/Early September**
    b. Burns & McDonnell will be sending out FMP Part 2 Draft and RLAA Part 2 Draft with 2-3 weeks of review time before the next meeting.
    c. The Survey- Please fill out the survey and share with local community if you are located in flooding areas.
3. Burns & McDonnell & Team will send out:
    a. A doodle poll for the next meeting
    b. Meeting Minutes and Copy of Presentation
    c. The mailer flyer for the Community Flood Preparedness Questionnaire to FMP Committee members to share with their communities and networks.
    d. MIG will share a doodle poll with the PPI committee members for a meeting at the beginning of August.
    e. An Agenda for the next meeting which will include the project schedule, voting on the objectives, voting on the Charter, questions on the FMP Draft Part 1, public meetings scheduled and other public outreach activities

Meeting Adjourned at 11:40pm PDT

County of Los Angeles
2025 Floodplain Management Plan Revision
3rd Floodplain Management Plan (FMP) Meeting
Tuesday, October 1st, 2024, 10:00 a.m. to 12:00
Virtual Meeting

Introductions

- Group Introductions
- Review Agenda

Repetitive Loss Area Analysis (RLAA) Part 2- DRAFT

- Overview of RLAA Part 2
    - New and Previous Repetitive Loss Areas – Regional Map of Areas
    - Basis for New Repetitive Loss Areas
    - Field Surveys Conducted by Public Works for New RLAs
    - Probable Mitigation Measures
- Comments on RLAA Part 2 – Draft

Floodplain Management Plan (FMP) Part 2- DRAFT

- Overview of Draft FMP Part 2
- Comments on Draft FMP Part 2 - Draft

Review of FMP & RLAA Schedules / Milestones

- Review of FMP Milestones Table
- Input on FMP Meetings

Public Outreach

- Public Engagement Status and Discussion

Next Committee Meeting

- Discuss date of next meeting (anticipated November 6th, 7th,12th or 13th)
- Draft FMP Part 3 and Draft RLAA Part 3

Adjourn

County of Los Angeles
2025 Floodplain Management Plan Revision
3rd Floodplain Management Plan (FMP) Meeting
Wednesday, October 1, 2024, 10:00 a.m. to 12:00 p.m. PDT
Virtual Meeting

Attendees	Organization	Type
Glenn Tong	PW Building & Safety	Government (Alternate)
Joshua Felton	PW Building & Safety	Government (Alternate)
Loni Eazell	PW Emergency Management Group	Government
Angine Geragoosian	PW Emergency Management Group	Government (Alternate)
Pat Wood	PW Stormwater Engineering – CRS Coordinator	Government
Anjero Asprer	PW Stormwater Engineering – CRS Coordinator	Government (Alternate)
Gary (Yong) Guo	PW Stormwater Engineering – Hydrology & Hydraulics	Government (Alternate)
CJ Caluag	PW Stormwater Planning	Government (Alternate)
Nam Doan	PW Community Service & Government Relations Group	Government (Alternate)
Dorothy Wong	Altadena Town Council	Non-Government
Debbie Sharpton	Environmental Restoration Group	Non-Government
Mark Caddick	Antelope Valley Resident, Acton	Non-Government
Samson Wong	City of LA Bureau of Engineering	Non-Government
Salomon Miranda	CA Department of Water Resources	Non-Government
Shannon Ggem	Malibu Lake Mountain Club	Non-Government
Thu Win	PW Stormwater Engineering	Core Planning Team
William Saunders	PW Stormwater Engineering	Core Planning Team
Makenna Hobson	Burns & McDonnell	Core Planning Team
David Pohl	Burns & McDonnell	Core Planning Team
Courtney Semlow	Craftwater	Core Planning Team
Stephanie Pavon	MIG	Core Planning Team

Meeting Notes:

Welcome and Introductions

1. Anjero Asprer welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves. The required quorum of a minimum of 10 members for the meeting is met.

Agenda

1. David Pohl presented the agenda to guide what will be spoken about today.

Draft RLAA Part 2 Power Point

1. Burns & McDonnell presented a PowerPoint slide presentation outlining the Draft RLAA Part 2 document and the corresponding FEMA CRS requirements met by each Chapter. The topics covered included:
    a. Presentation of the determination of the five new repetitive loss areas that are provided in the RLAA Part 2. Information on these new Repetitive Loss Areas presented included the number of properties/structures within the area, the methodology in developing the RLA and possible mitigation measures to address impacts from flooding.
    b. Discussion of the Reverse Function Analysis and how it was used for several of the RLA.
    c. Comments during the presentation included:

    Comment #1: The FMP should identify which Repetitive Loss Areas are within a designated disadvantaged community as there may be grant funding available to address flood hazard issues.

    Response #1: The FMP Part 2 provides a map of the disadvantaged communities. A map can be added to the RLAA Part 2 or 3 that includes this disadvantage community data with the RLA information on a map. The project team will look into this and include this into the RLAA. This may go into Part 3 which covers mitigation measures and priorities.

    Comment #2: Will there be education and outreach efforts directed at the Repetitive Loss Properties (RLP)?

    Response #2: There are several outreach efforts directed at RLP and the properties within the RLA. This includes the community meetings during the planning process and after the RLAA and FMP updates are available for public review. A Community Meeting was held at the Malibou Lake community during the planning efforts. In addition, letters have been sent to the RLP and properties within the RLAs to notify them of the RLAA update. Another notice will be sent when the RLAA is available for public review and input. The notices include a link to the FMP Web-site and survey. The FMP web-site includes information from FEMA and Public Works on mitgation measures that can be implemented by private property owners. Although no educational information is directed at a particular RLP or RLA, the information from FEMA and Public Works provides a range of mitgation measures that are applicable to most properties.

    Comment #3: How are properties taken off the list of RLP? For example, if a property has undergone changes to meet current standards.

Response #3: Properties are removed from the list of RLP through a process that includes submitted the documentation to FEMA. Public Works submits this documentation when property status changes that allows for a change in status. Public Works has submitted this documentation for example for properties where the structures have been removed. FEMA resources may be the reason these properties off the list to date. It is important, however, to update the status of properties in the RLAA where flooding that have impacted the building have been mitigated. Public Works will continue to submit the documentation to request properties be removed as information is provided. There are benefits to reducing the number of RLP as requirements under the CRS decrease.

d. Written comments that have been received from the FMP Committee prior to the meeting were discussed and included:

Comment #1: Agua Dulce A: follow up needed on private property owner modifications

Response #1: Public Works conducts surveys of RLP periodically to check on status and also receives updates on properties that undergo changes requiring a building permit from Planning. This RLA will be identified for follow-up surveys to check on property owner modifications as notes in the report. Updates based on the surveys and other sources will be made when available. Updates will also be included in the annual report for the FMP as required by the CRS guidelines.

Comment #2: Mitigation Measures Table: Regarding the public entity actions, which involve improvements and maintenance, has/have the appropriate agencies been notified? If so, when, what action taken?

Response #2: Part 3, which will be sent to the FMP Committee in the next week for review, includes more detail on the responsibilities, riels and priorities of the mitigation measures listed in Part 2. Part 3 will identify the agency, where applicable, that is responsible for the action. The status of the action to implementation mitigation measures are reviewed annually and reported per the CRS guidance. Status of mitgation measures on private properties will be based on the surveys and information provided by the property owners.

Comment #3: Clarify the responsible party for maintaining offsite drainage and drainage within private property with regard to flooding

Response #3: The response was covered under the previous comment.

Comment #4: Clarify who would be providing education/outreach outside of the LACFCD

Response #4: Although there is limited funding for education/outreach efforts outside of the LACFCD, the FMP process includes community outreach meetings to communities where RLA are identified. As mentioned, RLP and properties within the RLAs are notified of the RLAA updates, public review of the RLAA and annual notifications. These notifications include links to the FMP website that includes educational material regarding mitigation measures that can be used by private property owners. Additional information on outreach efforts will be provided by Community Relations.

Comment #5: Clarify current status of Quartz Hill Drainage improvements. Hasn't the construction of the Quartz Hill drain addressed the flooding issues?

Response #5: Public Works will look into the current status. As mentioned in the above responses, Public Works conducts surveys of RLP periodically to check on status. This RLA will be identified for follow-up surveys. Updates based on the surveys and other sources will be made when available. Updates will also be included in the annual report for the FMP as required by the CRS guidelines.

e. The comment period for the RLAA Part 2 is extended to October 8th to allow for any additional comments committee members may have.

Draft FMP Part 2 Power Point

2. Burns & McDonnell presented a PowerPoint outlining the Draft FMP Part 2 document and the corresponding FEMA CRS requirements met by each Chapter. The topics presented included:

    a. Overview of the CRS guidelines and the corresponding chapter and content of the FMP Part 2 that meet these reporting requirements.
    b. Discussion of the land use and how most of the unincorporated county area is rural and open space compared to the urban areas in southeast LA which comprise a much smaller of the total unincorporated area but have much higher populations and density per area. These land uses affect the risk assessment results regarding comparative number of the population and structures potentially impacted by flooding.
    c. Discussion of the maps generated from the HAZUS results which included potentially impacted population, number of structures and critical facilities potentially impacted and the portion of total replacement costs of structures that could be impacted by flooding.
    d. Presentation of the concentrated disadvantage index and disaster declarations in LA County.

e. Discussion of the comments received on the FMP part 2 and opened the flood to additional comments
f. The comment period for the FMP Part 2 is extended to October 8th to allow for any additional comments committee members may have.

Public Outreach

1. MIG presented a brief overview of public outreach activities. The following is a summary of the information shared with the FMP Committee.

    a. PPI Committee Meeting 2 - Met in early September to discuss and review the PPI Implementation Matrix. The matrix includes the set of outreach topics, types of messaging, audiences to reach, types of outcomes and set of projects underway or needed to reach these outcomes and audiences.

2. MIG will provide a revised draft, which includes comments and discussion from the committee meeting, via email for further review and comment from PPI committee members. Stephanie also announced the next committee meeting will be held in early November and will address the implementation and evaluation of PPI Implementation Matrix projects.

3. Community Floodplain Questionnaire
    a. Stephanie Pavón from MIG presented an update about responses to the Community Floodplain Questionnaire and requested that committee members promote the survey to their neighbors, communities and networks in unincorporated Los Angeles County.

Next Committee Meeting and Action Items

1. The FMP committee should review/provide input on:
    a. Comment period for the RLAA and FMP Part 2 is extended to the 8th. Please send comments to Anjero.
    b. The Doodle Poll will be sent out in the next 2-weeks for the next meeting time and date. The date will be tentatively scheduled for November 12th.
    c. Burns & McDonnell will be sending out FMP Part 3 Draft and RLAA Part 3 Draft with 2-3 weeks of review time before the next meeting.
    d. The Survey- Please fill out the survey and share with local community if you are located in flooding areas.
2. Burns & McDonnell & Team will send out:
    a. A doodle poll for the next meeting
    b. Meeting Minutes and Copy of Presentation

c. The mailer flyer for the Community Flood Preparedness Questionnaire to FMP Committee members to share with their communities and networks.
d. MIG will share a doodle poll with the PPI committee members for a meeting at the beginning of November.
e. An Agenda for the next meeting

Meeting Adjourned at 11:30am PDT

County of Los Angeles
2025 Floodplain Management Plan Revision
4th Floodplain Management Plan (FMP) Meeting
Tuesday, November 12nd, 2024, Time TBD
Virtual Meeting

Introductions

- Group Introductions
- Review Agenda

Repetitive Loss Area Analysis (RLAA) Part 3- DRAFT

- Overview of RLAA Part 3
- Comments on RLAA Part 3 – Draft

Floodplain Management Plan (FMP) Part 3- DRAFT

- Overview of Draft FMP Part 3
- Comments on Draft FMP Part 3 - Draft

Public Outreach

- Public Engagement Status and Discussion

Adjourn

County of Los Angeles
2025 Floodplain Management Plan Revision
4th Floodplain Management Plan (FMP) Meeting
Wednesday, November 12, 2024, 10:00 a.m. to 11:30 p.m. PST
Virtual Meeting

Attendees	Organization	Type
Glenn Tong	PW Building & Safety	Government (Alternate)
Eden Berhan	PW Stormwater Maintenance	Government
Tera Haramoto	PW Building & Safety	Government
Joshua Felton	PW Building & Safety	Government (Alternate)
Angine Geragoosian	PW Emergency Management Group	Government (Alternate)
Pat Wood	PW Stormwater Engineering – CRS Coordinator	Government
Gary (Yong) Guo	PW Stormwater Engineering – Hydrology & Hydraulics	Government (Alternate)
Luis Garcia	PW Stormwater Planning	Government (Alternate)
Nam Doan	PW Community Service & Government Relations Group	Government (Alternate)
Katri Eskridge	PW Community Service & Government Relations Group	Government
Gina Natoli	LA County Dept. of Regional Planning	Government
Debbie Sharpton	Environmental Restoration Group	Non-Government
Mark Caddick	Antelope Valley Resident, Acton	Non-Government
Mark Martinez	County Fire Department	Non-Government
Samson Wong	City of LA Bureau of Engineering	Non-Government
Salomon Miranda	CA Department of Water Resources	Non-Government
Shannon Ggem	Malibu Lake Mountain Club	Non-Government
Steve LaDochy	Cal State LA Meteorology	Non-Government
Timothy Dahlum	Red Cross of Greater Los Angeles	Non-Government
William Saunders	PW Stormwater Engineering	Core Planning Team
Makenna Hobson	Burns & McDonnell	Core Planning Team
David Pohl	Burns & McDonnell	Core Planning Team
Courtney Semlow	Craftwater	Core Planning Team
Stephanie Pavon	MIG	Core Planning Team

Meeting Notes:

Welcome and Introductions

1. Pat Wood welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves. The required quorum of a minimum of 10 members for the meeting is met.

Agenda

1. David Pohl presented the agenda to guide what will be spoken about today.

Draft FMP and Draft RLAA Part 3 Document

1. Burns & McDonnell presented the Draft FMP Part 3 and associated comments that were received from the FMP Committee on the document. The same comments applied to the RLAA Part 3 document as both documents contain the same tables discussed. Comments mainly addressed the Action Plan Flood Mitigation Actions table (see marked up Table at end of document) and included:
    a. Comment received regarding funding the flood mitigation action items listed in the table outside of the LACFCD and which proposed actions apply to areas outside of the LACFCD. This comment applied to items 1-10, 14, 20, 30, 33 and 36.
        i. Actions funded by the LACFCD might not extend to areas outside its jurisdiction depending on the level of effort and cost. However, actions that include outreach, education and information activities overlap into areas outside of the LACFCD as education information and outreach efforts are made available to all communities within the unincorporated LA County. Activities that can be integrated into existing programs without requiring substantial additional funding may also be covered. Additionally, some listed actions, including drainage infrastructure, may be covered outside of the LACFCD by the LA County Public Works Road Maintenance Division in areas where the roadway and drainage infrastructure is under the County's jurisdiction.
    b. There were comments regarding adding additional support agencies to some of the action items, which included the National Weather Service (items 9, 30 and 31), insurance boards (item 7 and 10) and LA sanitation (item 24).
        i. The National Weather Services will be added as a support agency to these action items as they provide warning systems that are coordinated with County flood preparation and emergency services.
        ii. In response to the comment requesting if the State Insurance Board should be added as a support agency to items 7 and 10, the flood insurance program is a federal program that is not under the state agency, and therefore is not a supporting agency.
        iii. The commentor clarified that what was asked if City of LA Department of Sanitation be added as a supporting agency under Item 24. The FMP is focused on unincorporated Los Angeles County and there for LASAN is not a supporting agency.
    c. There was also a general comment regarding the Quartz Hill Drain its influence on mitigation for the properties within Quartz Hill Repetitive Loss Areas.
        i. The FMP team will further investigate if the repetitive loss properties are within the drainage areas of the Quarta Hill Drain and the design capacity of the system. Depending on this assessment, a request will

be made to FEMA to change the status of these properties to "mitigated."

d. This led to the question of how FEMA properties are removed from the RLAA list.
    i. It was noted that FEMA typically does not remove properties from the repetitive loss list but will reclassify them as "mitigated" which can change their risk rating by FEMA.
e. There was a follow up question to this discussion on how property owners can report actions that have mitigated flood risk such as elevation and drainage improvement.
    i. This information can be provided to the Public Works Planning Division and then added to the annual FMP updates on mitigation measures taken at listed repetitive loss properties. Public Works agreed to submit these updates annually and, where appropriate, submit them for a reclassification through the Form AW-501 process to FEMA.
    ii. FEMA has not responded to the forms LAC had previously send in. After discussion on what LAC can do to help move along this process, a new item (item 38) was added to the mitigation table which describes that the Public Works will provide annual submittals/re-submittals of the form to FEMA for mitigated Repetitive Loss Areas.
f. A comment on item 20 regarding adding information on funding from the Safe Clean Water Program and other funding for areas outside of the LACFD.
    i. The Safe Clean Water Program is limited to projects within the LACFD. There are grant funds at the state and federal level for nature-based solution type projects. This will be added to item 20.
g. Finally, there was a review of the funding under existing programs/budgets to confirm the answers are applicable to the entire unincorporated LA County, not just those in the LACFCD.
    i. The table in the FMP/RLAA document was reviewed and updated to reflect any changes to funding terminology.

The comment period for the FMP Part 3 and RLAA Part 3 is extended to November 19th to allow for any additional comments committee members may have.

Public Outreach

1. MIG presented a brief overview of public outreach activities. The following is a summary of the information shared with the FMP Committee.

2. PPI Committee Meeting 3 - the next PPI committee meeting will be taking place next Tuesday, November 19, 2024, where the committee will discuss the PPI's implementation plan and any needed updates. MIG recently shared the revised PPI program matrix with the

committee for review and comments. A fourth and last meeting will be held before the end of the year, and after that the final draft of the PPI will be shared with the committee for review and final comment.

3. Community Floodplain Questionnaire
    a. Stephanie Pavón from MIG presented an update about the Community Floodplain Questionnaire and requested that committee members continue to promote the survey to their neighbors, communities and networks in unincorporated Los Angeles County. The Public Works communications team is currently promoting the questionnaire through their social media accounts. The questionnaire will remain open until December 20, 2024.
4. Public Meetings During Upcoming Comment Period
    a. Stephanie mentioned that the project team will be hosting three public meetings during the Draft FMP public Comment Period, currently scheduled for February and March of 2025. These will take place in Lancaster, Agua Dulce, and in the Santa Monica Mountains, potentially at Malibou Lakes. Stephanie said that MIG will reach out to community representatives for assistance with publicity and co-hosting if possible. Shannon Ggem from Malibou Lakes said they would be happy to help coordinate an event there during an existing meeting to encourage participation from local residents.

Vice Chair Update

Anjero Asper has been promoted, and William Saunders has taken over as Public Works Project Manager. This has left an opening for vice chairperson of the FMP committee. William Saunders was nominated by Pat Wood for the vice chairperson position.

MOTION made by Pat Wood to approve William Saunders as the Vice Chairperson and seconded by Steve LaDochy, Motion passed with no votes opposed.

Next Committee Meeting and Action Items

1. The FMP committee should review/provide input on:
2. Comment period for the RLAA and FMP Part 3 is extended to November 19th. Please send any additional comments to William Saunders and cc Makenna Hobson.
    a. Please fill out the survey and share with local community by December 20th.
    b. The Doodle Poll for meeting number 5 will be sent out at least 2-weeks two weeks prior to the next meeting time and date. The date will be tentatively scheduled for February 2025.
        i. Burns & McDonnell will send out the FMP Part 4 with 2-3 weeks of review before the next meeting.

Meeting Adjourned at 11:30am PST

Table 11-3: Action Plan- Flood Mitigation Actions

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
1—Promote awareness of flood hazards to residents in flood hazard areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Building and Safety Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; County Regional Planning Department	Low	Ongoing	1, 3, 11	Yes-1
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Building and Safety Division, Land Development Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	3, 11	Yes-2
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Los Angeles County Chief Executive Office/Office of Emergency Management (CEO OEM), Public Works (Disaster Services Group) ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	1, 3	Yes-3
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • **Annually notify owners regarding local flood hazards and proper protection activities** • **Provide technical advice regarding flood protection and flood preparedness** • **Distribute a revised questionnaire to new Repetitive Loss Properties.** ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Program for Public Information) ***Funding Source***: Public Works	Low	Ongoing	1, 2, 3, 11	Yes-4
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. ***Lead Agency:*** Fire Department, Public Works (Administrative Services Division, Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group) ***Funding Source:*** FEMA; Cal EMA; Fire Department; Public Works	Low	Ongoing	3, 9	Yes-5

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
6—Provide public education about maintaining the stormwater system free of debris. ***Lead Agency:*** Public Works (Stormwater Quality Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Stormwater Engineering Division, Stormwater Maintenance Division, Stormwater Planning Division, Road Maintenance Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	1, 9	Yes-6
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Maintenance Division, Stormwater Planning Division, Transportation Planning and Programs Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 4, 6, 8	Yes-7
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Community & Government Relations Group) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	1, 3, 11	Yes-8
9—Provide emergency preparedness and flood protection information to the general public. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Stormwater Engineering Division, Program for Public Information, Stormwater Planning Division, Community & Government Relations Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works; USC Sea Grant	Low	Ongoing	1, 9, 11	Yes-9
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. ***Lead Agency:*** CEO OEM, Public Works (Disaster Services Group) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works	Low	Ongoing	1, 9, 11	Yes-10
11—Develop and maintain a list of priority maintenance-related problem sites. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 8	Yes-11

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. ***Lead Agency:*** Public Works (Stormwater **Maintenance ~~Engineering~~** Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 8	Yes-12
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 8	Yes-13
14—Evaluate LACFCD storm drain, open channel, and flood retention basin facilities for future improvements. Drainage infrastructure outside of the LACFCD may be covered by the Road Maintenance Division where applicable. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Public Works (Design Division, Stormwater Maintenance Division, Stormwater Engineering Division, Stormwater Quality Division) Stakeholders ***Funding Source:*** Public Works	Low	Ongoing	2, 8	Yes-14
15— Pursue appropriate flood hazard mitigation grant funding for projects (i.e. BRIC) that use the Community Lifeline Framework, and address multiple hazards, where applicable. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Disaster Services Group, Stormwater Planning Division), CEO OEM ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	1, 8	Yes-15
16—Consider the conversion of high-risk properties into open space. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department; County Parks and Recreation	High	Ongoing	4, 5, 7	Yes-16
17—Refine the plan check system to track properties in the flood zone and address drainage. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 4, 8	Yes-17

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division) ***Funding Source:*** Public Works	Low	Ongoing	4, 7, 8,	Yes-18
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Chief Information Office) ***Funding Source:*** Public Works	Low	Ongoing	1, 2, 4	Yes-19
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Engineering Division), Stakeholders ***Funding Source:*** FEMA, U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department, Safe Clean Water (SCW) Program	Low	Ongoing	1, 6, 10	Yes-20
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. ***Lead Agency:*** Public Works (Stormwater Planning Division, Stormwater Quality Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works	High/ Medium	Long term	1, 2, 3, 5, 6	Yes-21
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. ***Lead Agency:*** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Regional Planning Department, Public Works (Environmental Programs Division, Stormwater Quality Division, Stormwater Planning Division, Stormwater Engineering Division, Project Management Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; Public Works	Low	Ongoing	1, 2, 6	Yes-22
23—Maintain the Operational Area Emergency Response Plan. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Low	Ongoing	1, 3, 9	Yes-23

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. ***Lead Agency:*** Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Quality Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	2, 4, 7, 8	Yes-24
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division, Transportation Planning and Programs Division, Land Development Division) ***Funding Source:*** Public Works; County Regional Planning Department	Low	Ongoing	4, 6	Yes-25
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Transportation Planning and Programs Division) ***Funding Source:*** FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; Public Works; CEO OEM; County Regional Planning Department; County Parks and Recreation	Low	Ongoing	4, 5, 7	Yes-26
27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** County Regional Planning Department; Public Works	Low	Short term	1, 2, 3	Yes-27

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division, Stormwater Maintenance Division), Regional Planning Department ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 4, 6, 8	Yes-28
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; USC Sea Grant	Low	Long term	2, 3, 5, 10	Yes-29
30—Identify flood-warning systems for properties where such systems can be beneficially employed. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Sheriff's Department, Public Works (Stormwater Maintenance Division, Disaster Services Group), National Weather Service ***Funding Source:*** FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; Public Works; CEO OEM	Low	Ongoing	1, 8, 9	Yes-30
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Public Works (Disaster Services Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Medium/ Low	Long term	1, 9	Yes-31
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. ***Lead Agency:*** Public Works (Building and Safety Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 4, 8, 11	Yes-32

Action, Responsible Agencies and Potential Funding [a]	Estimated Project Cost [b]	Timeline	Objectives	In Previous Plan? - Action #
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** : Public Works (Stormwater Planning Division, Design Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Medium/ Low	Ongoing	1, 2, 3	Yes-33
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	1, 3	Yes-34
35—Continue County coordination with other agencies and stakeholders on issues of flood control. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	1, 3, 8	Yes-35
36—Continue to identify and assess drainage needs. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Support Agencies:*** Public Works (Stormwater Maintenance Division,, Road Maintenance Division) ***Funding Source:*** Public Works	Medium/ Low	Ongoing	1, 2, 11	Yes-36
37— Pursue Building Resilient Infrastructure and Communities (BRIC) program projects that use the Community Lifeline Framework. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Planning Division, Stormwater Maintenance Division) ***Funding Source:*** Public Works; FEMA	Low	Long Term	1, 11	Yes-37
38— Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Regional Planning Department,Building and Safety Division) ***Funding Source:*** Public Works; FEMA	Low	Annually	1, 3, 11	No

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

County of Los Angeles
2025 Floodplain Management Plan Revision
5th Floodplain Management Plan (FMP) Meeting
Tuesday, February 25th, 2025, 10-11am
Virtual Meeting

Introductions

- Group Introductions
- Review Agenda

Floodplain Management Plan (FMP) Part 4- DRAFT

- Overview of Draft FMP Part 4
- Comments on Draft FMP Part 4 – Draft

Updates to FMP Part 1 and Part 2

- Overview of changes made to Part 1 and Part 2 from FMP Comments
- Additional comment review and discussion

Schedule Updates

- Update on the schedule and timeline of the document.

Public Outreach

- Public Engagement Status and Discussion

Adjourn

County of Los Angeles
2025 Floodplain Management Plan Revision
5th Floodplain Management Plan (FMP) Meeting
Tuesday, February 25 2025, 10:00 a.m. to 10:45 p.m. PST
Virtual Meeting

Attendees	Organization	Type
Angine Geragoosian	PW Emergency Management Group	Government (Alternate)
Anthony Wong	PW Building & Safety	Government (Alternate)
CJ Caluag	PW Stormwater Planning	Government (Alternate)
Pat Wood	PW Stormwater Engineering – CRS Coordinator	Government
Gary (Yong) Guo	PW Stormwater Engineering – Hydrology & Hydraulics	Government (Alternate)
Nam Doan	PW Community Service & Government Relations Group	Government (Alternate)
Katri Eskridge	PW Community Service & Government Relations Group	Government
Gina Natoli	LA County Dept. of Regional Planning	Government
Salomon Miranda	CA Department of Water Resources	Non-Government
Samson Wong	City of LA Bureau of Engineering	Non-Government
Steve LaDochy	Cal State LA Meteorology	Non-Government
Makenna Hobson	Burns & McDonnell	Core Planning Team
David Pohl	Burns & McDonnell	Core Planning Team
Courtney Semlow	Craftwater	Core Planning Team
Stephanie Pavon	MIG	Core Planning Team

Meeting Notes:

Welcome and Introductions

1. Pat Wood welcomed attendees, thanked everyone for their participation throughout this plan update process and everyone introduced themselves. The required quorum of a minimum of 10 members for the meeting is met.

Agenda

1. David Pohl presented the agenda to guide what will be spoken about today.

Draft FMP Part 4 Document, Updates to FMP Part 1 and Updates to FMP Part 2

1. Burns & McDonnell presented the Draft FMP Part 4 and associated comments that were received from the FMP Committee on the document to date. FMP Part 4 outlines a strategy for maintaining and updating the plan to support its continued effectiveness. Success relies on integrating the plan's actions into existing policies and programs, prioritizing interagency coordination and public participation. Comments during the meeting mainly addressed the Public Participation Information (PPI) and included questions on if the PPI

will also be integrated into the FMP. This is included in Chapter 14 of Part 4. Chapter 14 describes the PPI Committee, composed of representatives from various local organizations and agencies, and their developed outreach strategies. They formulated key messages on flood preparedness, insurance, safety, and property protection. The committee also reviewed existing public awareness efforts to coordinate and avoid duplication. Comments received on this document before the meeting were editorial and were addressed in the document.

2. Burns & McDonnell presented updates to previously reviewed documents Part 1 and Part 2 and associated comments received from the FMP Committee during the past two weeks. Based on the previous meeting comments, the presented updates included additions to flood history, more information on past flood control projects, and additions of significant previous floods.
3. The new comments received in the past two weeks from the FMP Committee on these documents included discussions on the recent flooding (in 2025) following the major fires in the area. A new paragraph has been added to the document describing the recent storm following the wildfires. A new caveat was added to the document that this list is updated up to February 2025.

The comment period for the FMP Part 4 is extended to March 4th to allow for any additional comments committee members may have.

Survey Results

1. MIG presented the survey results from the public flood preparedness questionnaire. This information was also added the FMP part 1

Public Outreach

1. MIG presented a brief overview of public outreach activities. The following is a summary of the information shared with the FMP Committee.
2. Public Meetings During Upcoming Comment Period
3. MIG mentioned that the project team will be hosting a public meeting at Quartz Hill Library on April 3rd from 6-7:30pm during the Draft FMP public Comment Period. The public comment period for the FMP is anticipated to begin Mid-March and last until Late April.

Next Committee Meeting and Action Items

1. The FMP committee should review/provide input on:
2. Comment period for the FMP Part 4 is extended to Marth 4th. Please send any additional comments to William Saunders and cc Makenna Hobson.
3. Spread the word about the upcoming public meeting to those that may want to attend.

Meeting Adjourned at 10:45am PST

PUBLIC PARTICIPATION INFORMATION COMMITTEE MEETING AGENDAS, ATTENDANCE, AND SUMMARIES

County of Los Angeles
2025 Floodplain Management Plan Revision
Program for Public Information (PPI) Committee
Meeting #1

August 21, 2024
12:00 – 2:00 p.m.

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12:00 – 12:05 p.m.	**Welcome and Introductions** **Agenda Review**	PW MIG
12:05 – 12:15 p.m.	**PPI Committee Overview** • Purpose, role, composition • Meeting schedule • Work products	MIG
12:15 – 12:30 p.m.	**Background** • Community Rating System (CRS) credit structure and criteria *Questions*	
12:30 – 1:20 p.m.	**Assess the Community's Public Information Needs** • Target areas with flood concerns • Associated projects • Priority audiences – Who needs to be informed of flood problems? • Public information concerns for each area *Discussion – All*	
1:20 – 1:45 p.m.	**Formulate Messages** • Messages addressing priority topics areas – Know your flood hazard – Insure your property against your flood hazard – Protect people from the hazard – Protect your property from the hazard – Build responsibly – Protect natural floodplain functions *Discussion – All*	
1:45 – 2:00 p.m.	**Summary and Next Steps** • Future meeting schedule	
2:00 p.m.	***Adjournment***	MIG

Los Angeles County Floodplain Management Plan Update
PPI Committee Meeting #1
August 21, 2024
12:00 to 1:30 PM

Summary

During the first LA County Floodplain Management Plan (FMP) Program for Public Information (PPI) Committee meeting held on August 21, 2024 via Zoom, MIG presented a brief overview of the purpose for the PPI Committee and previous efforts to build upon. The following is a summary of the information shared with the PPI Committee.

PPI Committee Overview

Anjero Asprer, PE welcomed and thanked the group on behalf of Public Works. Esmeralda García from MIG opened the meeting, facilitated a round of introductions, and reviewed the agenda. The purpose, role, and composition of the PPI Committee along with the seven steps of the Community Rating System (CRS) were presented to those in attendance. The schedule of meetings and work products that will result from PPI Committee efforts were shared with the group.

Background

David Pohl from Burns & McDonnell shared the mission statement and goals of the FMP as well as providing more information about the CRS. At this time attendees were encouraged to ask any questions related to the information that had been shared with them.

Community's Public Information Needs

David walked through the Repetitive Loss Areas and the Watersheds and Hazard Zones Map – providing context on the communities at risk of flooding. Definitions for the conditions and attributes of Target Areas such as FEMA Repetitive Loss Property, Repetitive Loss Area, Flood Hazard Zones, and Types of Flooding were provided. He summarized the unincorporated communities within the identified Target Areas. These include Agua Dulce, Lake Hughes, Antelope Valley, Quartz Hill, Topanga, Calabasas, and Malibou Lakes among a few others.

Esmeralda briefly reviewed the target audiences and projects of the previous PPI effort, then the MIG team shared a digital whiteboard tool called MURAL, to take notes on any additional audiences that should be the focus of this update. Audiences mentioned during the discussion include:

- Realtors
- Property owners who were not informed of hazards when purchasing
- Residents near creeks
- Residents who relocate to Santa Monica Mountains
- Developers
- Designers
- Architect
- Engineers
- Contractors

Formulate Messages

This section outlined the previous priority topics and messaging to inspire potential topics and messages for this round of updates. The MURAL was utilized again to take notes, some ideas shared include:

Know Your Flood Hazard

- Utilizing stones, posts, or interpretative signage to show high water marks and projected flood levels and involving the community in the design process of the sign.
- Ensure high water mark signs respect and are integrated into the environment.
- Consider signage that goes beyond the standard County signs/signage.

Insure Your Property Against Your Flood Hazards

- Employing a social media campaign to reach realtors and share the importance of disclosing hazards.
- Ensure realtors and brokers have access to reports or other information they may need to inform buyers.
- Conduct outreach to brokers

Protect People From the Hazard

- Provide graphic or physical elements to indicate flooding risk such as messaging for surface water that is built into pavement.
- Emphasize the magnitude or dangers of high flowing water/floods.

- Show tenure of flooding (300-, 500-year) in signage.
- Incorporate this information in public art.
- Ensure people experiencing homelessness receive adequate warning and support.
- Continue coordination between Stormwater division and police and fire departments to inform people experiencing homelessness who are in high impact County flood areas.
- Consider expanding outreach to people experiencing homelessness in other parts of the county, potentially HSA.
- Deploy a community outreach strategy that targets community members in existing spaces.

Protect Your Property From the Hazard

- "Give the creek space"
- The "Turn around don't drown" campaign seemed to be effective during the last season.
- Secure your belongings/property so they don't float away.
- Inform residents of safe areas to park during a storm.
- Provide sandbags.
- Offer in-person consultations and assessments with engineers.

Build Responsibly

- Distribute booklets and other relevant material with homeowners.
- Partner with other county departments (libraries, Building and Safety).
- Hand out to people applying for permits in flood-prone areas.

Protect Natural Floodplain Functions

- Consider taglines for an informational campaign.
  - "Give water room"
  - "Leave space for water"
  - "Plants hold shorelines"
- Remind rural communities that streams are dynamic and need space to move.

Summary and Next Steps

To conclude the meeting Esmeralda shared the timeframes for the upcoming PPI Committee meetings and provided information on what to expect

following the first meeting. Attendees were thanked for their time and participation.

Action Items:

- PPI Committee members to respond and provide availability for upcoming meetings in September and November. MIG to schedule and share meeting link for dates decided upon.

County of Los Angeles
2025 Floodplain Management Plan Revision
Program for Public Information (PPI) Committee
Meeting #2

September, 17 2024
10:00 a.m. – 12:00 p.m.

10:00 – 10:05 a.m.	**Welcome** **Agenda Review**	MIG
10:05 – 11:45 a.m.	**Outreach Projects** • Confirm message and audience – Repetitive Loss Areas • Review outcomes • Lead agency / stakeholder • Frequency • Website *Discussion – All*	
11:45 – 11:55 a.m.	**Summary and Next Steps**	
12:00 p.m.	***Adjournment***	MIG

Los Angeles County Floodplain Management Plan Update
PPI Committee Meeting #2
September 17, 2024
10:00 AM to 12:00 PM

Summary

During the second LA County Floodplain Management Plan (FMP) Program for Public Information (PPI) Committee meeting held on September 17, 2024 via Zoom, MIG shared a revised version of the previous implementation matrix. The following is a summary of the information shared and discussed with the PPI Committee.

Agenda Overview

Esmeralda García from MIG welcomed the group on behalf of Public Works. Esmeralda opened the meeting and reviewed the agenda.

Outreach Projects

MIG built upon the previous implementation matrix using the comments and ideas shared by the PPI Committee following the first meeting. The revised matrix was shared and reviewed with the PPI Committee at the second meeting. Comments are summarized below.

Know Your Flood Hazard

Message: Know Your Flood Zone

- Opportunity to check analytics between social media posts and mailings to increase visits to website
- Mailing of outreach brochure, "Are You Prepared for a Flood?" is a countywide coordinated effort
    - Relates to ready.lacounty.gov
- High water mark sign to indicate how high a body of water can get
    - Provides a permanent visual similar to tsunami coastal signs
    - American flag image could reduce likelihood of shooting sign
    - May require an extensive review process
    - Impacts to accuracy if relocated or defaced
        - Creates a false sense of security
    - How many posts?
    - Seasonal schedule or use prior to and during rainy season rather than year round

    - Requires involvement of Regional Planning, Road Maintenance and Operations and others
        - Public Works to look into this idea further
    - Well integrated into environment
        - Made of environmental material
            - Local stone
            - Wood
- Posts near roadways showing projected flood levels
    - Well integrated into environment
        - Made of environmental material
            - Local stone
            - Wood
    - Personalize to community
    - Identify local creeks
    - Use for public safety
    - Educational opportunity
    - Seasonal schedule or use prior to and during rainy season rather than year round
    - Requires involvement of Regional Planning, Road Maintenance and Operations and others
        - Public Works to look into this idea further
    - Focus placement in specific communities and areas
        - Topanga
- Well-integrated interpretive signage
    - Artist in Florida creating signage to show elevation
    - Requires involvement of Regional Planning, Road Maintenance and Operations and others
        - Public Works to look into this idea further
    - Seasonal schedule or use prior to and during rainy season rather than year round
- Nextdoor and Twitter/X seem to be more active in regard to emergency notifications and content
- Social media post for "Are You Prepared for a Flood?" is standard procedure
    - Not just shared annually

Message: You Are in a Repetitive Flood Area

- Make interactive GIS layers related to flooding publicly available
    - Currently showing FEMA, 500-year flood areas, capital flood extents on adopted floodway maps for mountain unincorporated communities
    - Shapefiles from Public Works are shared with Regional Planning
    - No separate GIS layer for Repetitive Loss Analysis Areas or Repetitive Flood Areas due to Federal Privacy Act

- Same recommendations for signs, posts, and signage as Know Your Flood Zone message

Insure Your Property Against Your Flood Hazards

Message: You Nees Flood Insurance

- Realtors and Brokers added to target audience
    - Targeted outreach to brokers
    - Annual letters currently sent
    - Share brochure at Association of Realtors building
    - Partner to share link to National Flood Insurance Program (NFIP) website
    - Existing social media campaign strategy to continue

Message: Renters Can Buy Flood Insurance

- Is there an effort to conduct outreach in mobile home communities?
    - Often located in flood-prone areas
    - Most mobile homes are under state jurisdiction
    - Permanent structures or may be the county's jurisdiction
- Notify apartment complexes
    - Residents and property owners
- Add relators to target audience
- Use social media campaign

Protect People From the Hazard

Message: Avoid Swift Water!

- Graphic or physical element to indicate flood risk
    - Public Works to look into this idea further
- Built in reminder/messaging on road
    - Same considerations for signs, posts, and signage as Know Your Flood Zone message
    - Varies by property owner or who has jurisdiction
    - Crosswalk paint
    - Etching into road
    - Also consider in desert/rural/alluvial plain communities
    - Public Works to look into this idea further

Message: Turn round, don't drown

- Same considerations for signs, posts, and signage as Know Your Flood Zone message
- Same considerations for built in reminder/messaging in road as Avoid Swift Water! Message

Message: Be aware of hazardous road conditions

- Same considerations for built in reminder/messaging in road as Avoid Swift Water! message

Message: Do not camp or reside in waterways

- Add people who are camping/residing in channels and streams outside designated state camping areas to targeted audience
- Same considerations for built in reminder/messaging in road and graphic or physical elements as Avoid Swift Water! Message

Protect Your Property From the Hazard

Message: Need Advice for Protecting Your Property from Flood Hazards? Please Call Us or Visit Website.

- Revise message to "…Property from Flood Hazards After Fires?..."
- Add in-person post-fire consultations and assessments from engineers to projects
    - Annual letters to Repetitive Loss Areas list contact information
- Available after fires upon request
- Generalize social media projects, similar to previous sections

Message: Sandbags Available

- No comments

Message: Where to park during a storm

- New message
- Target audience:
    - Residents
    - Motorists
- Outcomes
    - Increase awareness of proper precautions
    - Decrease damage to personal property
- Projects
    - Mailings to targeted audiences
        - Public Works to look into further
            - Consider how to incorporate in annual mailings
            - Could design be different to be more graphic or visual
            - Other departments sharing message
    - Social media reminder
- Schedule
    - Prior to and during rainy season and during a flood response through
- Important reminder especially for those on a steep incline

Message: Give The Creek Space

- New message
- Target audience:
    - Residents, property owners, and businesses near natural water formations that could potentially flood or have in the past
- Outcomes
    - Increase in awareness of surrounding natural environment
    - Decrease damage to personal property
- Projects
    - Mailings to targeted audiences
        - Public Works to look into further
            - Consider how to incorporate in annual mailings
            - Could design be different to be more graphic or visual
            - Other departments sharing message
    - Social media message
- Schedule
    - Prior to and during rainy season and during a flood response through
    - Annually

Message: Secure Your Belongings

- New message
- Target audience:
    - Residents, property owners, and businesses in regulated floodplains
    - Residents, property owners and businesses in repetitive loss areas
- Outcomes
    - Increase in awareness of proper precautions
    - Decrease damage to personal and private property
- Projects
    - Mailings to targeted audiences
        - Public Works to look into further
            - Consider how to incorporate in annual mailings
            - Could design be different to be more graphic or visual
            - Other departments sharing message
    - Social media message
- Schedule
    - Prior to and during rainy season and during a flood response through

Build Responsibly

Message: A Little Investment Now Could Save You Money Later

- Call out libraries and other public/ community LA County facilities in audiences
- Distribute informational booklets to targeted audiences
    - Already shared with building permit counters and libraries

- Year round

Protect Natural Floodplain Functions

Message: No Dumping

- No comments

Message: Streams Move

- New message
- Target audience:
  - Alluvial plain communities
- Outcomes
  - Increase in awareness of surrounding natural environment
  - Decrease damage to personal property
- Projects
  - Mailings to targeted audiences
    - Public Works to look into further
      - Consider how to incorporate in annual mailings
      - Could design be different to be more graphic or visual
      - Other departments sharing message

Message: Give Water Room

- New message
- Target audience:
  - Residents, property owners, and businesses near bodies of water that could potentially flood or have in the past
- Outcomes
  - Increase in awareness of potential risks and hazards posed by flooding or heavy rain
- Projects
  - Social media message
- Schedule
  - Prior to and during rainy season and during a flood response

Message: Leave Space for Water

- New message
- Target audience:
  - Residents, property owners, and businesses near bodies of water that could potentially flood or have in the past
- Outcomes
  - Increase in awareness of potential risks and hazards posed by flooding or heavy rain
- Projects
  - Social media message

- Schedule
    - Prior to and during rainy season and during a flood response

Message: Plants hold shorelines

- Not many coastal county communities
- Could rephrase to stream banks or riverbanks
- Focus messaging on not removing vegetation
- Public Works is reluctant to include
    - Potential for unintended consequences

General Preparedness

Message: Sign Up for Alert LA County

- No comments

Message: Develop a Family Disaster Plan

- Add CEO Office of Emergency Management to role

Message: Know Your Risk

- Project
    - Maintain flood zone determination website
- Schedule
    - Annually

Message: Be aware, #LARain is coming

- No comments

Summary and Next Steps

To conclude the meeting Esmeralda shared action items and provided information on what to expect following the second meeting. Attendees were thanked for their time and participation.

Action Items:

- Share Implementation Matrix with PPI Committee
    - PPI Committee to provide additional comments on Implementation Matrix
- Provide list of elements that can be changed on website

- PPI Committee to review website and make note of ideas for revisions

County of Los Angeles
2025 Floodplain Management Plan Revision
Program for Public Information (PPI) Committee
Meeting #3

November 19, 2024
10:00 a.m. – 12:00 p.m.

10:00 – 10:05 a.m.	**Welcome** **Agenda Review**	MIG

10:05 – 11:45 a.m.	**Program for Public Information**
	• Implementation Plan
	  – Review and Confirm Projects
	• Monitoring and Evaluation
	  – Review and Confirm Schedule
	Discussion – All	

11:45 – 11:55 a.m.	**Summary and Next Steps**	
12:00 p.m.	***Adjournment***	MIG

Los Angeles County Floodplain Management Plan Update
PPI Committee Meeting #3
November 19, 2024
10:00 AM to 12:00 PM

Summary

During the third LA County Floodplain Management Plan (FMP) Program for Public Information (PPI) Committee meeting held on November 19, 2024 via Zoom, MIG shared a revised version of the draft implementation matrix which includes feedback. The following is a summary of the information shared and discussed with the PPI Committee.

Agenda Overview

Stephanie Lane Pavón from MIG welcomed the group on behalf of Public Works. Stephanie opened the meeting and reviewed the agenda.

Program for Public Information

MIG compiled comments for a draft implementation matrix using feedback and ideas shared by the PPI Committee following the second meeting. The draft matrix was shared and reviewed with the PPI Committee at the third meeting. Projects and their schedule were confirmed. Comments are summarized below.

Know Your Flood Hazard

Message: Know Your Flood Zone

- Mailing of outreach brochure, "Are You Prepared for a Flood?" is now available in English, Spanish, and Chinese.
    - Public Works team will translate document to additional languages as needed.
    - Social media posts for brochure are standard procedure and posted year-round.
- Project ideas related to high water mark signs or other graphic elements were considered by Public Works and found to not be practical and pose a liability.
    - These project ideas were removed from the draft implementation chart.
    - In its place Public Works suggests:
        - Multilingual Community Webinars – live or pre-recorded and posted online

        - Identifying and joining existing events to share information and conduct outreach
    - Community members also raised concerns about additional signage, and the need for customized approaches which center local community needs
- Multilingual Community Webinars that reflect the community needs
    - Geography based
    - Focusing on flood prone communities but also speaking with non-flood prone communities
    - Schedule:
        - Developed during rainy season
        - Posted for year-round availability
    - Digital platform is convenient
    - Advertising on Nextdoor and Meta
        - Challenging to gain traction on social media and gather attendees

Message: You Are in a Repetitive Flood Area

- Same recommendations for removing ideas related to signs, posts, or other graphic elements as Know Your Flood Zone message

Insure Your Property Against Your Flood Hazards

Message: You Need Flood Insurance

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message
- Targeted outreach to brokers includes:
    - Annual mailer/ letters
    - Sharing brochure at Association of Realtors building
        - Year-round outreach, once posted it's a permanent resource
    - Partnering to share link to National Flood Insurance Program (NFIP) website
        - Year-round outreach, once posted it's a permanent resource
- Existing social media campaign strategy to continue
    - Public Works to confirm social media campaigns with CRG

Message: Renters Can Buy Flood Insurance

- Notify apartment complexes
    - Residents and property owners
- Use social media campaign
- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Protect People From the Hazard

Message: Avoid Swift Water!

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message
- Same recommendations for removing ideas related to signs, posts, or other graphic elements as Know Your Flood Zone message

Message: Turn around, don't drown

- Same recommendations for removing ideas related to signs, posts, or other graphic elements as Know Your Flood Zone message

Message: Be aware of hazardous road conditions

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message
- Same recommendations for removing ideas related to signs, posts, or other graphic elements as Know Your Flood Zone message

Message: Do not camp or reside in waterways

- Same recommendations for removing ideas related to signs, posts, or other graphic elements as Know Your Flood Zone message

Protect Your Property From the Hazard

Message: Need Advice for Protecting Your Property from Flood Hazards After Fires? Please Call Us or Visit Website.

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Message: Sandbags Available

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Message: Where to park during a storm

- Propose revising new message to one "Consider Where You Park During a Storm"
- Projects
    - Adjacent topic covered in Multilingual Community Webinar (Remove obstructions from the flow path)
    - Mailings to target audiences
        - Public Works to look into further
            - Consider how to incorporate in annual mailings
            - Could design be different to be more graphic or visual
            - Other departments sharing message
    - Social media reminder
- Schedule

    - Prior to and during rainy season and during a flood response through

Message: Give The Creek Space

- Propose revising new message to "Don't Block the Flows"
- Projects
    - Building and development standards in LA County code
        - Need to confirm schedule
    - FAQ
        - Tailored for different regions in the county
        - Available year-round, updated as needed
    - Homeowners Guide
        - Need to confirm schedule
    - Removed mailings to target audiences and social media messages from projects.
        - Message applies to those who are developing on their property or if a building permit is requested

Message: Secure Your Belongings

- Removed mailings to target audiences and social media messages from projects.
    - Limit overwhelming residents with information they already receive on "Are You Prepared for a Flood?" brochure
- Projects:
    - NFIP website – links to FEMA fact sheets
        - Available year-round
    - FAQ
        - Tailored for different regions in the county
        - Available year-round, updated as needed
    - Mailing of outreach brochure "Are You Prepared for a Flood?" to target audiences
        - Annually prior to rainy season; October
    - Social media post for "Are You Prepared for a Flood?" brochure
        - Annually prior to rainy season; October
    - "Are You Prepared for a Flood?" brochure linked on NFIP website
        - Available year-round

Build Responsibly

Message: A Little Investment Now Could Save You Money Later

- Removed libraries and other public/ community LA County facilities from audiences, moved to project
    - Distribute informational booklets to Library patrons and other public community LA County facilities
        - Year round

Protect Natural Floodplain Functions

Message: No Dumping

- Project:
    - Illegal dumping resource linked on NFIP website
    - Available year-round

Message: Streams Move

- Removed mailings to target audiences from projects.
- Projects:
    - FAQ
        - Tailored for different regions in the county
        - Available year-round, updated as needed

Message: Give Water Room

- Selected one message from the two: "Give Water Room" and "Leave Space for Water"
    - Felt both were the same
- Target audiences
    - Countywide
    - Residents, property owners and businesses in regulated floodplains
- Outcomes
    - Increase in the number of projects which incorporate watershed ecosystem restoration
- Projects
    - Removed social media message
    - Added community outreach to gather input on planning and design of projects
- Schedule
    - When grant funding and projects become available; reviewed annually

Message: Leave Space for Water

- Removed and combined with "Give Water Room" message

Message: Plants hold shorelines

- Removed from messages

General Preparedness

Message: Sign Up for Alert LA County

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Message: Develop a Family Disaster Plan

- Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Message: Know Your Risk

- Project
    - Include topic in Multilingual Community Webinars mentioned in Know Your Flood Zone message

Message: Be aware, #LARain is coming

- No comments

Summary and Next Steps

To conclude the meeting Stephanie shared action items and provided information on what to expect following the third meeting. Attendees were thanked for their time and participation.

Action Items:

- Share revised draft Implementation Matrix with PPI Committee
    - PPI Committee to confirm changes and provide any additional comments on Implementation Matrix
- Correct agenda and share with PPI Committee

County of Los Angeles
2025 Floodplain Management Plan Revision
Program for Public Information (PPI) Committee
Meeting #4

January 15, 2025
10:00 a.m. – 12:00 p.m.

10:00 – 10:05 a.m.	**Welcome** **Agenda Review**	MIG
10:05 – 11:45 a.m.	**Program for Public Information** • PPI Plan – Review document	
11:45 – 11:55 a.m.	**Summary and Next Steps**	
12:00 p.m.	***Adjournment***	MIG

Los Angeles County Floodplain Management Plan Update
PPI Committee Meeting #4
January 15, 2025
10:00 AM to 12:00 PM

Summary

During the fourth LA County Floodplain Management Plan (FMP) Program for Public Information (PPI) Committee meeting held on January 15, 2025 via Zoom, MIG shared the draft program for public information document (PPI Plan). The following is a summary of the information shared and discussed with the PPI Committee.

Agenda Overview

Esmeralda García from MIG welcomed the group on behalf of Public Works. Esmeralda opened the meeting and reviewed the agenda.

Program for Public Information

MIG revised and finalized the draft implementation matrix following the third meeting and began drafting the PPI Plan. The draft PPI Plan was developed using the previous PPI document from the 2020 Comprehensive Floodplain Management Plan as a guide. The draft PPI Plan was shared and reviewed with the PPI Committee at the fourth meeting. Projects, website content and all other information included in the document were reviewed and confirmed. Comments are summarized below.

Multi-lingual Community Specific Videos

- Include narrated introductions and review of presentation
- Closed captioning available
- Videos in English, and Spanish when necessary to meet community's needs
- Videos will cover general topics for all communities like emergency preparedness and building requirements
- Some communities will be provided with more specific information based on their needs and geography

Website

- Link to multi-lingual community specific videos will be provided on Public Works' NFIP website
- NFIP website will transition look and feel to reflect Public Works website
    - Ensures consistency
    - Opportunity to make website user-friendly and easy to navigate

Patricia Wood from the Department of Public Works set forward a motion to approve the PPI Plan as shared. The motion was supported by Kari Eskridge from the Department of Public Works and put to a vote using a poll. The poll results unanimously approved the PPI Plan as shared.

Summary and Next Steps

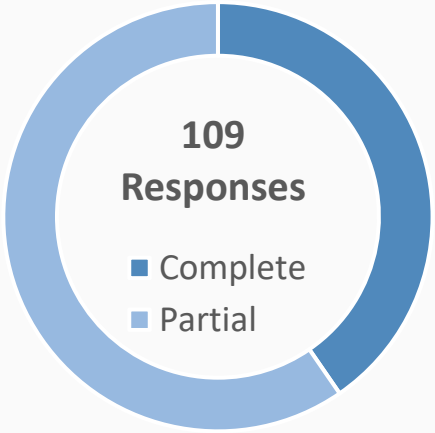
To conclude the meeting Esmeralda shared next steps and provided information on what to expect following the fourth meeting. Attendees were thanked for their time and participation.

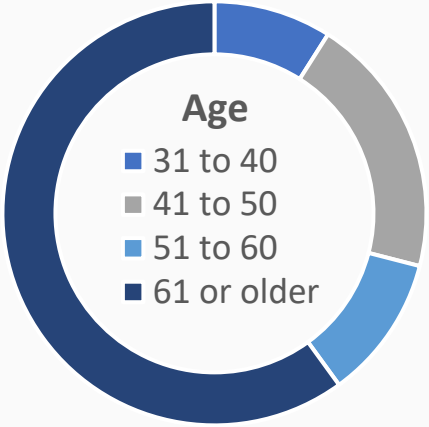
Action Items:

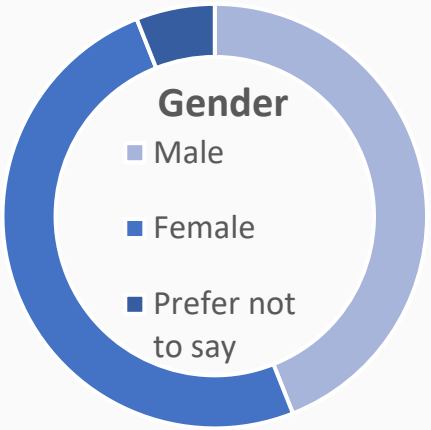
- Finalize draft PPI Plan document
    - Share final draft PPI Plan with PPI Committee

LOS ANGELES COUNTY SURVEY RESULTS- FLOOD PREPAREDNESS QUESTIONNAIRE

Summary of Survey Results







Some communities we heard from:

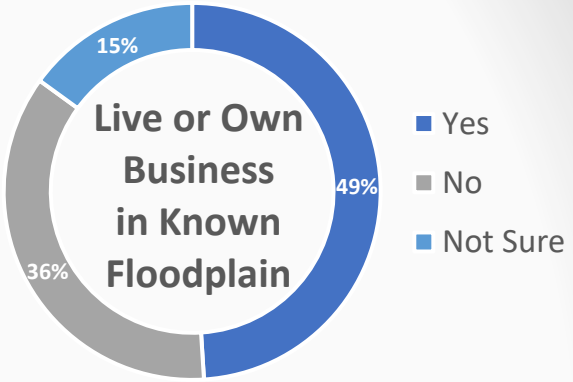
- Green Valley
- Acton
- Malibou Lake
- Topanga
- Antelope Valley

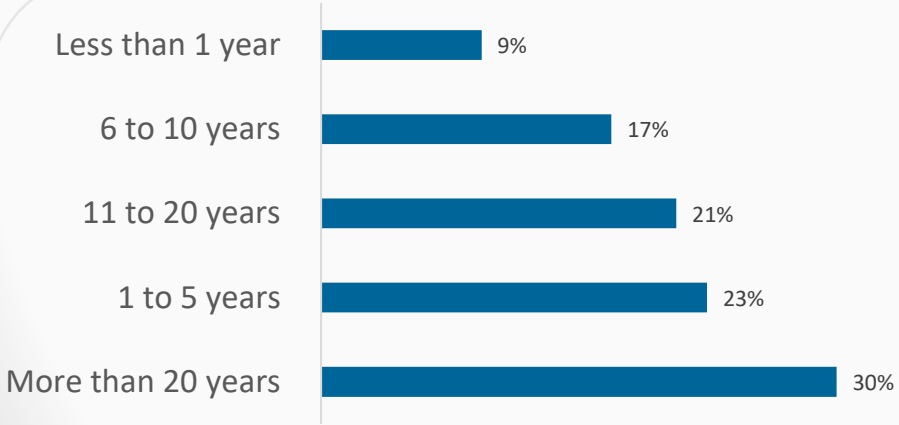
Public Works
LOS ANGELES COUNTY

Summary of Survey Results

Nearly half of respondents live or own a business in a known floodplain

- 82% of those who responded yes or not sure, identified the property as a residence
  - 94% owned the property in the known floodplain
    - Of those who owned the property: 68% have a mortgage, 26% did not have a mortgage, and 6% chose not to answer.

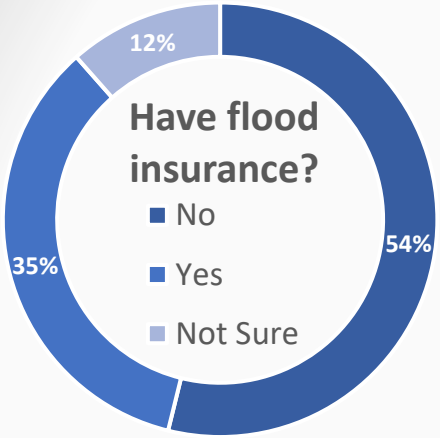




Respondents time lived or spent doing business at their property varies

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Summary of Survey Results



54% of respondents do not have flood insurance

- Of the 35% who shared they have flood insurance; it was mandatory for 83% to purchase

Top three reasons why respondents do not have flood insurance

- Their property has never flooded
- Too expensive
- Property is located on high ground

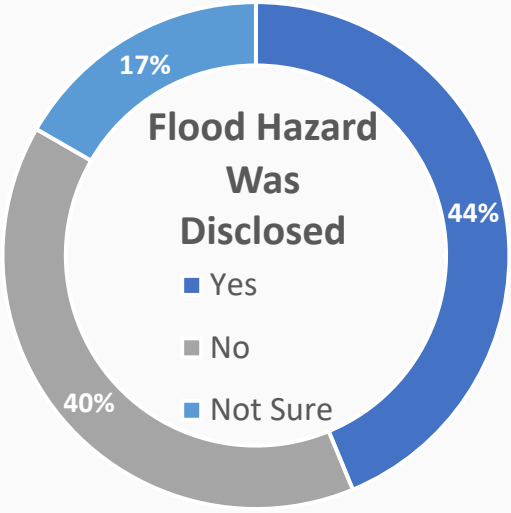
Only 10% of respondents shared they have had problems when getting homeowners or renters insurance due to flood risk.

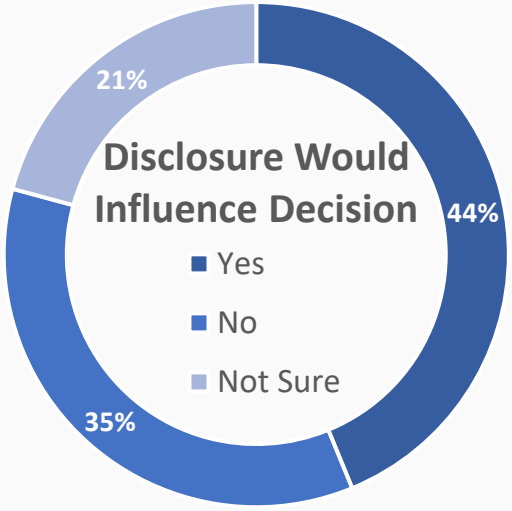
Public Works
LOS ANGELES COUNTY

Summary of Survey Results

When moving into their property, **60% did not consider the impact of a potential flood.**

Before purchasing or moving into their property, respondents shared:





Public Works
LOS ANGELES COUNTY

Summary of Survey Results

Level of Concern for Flood Related Hazards

	Not concerned	Somewhat concerned	Concerned	Very concerned	Extremely concerned	Not Sure
Climate change impacts	23%	18%	27%	16%	16%	0%
Coastal erosion	57%	12%	21%	5%	5%	0%
Coastal flooding	56%	15%	22%	5%	2%	0%
Detours caused by flooding of roads	19%	14%	33%	17%	17%	0%
Failure of infrastructure (such as water/sewer main pipes, water storage tanks)	18%	20%	15%	18%	25%	4%
Flooding from groundwater seepage	35%	18%	16%	18%	8%	5%
Land subsidence (sinking)	34%	26%	13%	16%	11%	0%
Mud-flow hazards	21%	15%	26%	13%	23%	2%
Post-fire mud/debris flow	18%	16%	24%	13%	26%	3%
River/stream/channel overflow	26%	26%	21%	4%	21%	2%
River/stream migration (changes in the path of flows)	32%	34%	13%	3%	18%	0%
Stream bank erosion	36%	21%	10%	15%	15%	3%
Tsunami (big sea waves caused by earthquakes or other disturbances)	60%	27%	5%	5%	3%	0%
Urban stormwater flooding/Drainage issues	20%	25%	15%	25%	13%	2%

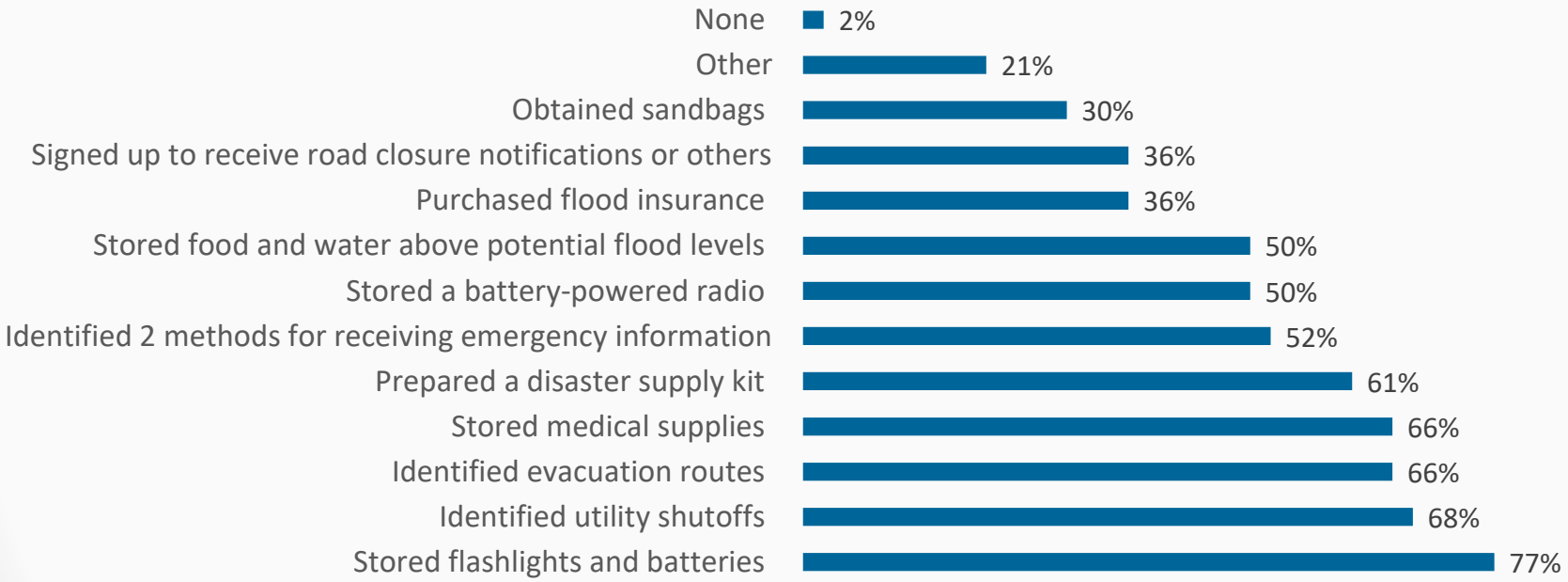
**Green color highlights which choice(s) received the most responses*

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Summary of Survey Results

Many are somewhat prepared (39%) or very well prepared (20%) to deal with flood events.

Some of the steps respondents have taken to prepare include:



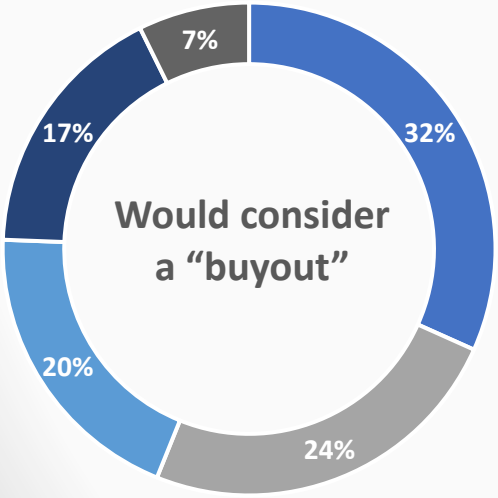
Public Works
LOS ANGELES COUNTY

Summary of Survey Results

Roughly **42% of respondents are unsure or not willing to spend money in order to retrofit their property** and reduce flood related risks

The **top three incentives** that would encourage respondents to spend money retrofitting their property:

- Grant funding
- Insurance premium discounts
- Mortgage discounts



If their property were in a "high flood hazard" area or experienced more than one flood, respondents expressed:

- Neither Agree nor Disagree
- Somewhat Agree
- Strongly Agree
- Strongly Disagree
- Somewhat Disagree

Public Works
LOS ANGELES COUNTY

Summary of Survey Results

Importance of County, State, and Federal Projects

	Low	Medium	High
Assist vulnerable property owners with securing funding for mitigation (measures to lessen damage from floods).	26%	30%	44%
Buy flood-vulnerable properties, remove any buildings, and maintain the land as open space.	44%	28%	28%
Capital projects such as dams, levees, flood walls and drainage improvements.	16%	27%	57%
Projects that will mitigate (lessen) future flood impacts caused by climate change.	30%	16%	54%
Provide better information about flood risk to the public.	30%	30%	40%
Retrofit (modify) infrastructure, such as improving culverts, bridges, and local drainage facilities to handle more stormwater flows.	18%	21%	61%
Strengthen codes and regulations to include higher regulatory standards for activities in flood hazard areas.	34%	37%	29%

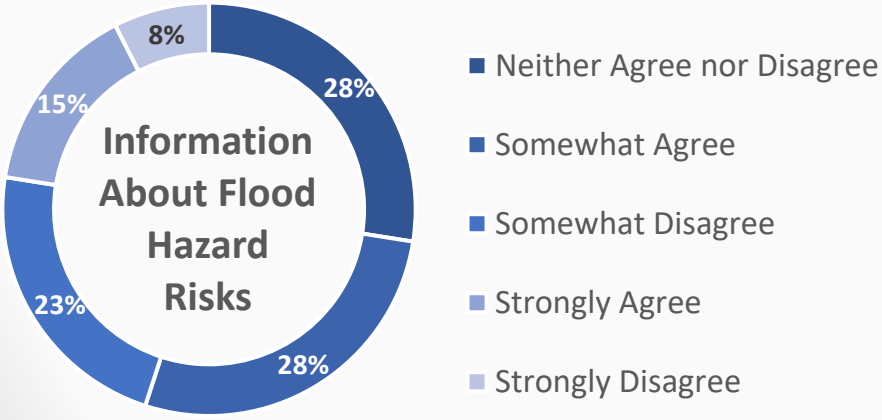
**Green color highlights which choice(s) received the most responses*

Summary of Survey Results

Respondents expressed:

- It is the responsibility of the government to provide education and awareness programs that promote action to reduce a community's exposure to the risks associated with flood hazards.
- It is one's own personal responsibility to educate themselves and take action to reduce exposure to risks associated with flood hazards.

Alert or notifications sign-ups, personal experience, mailers, and websites along with news outlets have provided respondents with useful information when preparing for a flood event.



When asked if information about the risks associated with flood hazards was readily available and easy to locate, responses were mixed.

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Summary of Survey Results

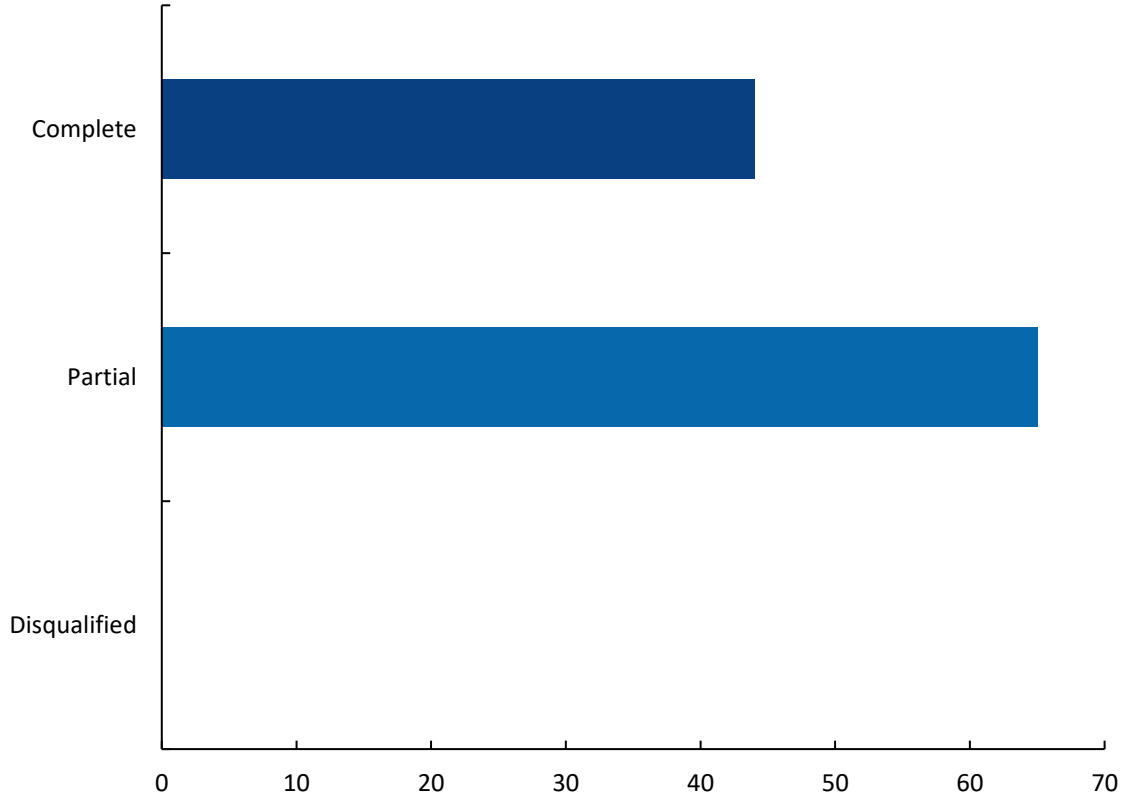
64% of respondents were unaware of the current Floodplain Management Plan's programs and policies

The five most effective methods shared for providing information:

- Internet
- Community Events
- Public Awareness
- Social Media
- Fire Department/Rescue

Best methods for urgent information or action were text message, cell or mobile phone call, or email.

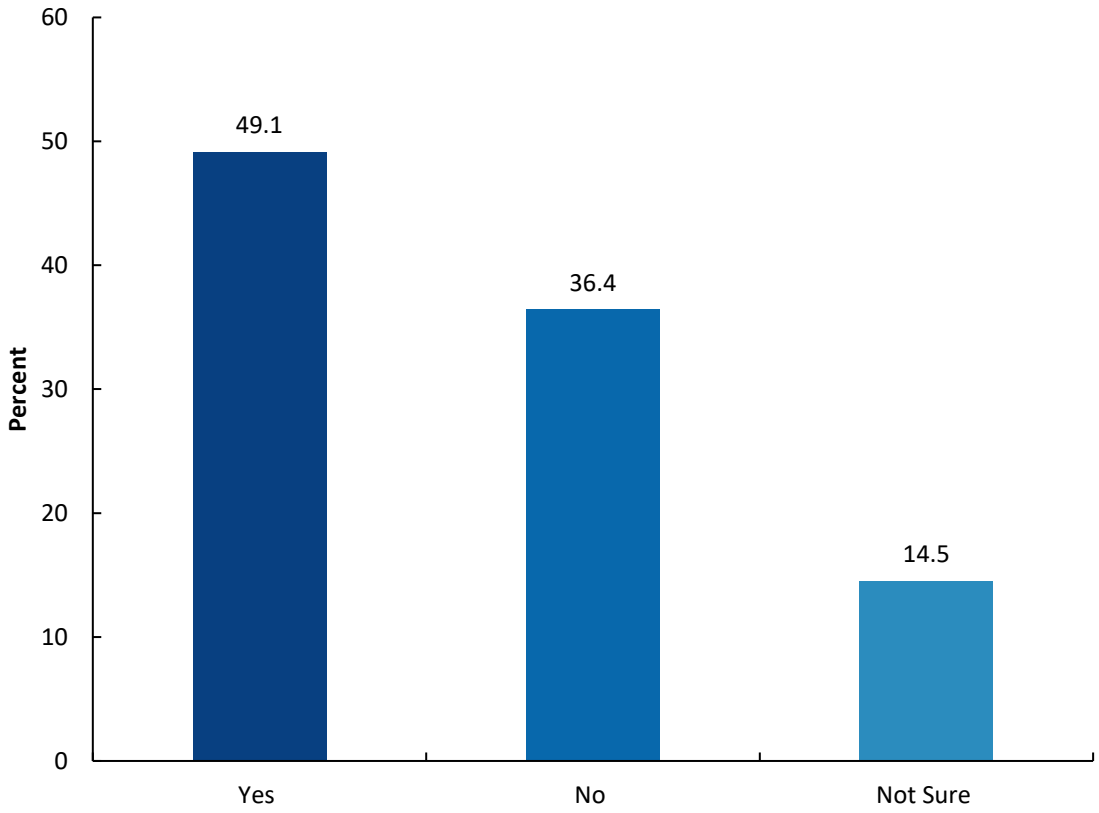
Response Statistics



	Count	Percent
Complete	44	40.4
Partial	65	59.6
Disqualified	0	0
Totals	109	

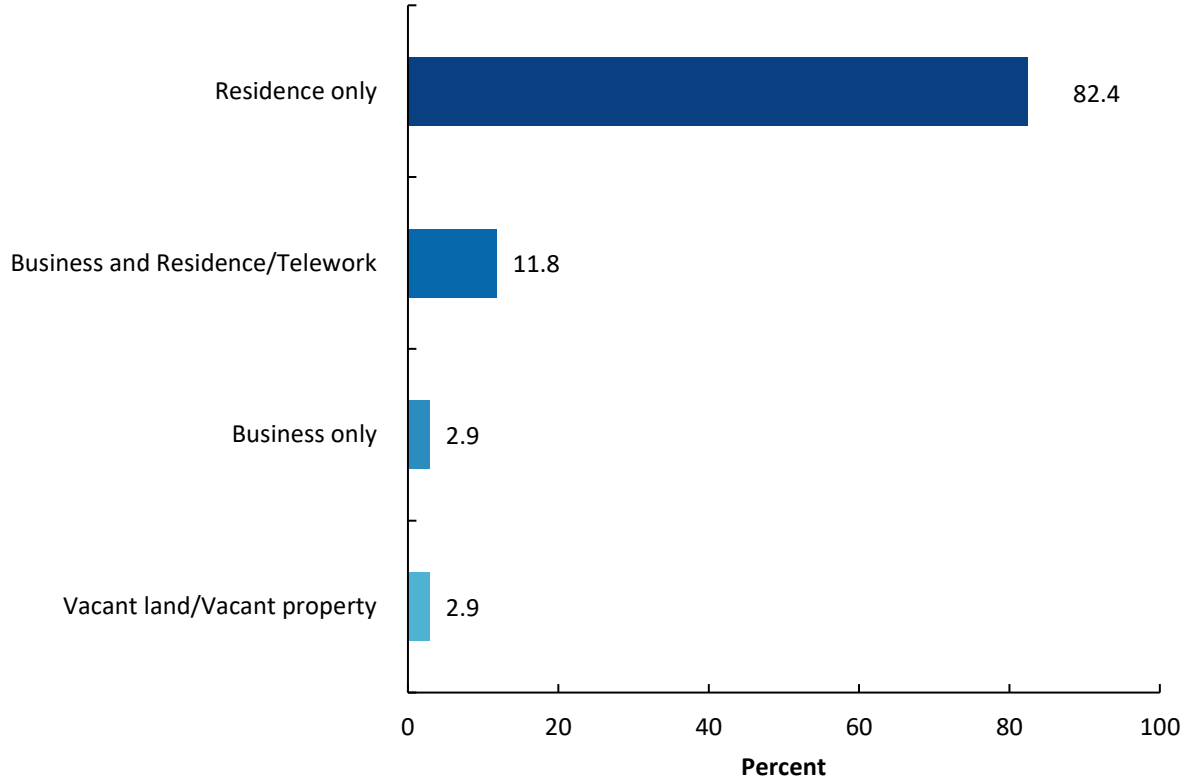
1.Do you live or own a business in a known floodplain or an area that has experienced recent flooding? (Select one)

A floodplain is an area of land next to a river, stream, channel or other water source which may experience flooding when these water sources grow in size due to rain storms or other events.



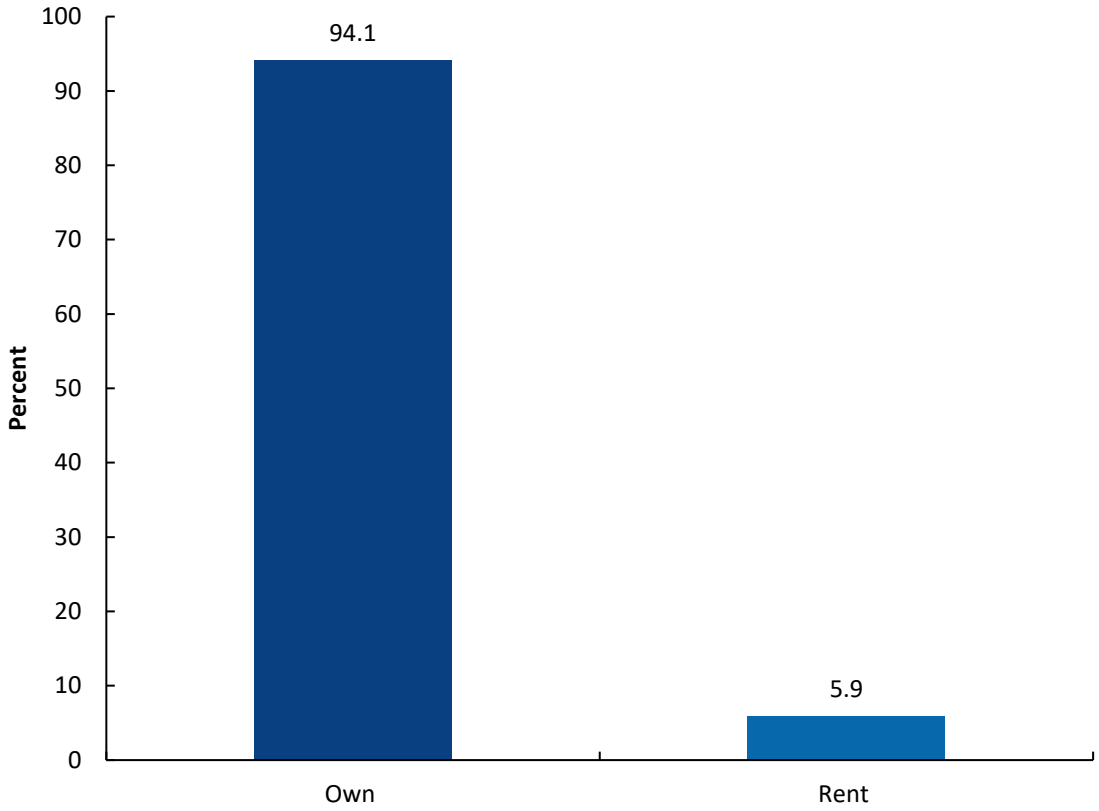
Value	Percent	Count
Yes	49.1%	27
No	36.4%	20
Not Sure	14.5%	8
	Totals	55

2.Is this property your residence or business? (Select one)



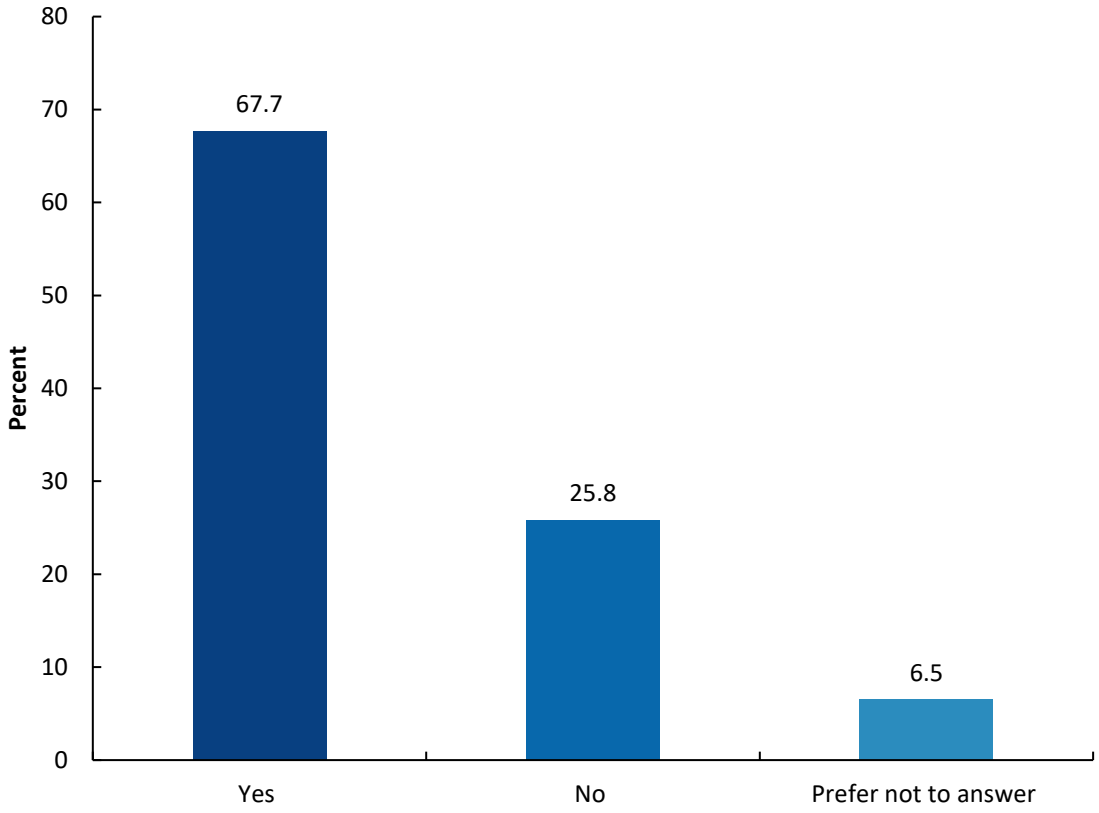
Value	Percent	Count
Residence only	82.4%	28
Business and Residence/Telework	11.8%	4
Business only	2.9%	1
Vacant land/Vacant property	2.9%	1
	Totals	34

3.Do you own or rent this property? (Select one)



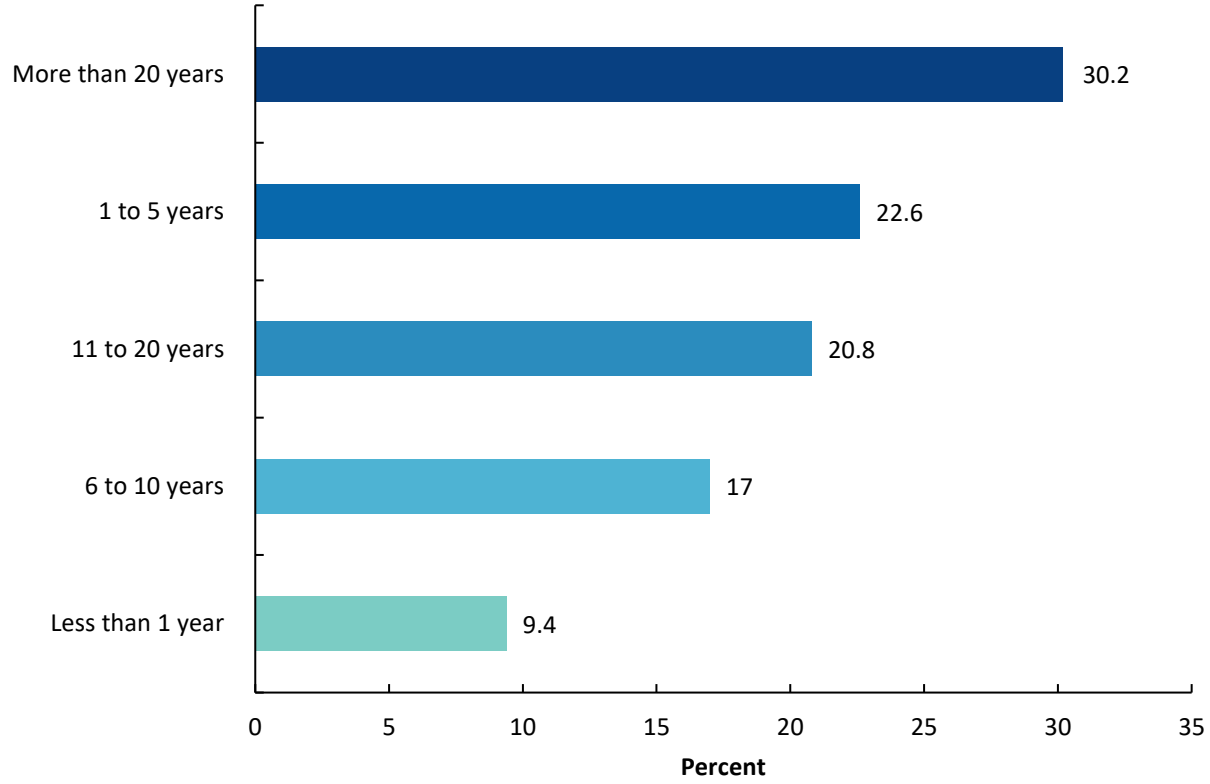
Value	Percent	Count
Own	94.1%	32
Rent	5.9%	2
	Totals	34

4.Do you have a mortgage on this property? (Select one)



Value	Percent	Count
Yes	67.7%	21
No	25.8%	8
Prefer not to answer	6.5%	2
	Totals	31

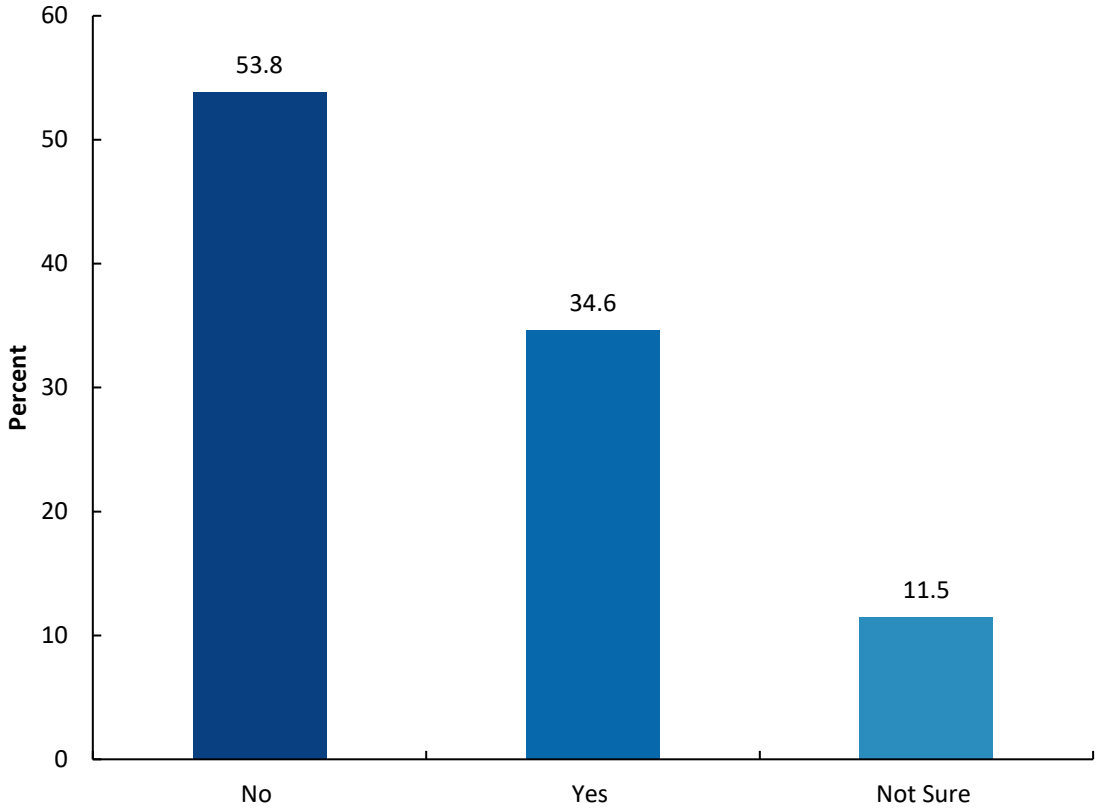
5.How long have you lived or done business at this property? (Select one)



Value	Percent	Count
More than 20 years	30.2%	16
1 to 5 years	22.6%	12
11 to 20 years	20.8%	11
6 to 10 years	17.0%	9
Less than 1 year	9.4%	5
	Totals	53

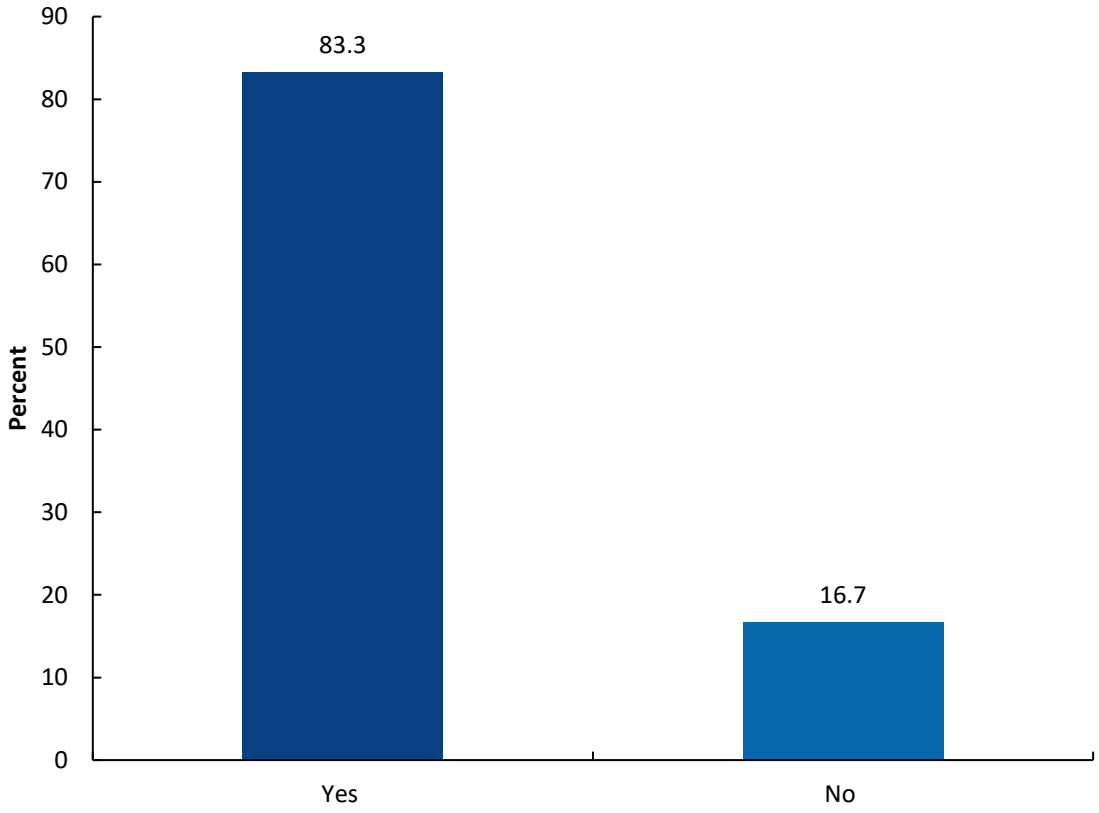
6.Do you have flood insurance? (Select one)

Flood insurance may cover losses such as damage to the structure of your residence or property and personal belongings as a result of flooding events like heavy rainfall or other overflows of water.



Value	Percent	Count
No	53.8%	28
Yes	34.6%	18
Not Sure	11.5%	6
	Totals	52

7.Was it mandatory for you to purchase flood insurance?

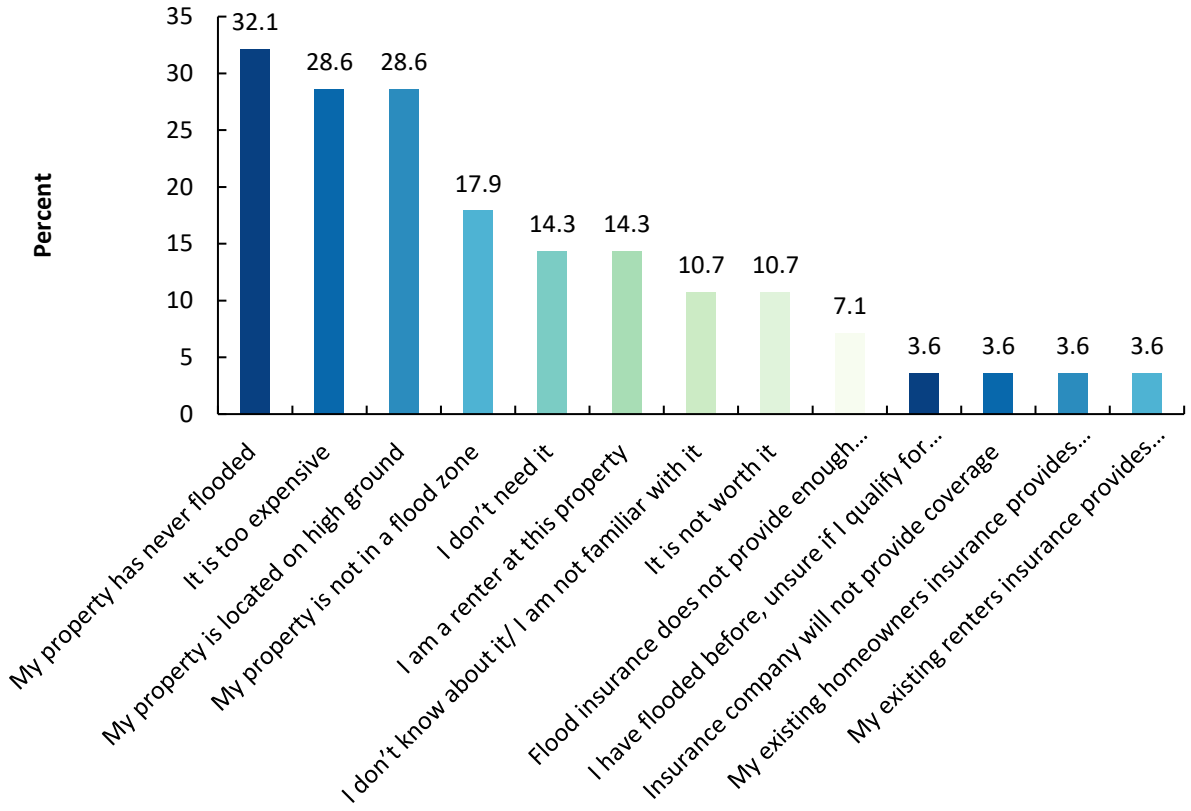


Value	Percent	Count
Yes	83.3%	15
No	16.7%	3
	Totals	18

8.Why did you purchase flood insurance? (Briefly explain)

ResponseID	Response
55	For insurance
71	Went from "potential flood risk" area when purchased 10 years ago to "floodplain" after information gathering meeting.

9.Why don’t you have flood insurance? (Check all that apply)

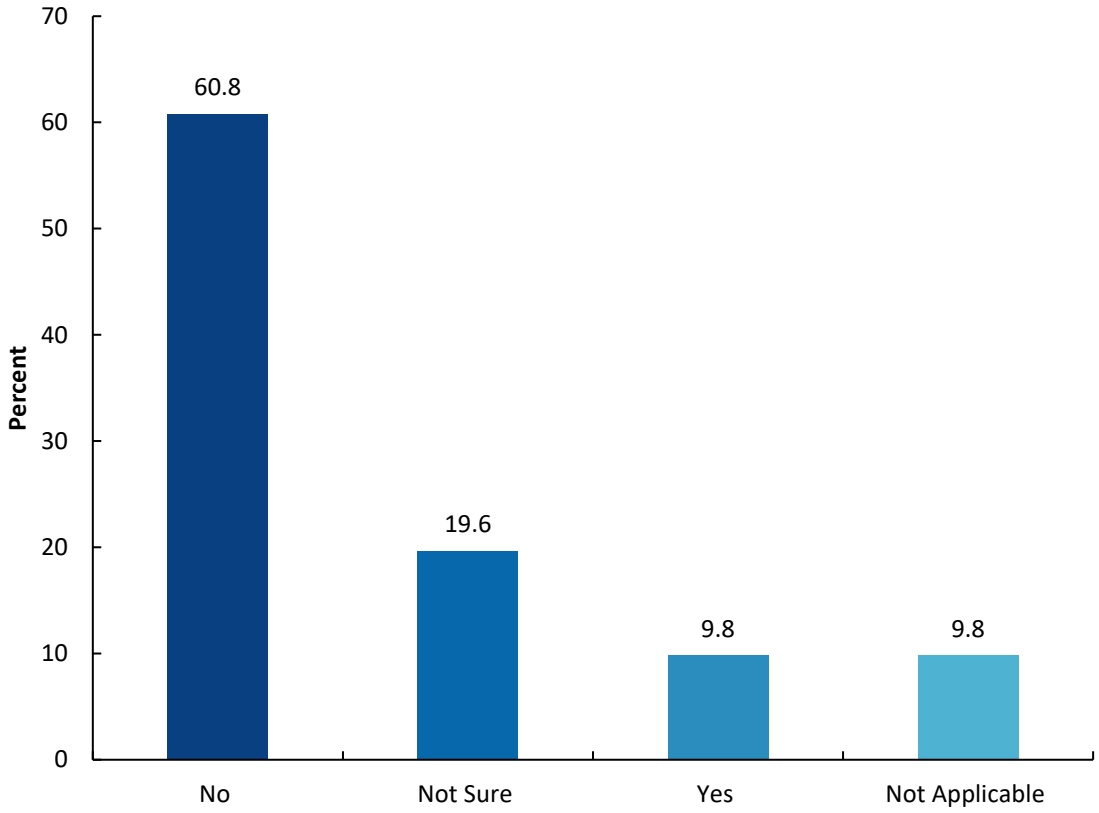


Value	Percent
My property has never flooded	32.1%
It is too expensive	28.6%
My property is located on high ground	28.6%
My property is not in a flood zone	17.9%
I don’t need it	14.3%
I am a renter at this property	14.3%
I don’t know about it/ I am not familiar with it	10.7%
It is not worth it	10.7%
Flood insurance does not provide enough coverage	7.1%

I have flooded before, unsure if I qualify for coverage	3.6%
Insurance company will not provide coverage	3.6%
My existing homeowners insurance provides coverage	3.6%
My existing renters insurance provides coverage	3.6%

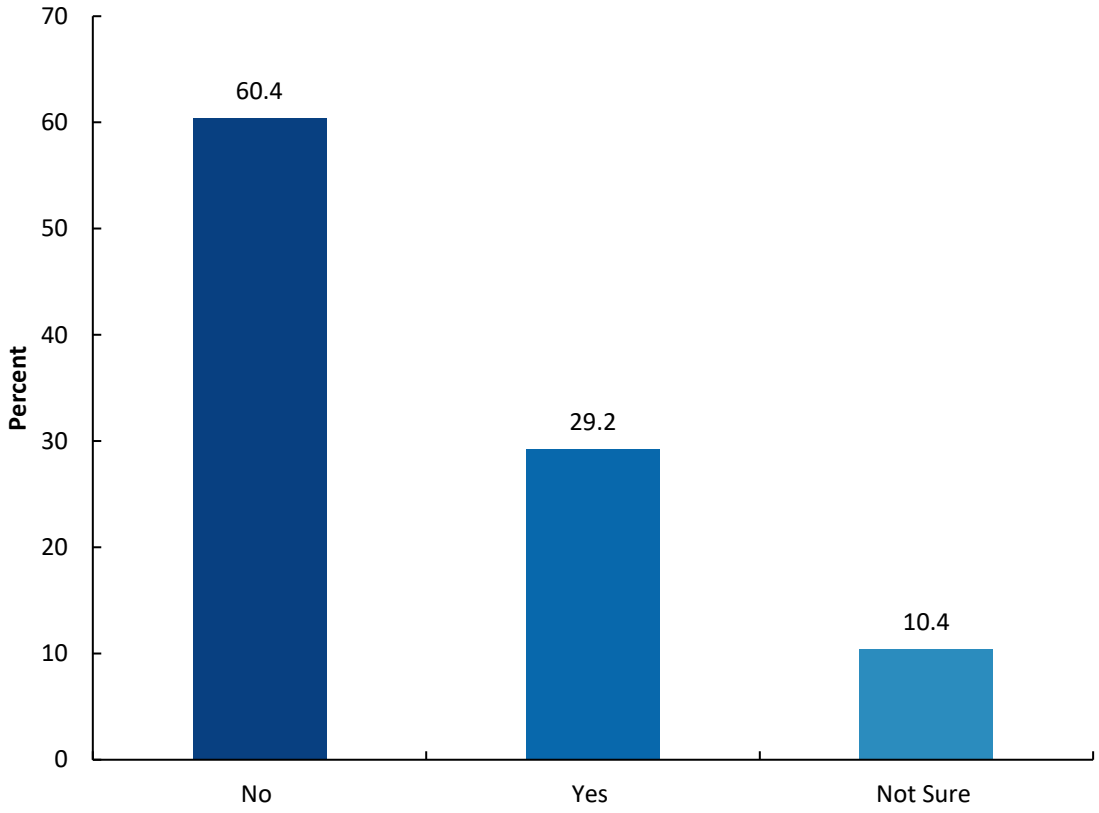
Statistics	
Total Responses	28.0

10.Have you had problems getting homeowner's or renter's insurance due to flood risk? (Select one)



Value	Percent	Count
No	60.8%	31
Not Sure	19.6%	10
Yes	9.8%	5
Not Applicable	9.8%	5
	Totals	51

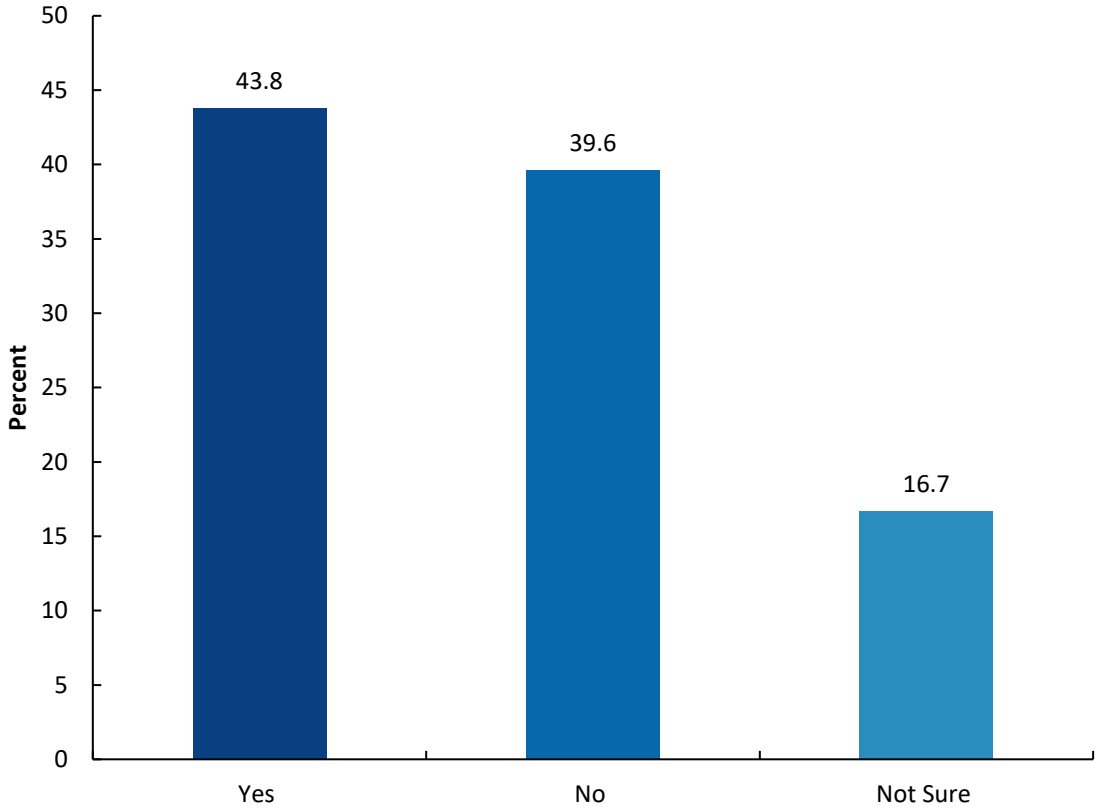
11.When you moved into your property, did you consider the impact a potential flood could have on that property? (Select one)



Value	Percent	Count
No	60.4%	29
Yes	29.2%	14
Not Sure	10.4%	5
	Totals	48

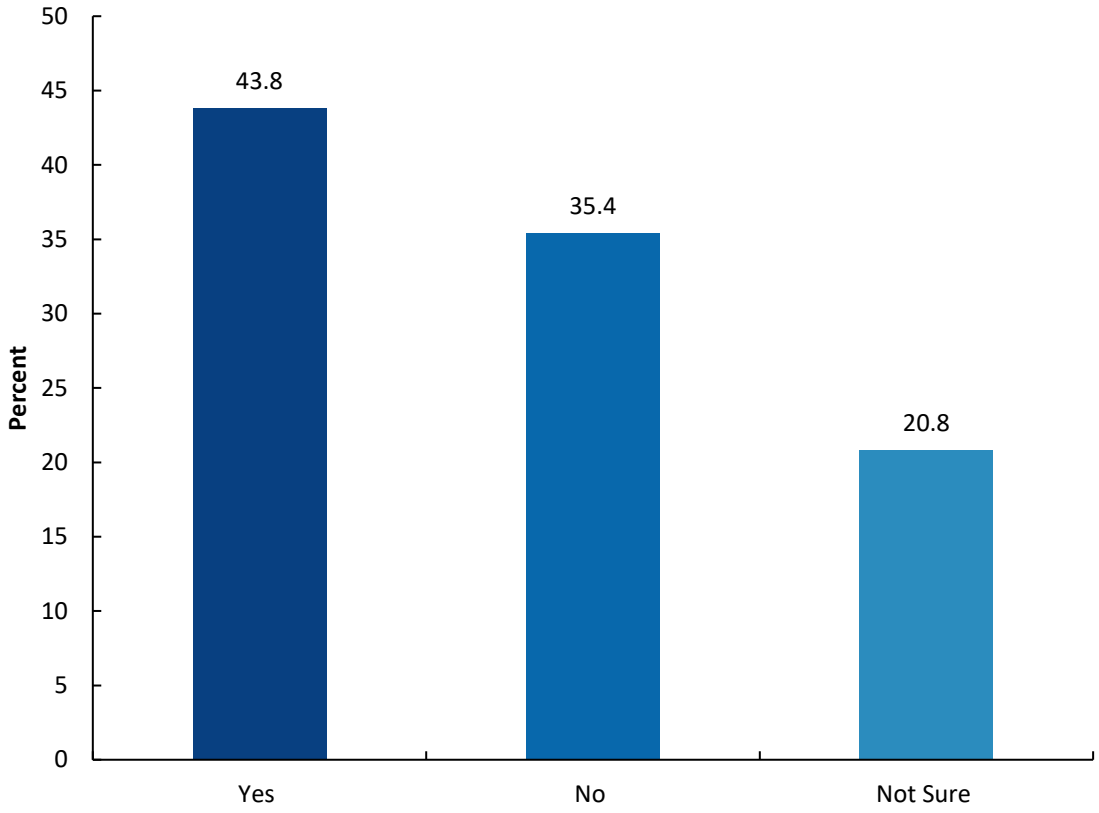
12.Was the presence of a flood hazard disclosed to you before you purchased or moved into your property? (Select one)

A flood hazard is the potential danger or adverse conditions caused by an overflow of water.



Value	Percent	Count
Yes	43.8%	21
No	39.6%	19
Not Sure	16.7%	8
	Totals	48

13.Would the disclosure of a flood hazard have influenced your decision to buy or rent the property? (Select one)



Value	Percent	Count
Yes	43.8%	21
No	35.4%	17
Not Sure	20.8%	10
	Totals	48

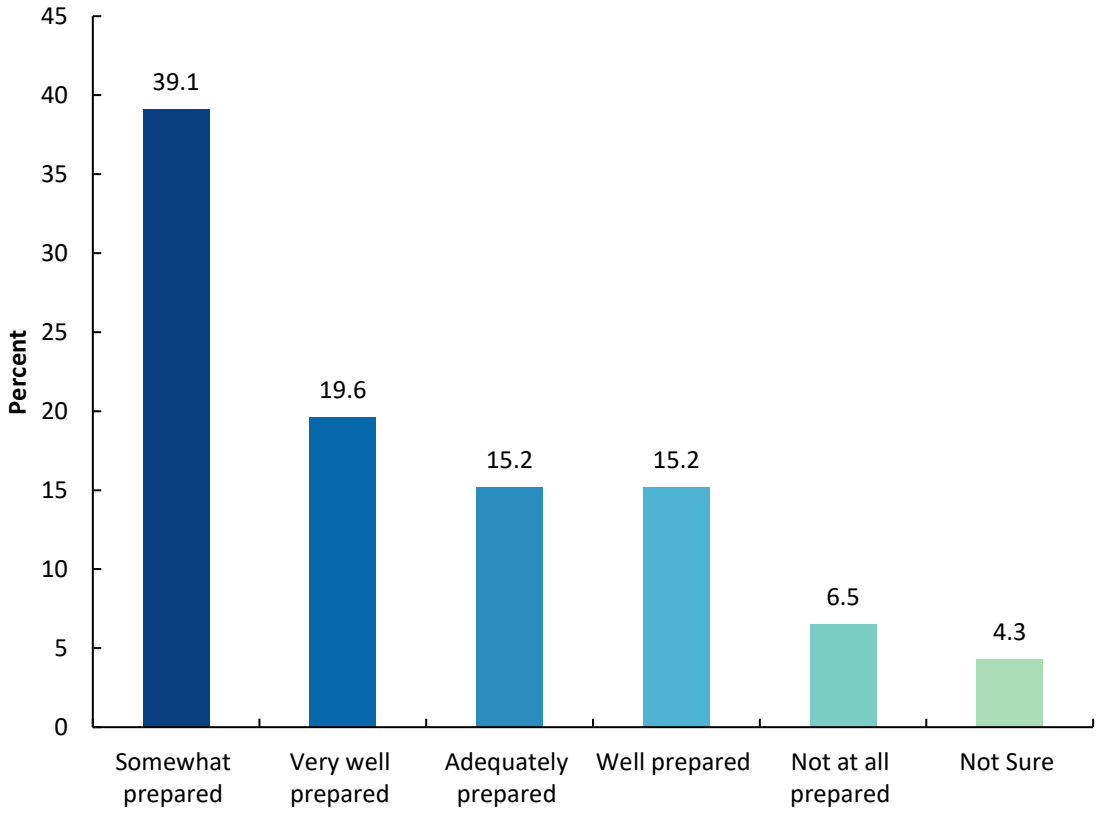
14.Indicate your level of concern regarding each of the following flood related hazards in your community or to your property.

	Not concerned		Somewhat concerned		Concerned		Very concerned		Extremely concerned		Not Sure		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
Climate change impacts	10	22.7%	8	18.2%	12	27.3%	7	15.9%	7	15.9%	0	%	44
Coastal erosion	24	57.1%	5	11.9%	9	21.4%	2	4.8%	2	4.8%	0	%	42
Coastal flooding	23	56.1%	6	14.6%	9	22.0%	2	4.9%	1	2.4%	0	%	41
Detours caused by flooding of roads	8	19.0%	6	14.3%	14	33.3%	7	16.7%	7	16.7%	0	%	42
Failure of infrastructure (such as water/sewer main pipes, water storage tanks)	7	17.5%	8	20.0%	6	15.0%	7	17.5%	10	25.0%	2	5.0%	40
Flooding from groundwater seepage	13	34.2%	7	18.4%	6	15.8%	7	18.4%	3	7.9%	2	5.3%	38
Land subsidence (sinking)	13	34.2%	10	26.3%	5	13.2%	6	15.8%	4	10.5%	0	%	38
Mud-flow hazards	8	20.5%	6	15.4%	10	25.6%	5	12.8%	9	23.1%	1	2.6	39

												%	
Post-fire mud/debris flow	7	18.4%	6	15.8%	9	23.7%	5	13.2%	10	26.3%	1	2.6%	38
River/stream/channel overflow	10	25.6%	10	25.6%	8	20.5%	2	5.1%	8	20.5%	1	2.6%	39
River/stream migration (changes in the path of flows)	12	31.6%	13	34.2%	5	13.2%	1	2.6%	7	18.4%	0	%	38
Stream bank erosion	14	35.9%	8	20.5%	4	10.3%	6	15.4%	6	15.4%	1	2.6%	39
Tsunami (big sea waves caused by earthquakes or other disturbances)	22	59.5%	10	27.0%	2	5.4%	2	5.4%	1	2.7%	0	%	37
Urban stormwater flooding/Drainage issues	8	20.0%	10	25.0%	6	15.0%	10	25.0%	5	12.5%	1	2.5%	40
Write-in: County maintenance and clearing of our road	0	%	0	%	0	%	0	%	1	100.0%	0	%	1
Write-in: Improper/inefficient catchment of excess rainwater/la	0	%	0	%	0	%	0	%	1	100.0%	0	%	1

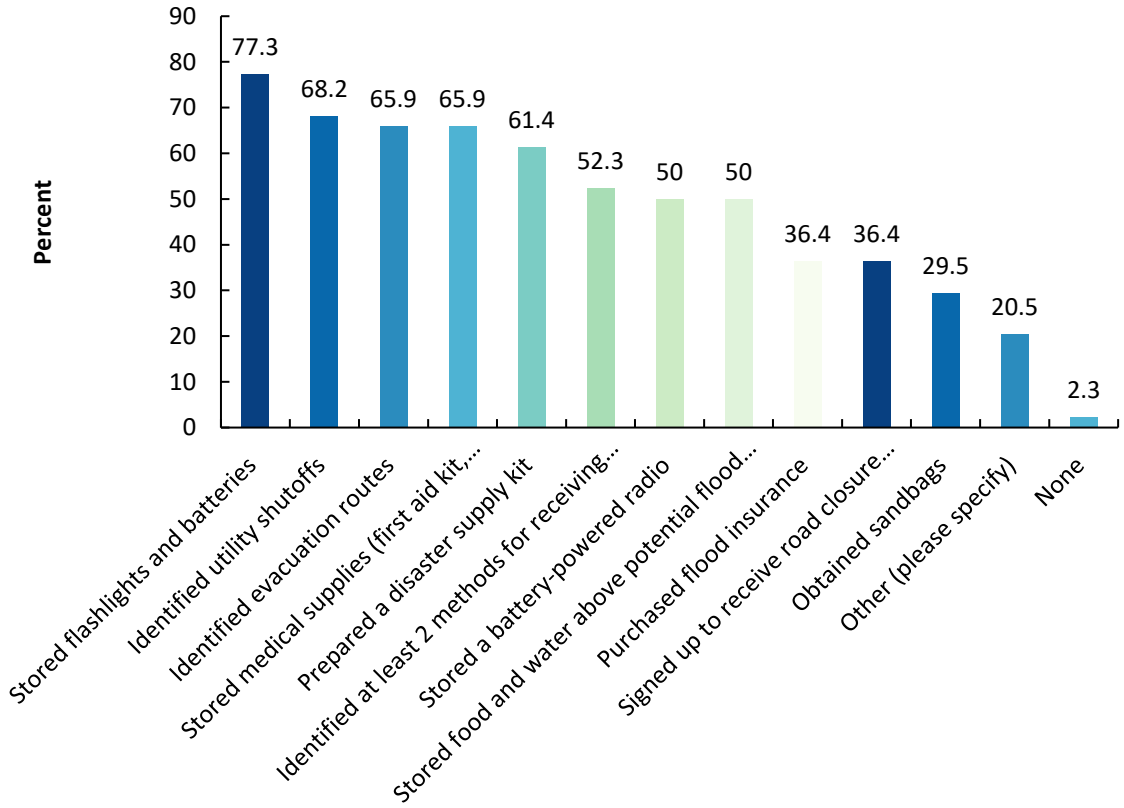
kes becoming creeks/creeks becoming washes or dry-creeks due to unchecked erosion and lack of proper catchment													
Write-in: Lack of maintenance of waterways	0	%	0	%	0	%	0	%	1	100.0%	0	%	1
Write-in: Loss of natural habitat/open space	0	%	1	100.0%	0	%	0	%	0	%	0	%	1
Write-in: Not allowing rebuild in floodplain areas	0	%	0	%	0	%	0	%	1	100.0%	0	%	1
Write-in: Road Grading	0	%	0	%	0	%	1	100.0%	0	%	0	%	1
Write-in: Un Maintained Adjoining Property	0	%	0	%	1	100.0%	0	%	0	%	0	%	1
Write-in: testing the text here	0	%	0	%	0	%	1	100.0%	0	%	0	%	1

15.How prepared is your residence or business to deal with a flood event? (Select one)



Value	Percent	Count
Somewhat prepared	39.1%	18
Very well prepared	19.6%	9
Adequately prepared	15.2%	7
Well prepared	15.2%	7
Not at all prepared	6.5%	3
Not Sure	4.3%	2
	Totals	46

16.Which of the following steps has your residence or business taken to prepare for a flood event? (Check all that apply)



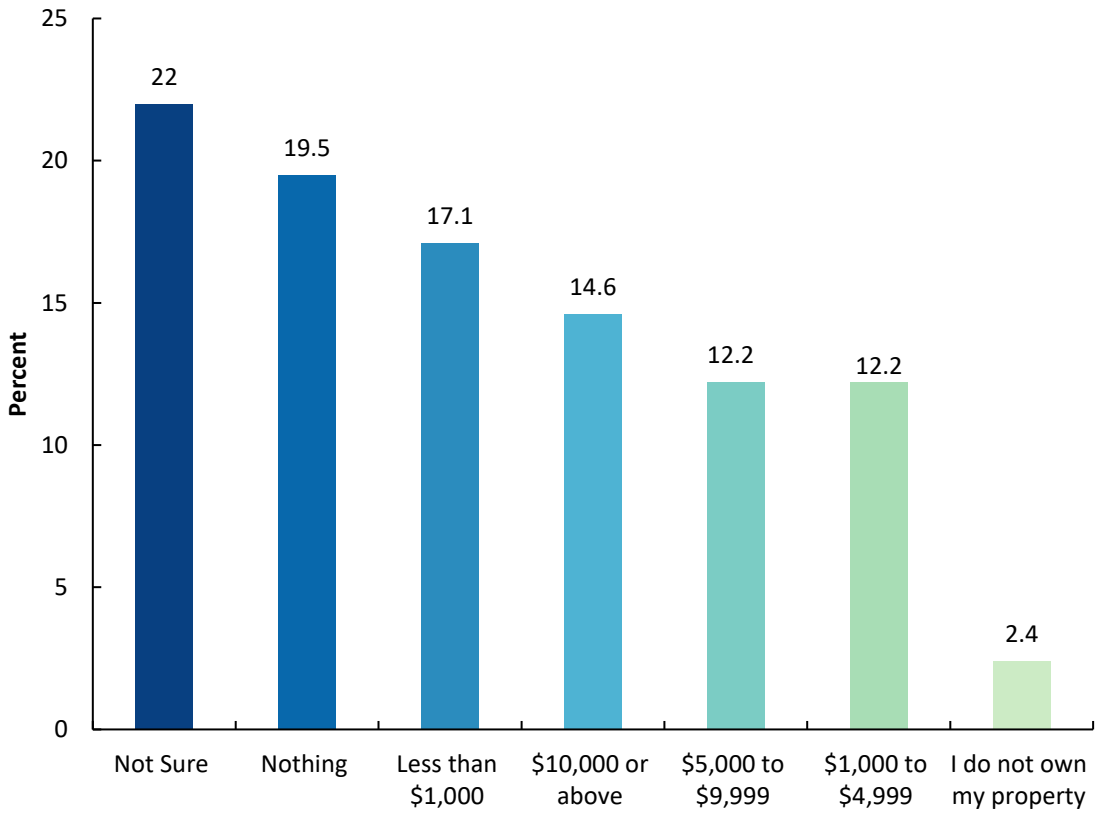
Value	Percent
Stored flashlights and batteries	77.3%
Identified utility shutoffs	68.2%
Identified evacuation routes	65.9%
Stored medical supplies (first aid kit, medications)	65.9%
Prepared a disaster supply kit	61.4%
Identified at least 2 methods for receiving emergency notifications and information during emergencies	52.3%
Stored a battery-powered radio	50.0%
Stored food and water above potential flood levels	50.0%

Purchased flood insurance	36.4%
Signed up to receive road closure notifications or other notices	36.4%
Obtained sandbags	29.5%
Other (please specify)	20.5%
None	2.3%

Statistics	
Total Responses	44.0

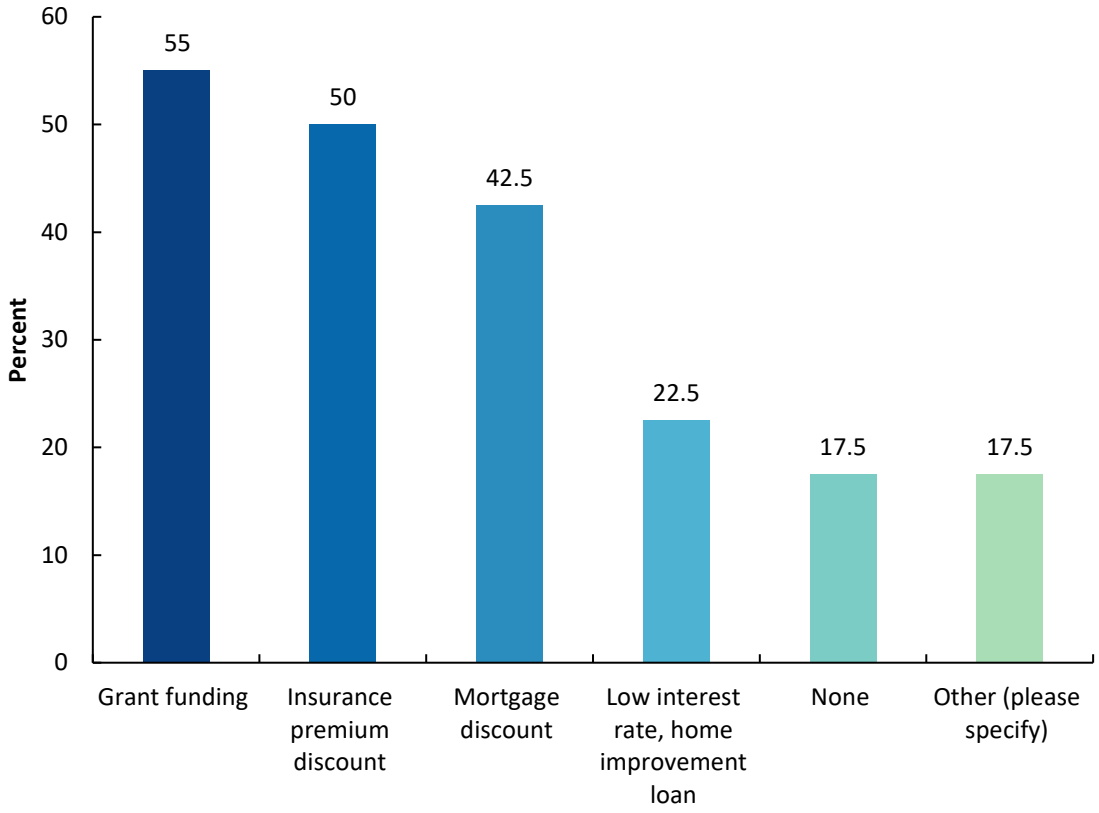
Other (please specify)
Backup Power source
Generator
Identified flow-thru areas
Installed drains & waterproofed underground wall
Provisions in RV in preparation for evacuation.
Replaced roof and added water barrels
We live on high ground
run computer erosion simulations to identify most likely floodways

17.How much money are you willing to spend to retrofit your property to reduce risks associated with floods (such as elevating a structure above flood level, flood-proofing a non-residential structure, building berms or flood walls)? (Select one)



Value	Percent	Count
Not Sure	22.0%	9
Nothing	19.5%	8
Less than $1,000	17.1%	7
$10,000 or above	14.6%	6
$5,000 to $9,999	12.2%	5
$1,000 to $4,999	12.2%	5
I do not own my property	2.4%	1
	Totals	41

18.Which of the following incentives would encourage you to spend money to retrofit your property to protect against risks associated with floods? (Check all that apply)



Value	Percent	Count
Grant funding	55.0%	22
Insurance premium discount	50.0%	20
Mortgage discount	42.5%	17
Low interest rate, home improvement loan	22.5%	9
None	17.5%	7
Other (please specify)	17.5%	7

Other (please specify)	Count
A good plan for landscape modification based on viable simulation which lines up with real-world observation and has minimal impact/works with the natural "environment"	1
Amnesty and county not coming in and red tagging especially for folks who don't have money	1
Federal & State tax credits	1
Federal tax break like electric cars get	1
Fedral Tax credit like they do for electric cars. Or a state credit	1
Limited poverty level income, so you provide the funds....	1
free	1
Totals	7

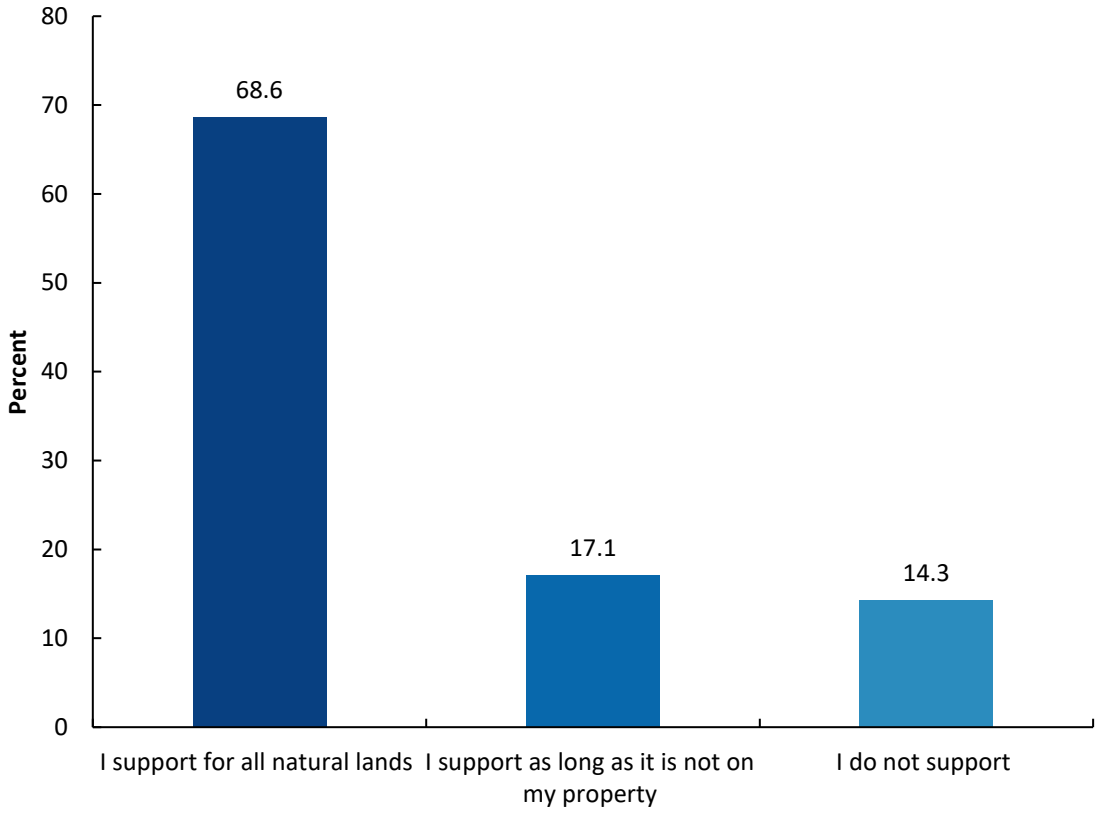
19.How important would you rank the following County, State, or Federal agencies' projects to reduce damage and disruption from flooding?

	Low		Medium		High		Responses
	Count	Row %	Count	Row %	Count	Row %	Count
Assist vulnerable property owners with securing funding for mitigation (measures to lessen damage from floods).	11	25.6%	13	30.2%	19	44.2%	43
Buy flood-vulnerable properties, remove any buildings, and maintain the land as open space.	17	43.6%	11	28.2%	11	28.2%	39
Capital projects such as dams, levees, flood walls and drainage improvements.	6	16.2%	10	27.0%	21	56.8%	37
Projects that will mitigate (lessen) future flood impacts caused by climate change.	11	29.7%	6	16.2%	20	54.1%	37
Provide better information about flood risk to the	11	29.7%	11	29.7%	15	40.5%	37

public.							
Retrofit (modify) infrastructure, such as improving culverts, bridges, and local drainage facilities to handle more stormwater flows.	7	18.4%	8	21.1%	23	60.5%	38
Strengthen codes and regulations to include higher regulatory standards for activities in flood hazard areas.	12	34.3%	13	37.1%	10	28.6%	35
Write-in: County / State / Feds looking for a massive land-grab?	0	%	0	%	1	100.0%	1
Write-in: I saw some excellent work along Mulholland, LA County this year... The road shoulder is extremely permeable there, and captures a TON of water very efficiently. This type of work is very important.	0	%	0	%	0	%	0

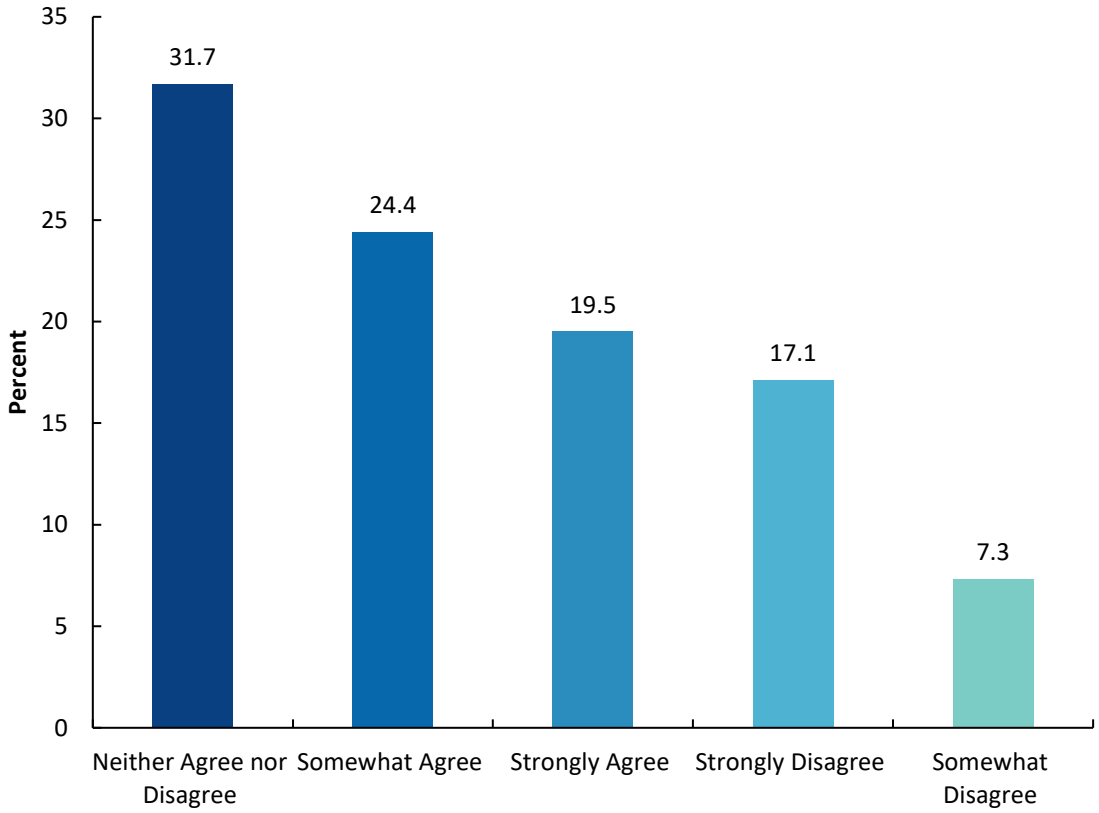
Roadways in flood-prone areas can be designed to double							
Write-in: Periodic maintenance of local creeks too. Like cleaning up fallen trees and debris that block the water	0	%	0	%	1	100.0%	1
Write-in: Relocate homeless encampments from rivers	0	%	0	%	1	100.0%	1
Write-in: testing	1	100.0%	0	%	0	%	1

20.Do you support the preservation of natural land that contains a flood hazard? (Select one)



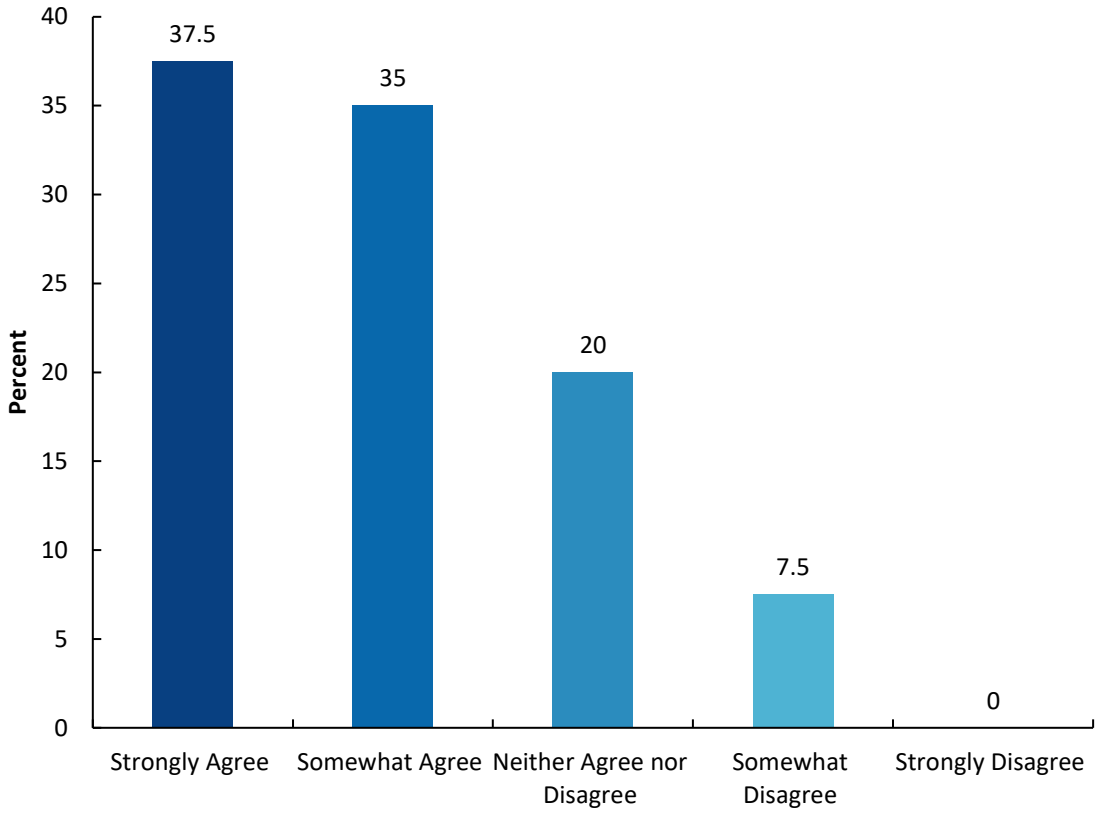
Value	Percent	Count
I support for all natural lands	68.6%	24
I support as long as it is not on my property	17.1%	6
I do not support	14.3%	5
	Totals	35

21.If my property were located in a designated “high flood hazard” area or had experienced damages from more than one flood event, I would consider a “buyout” offered by a public agency. (Select one)



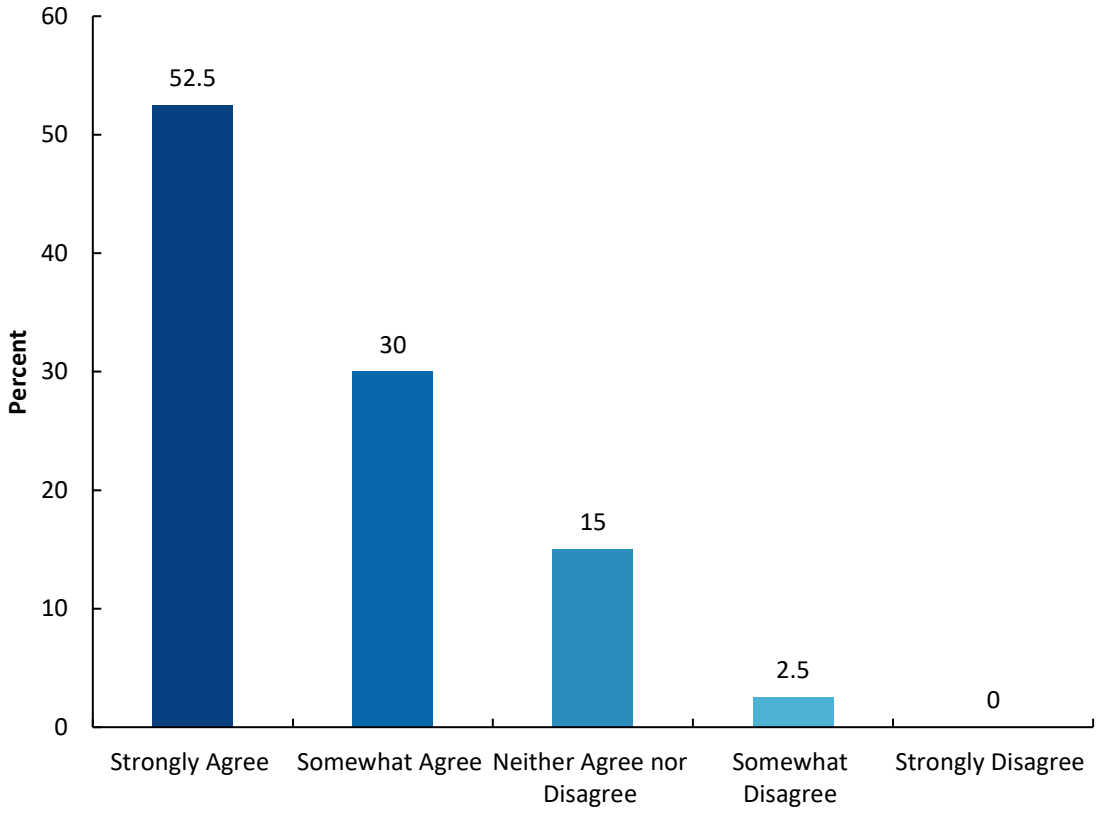
Value	Percent	Count
Neither Agree nor Disagree	31.7%	13
Somewhat Agree	24.4%	10
Strongly Agree	19.5%	8
Strongly Disagree	17.1%	7
Somewhat Disagree	7.3%	3
	Totals	41

22.It is the responsibility of government (local, state and federal) to provide education and awareness programs that promote actions by the community to reduce their exposure to the risks associated with flood hazards. (Select one)



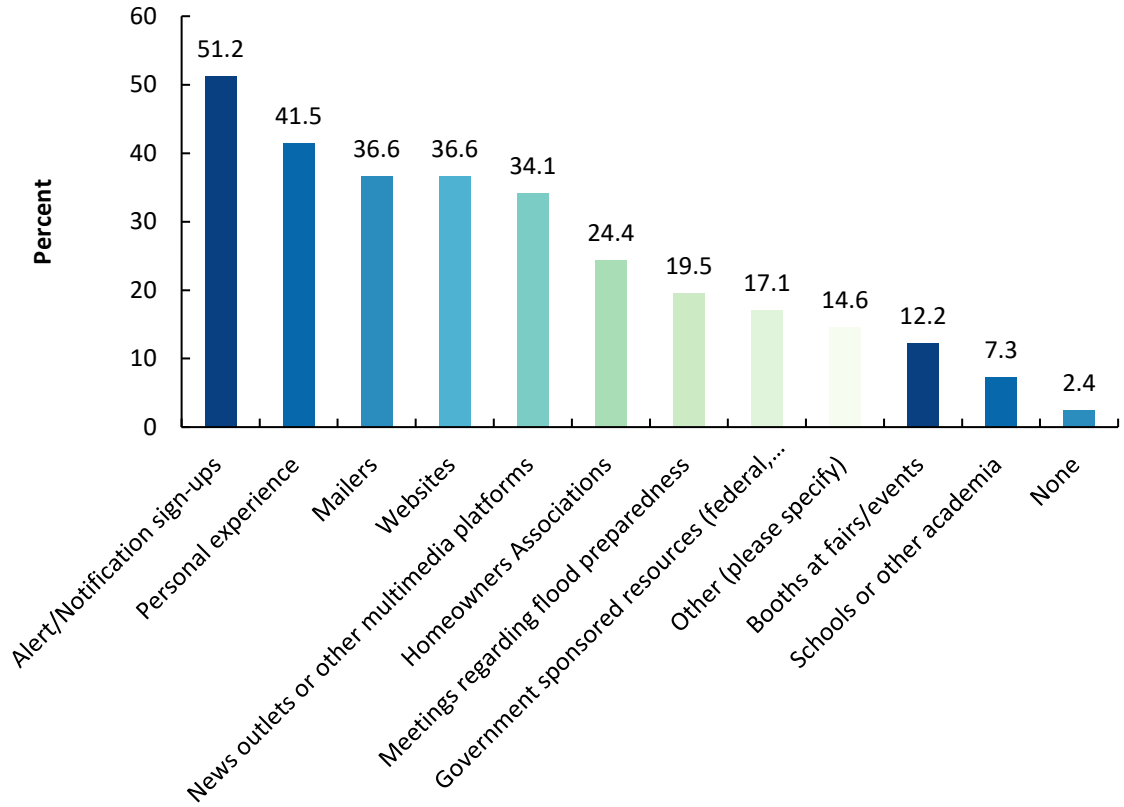
Value	Percent	Count
Strongly Agree	37.5%	15
Somewhat Agree	35.0%	14
Neither Agree nor Disagree	20.0%	8
Somewhat Disagree	7.5%	3
Strongly Disagree	0.0%	0
	Totals	40

23.It is my responsibility to educate myself and take actions that will reduce my exposure to the risks associated with flood hazards. (Select one)



Value	Percent	Count
Strongly Agree	52.5%	21
Somewhat Agree	30.0%	12
Neither Agree nor Disagree	15.0%	6
Somewhat Disagree	2.5%	1
Strongly Disagree	0.0%	0
	Totals	40

24.Which of the following has provided you with useful information to help you prepare for a flood event? (Check all that apply)



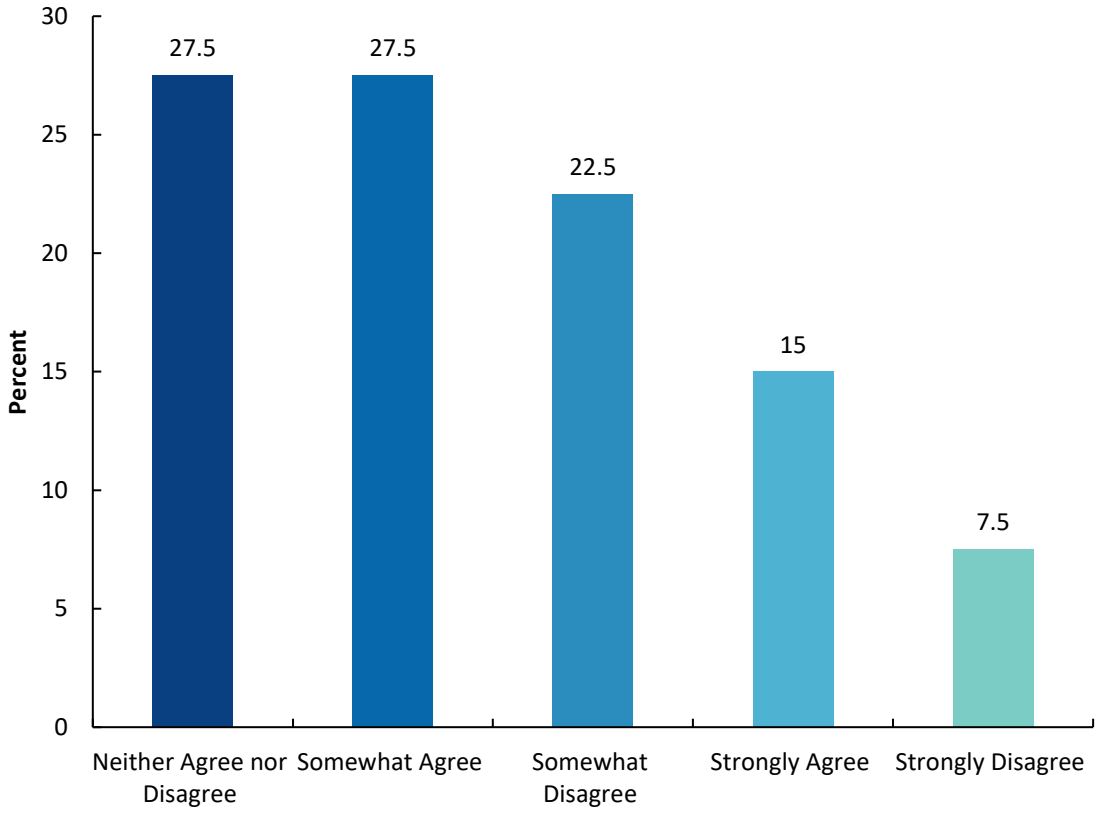
Value	Percent
Alert/Notification sign-ups	51.2%
Personal experience	41.5%
Mailers	36.6%
Websites	36.6%
News outlets or other multimedia platforms	34.1%
Homeowners Associations	24.4%
Meetings regarding flood preparedness	19.5%
Government sponsored resources (federal, state, or local)	17.1%

Other (please specify)	14.6%
Booths at fairs/events	12.2%
Schools or other academia	7.3%
None	2.4%

Statistics	
Total Responses	41.0

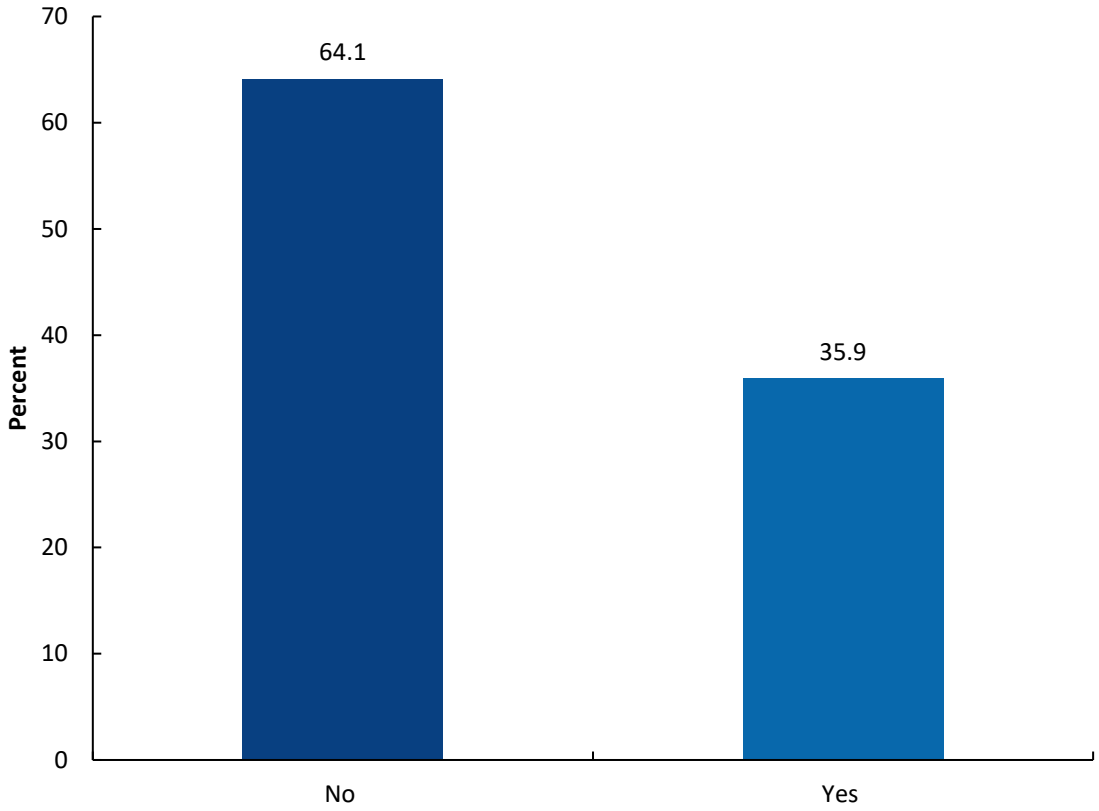
Other (please specify)
Friends Family
Hiring consultants
I kind of like being in a flood, honestly, it helps me to have a good intuition of how the natural land and the infrastructure are responding in a way that one cannot get by any other source. This way i can evaluate synthetic or natural solutions for prevention for future years.
SOCIAL MEDIA
Would be nice if politicians were honest with communities

25.Information about the risks associated with flood hazards is readily available and easy to locate. (Select one)



Value	Percent	Count
Neither Agree nor Disagree	27.5%	11
Somewhat Agree	27.5%	11
Somewhat Disagree	22.5%	9
Strongly Agree	15.0%	6
Strongly Disagree	7.5%	3
	Totals	40

26.Are you aware of the current Floodplain Management Plan's programs and policies to reduce flooding hazards? For example, the National Flood Insurance Program, Flood Alerts and Warnings, Disaster Assistance and Grant programs. (Select one)



Value	Percent	Count
No	64.1%	25
Yes	35.9%	14
	Totals	39

27.Choose up to five (5) of the following methods you think are most effective for providing flood hazard and disaster information:

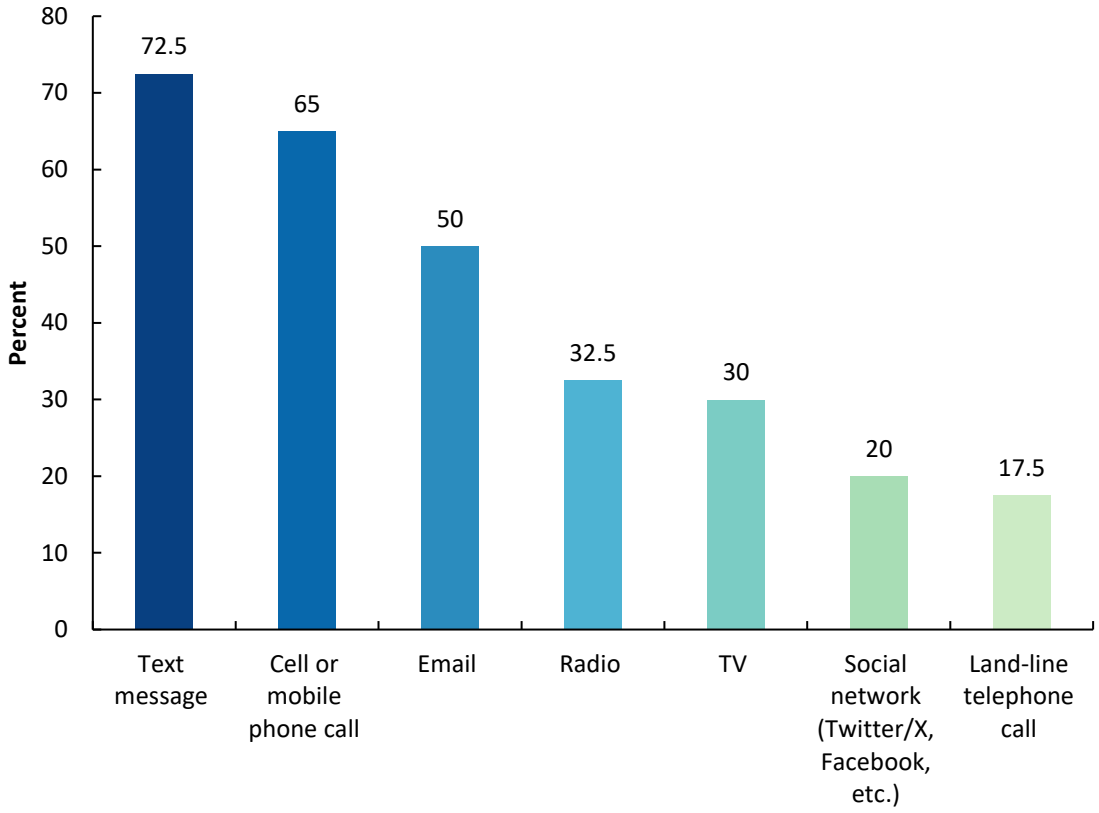
Value	Percent
Internet	55.0%
Community Events	37.5%
Public Awareness Campaign (such as Flood Awareness Week, Winter Storm Preparedness Month)	37.5%
Social Media (Twitter/X, Facebook, Nextdoor, etc.)	37.5%
Fire Department/Rescue	30.0%
Informational Brochures	25.0%
Word of Mouth	25.0%
Local Government Newsletters	22.5%
TV News	22.5%
Community Emergency Response Training (CERT) Classes	17.5%
Public Library	17.5%
Public Meetings	17.5%
Radio News	17.5%
Law Enforcement	12.5%
Newspaper	12.5%
Outdoor Advertisements	10.0%
TV Ads	10.0%

Faith-based Institutions	5.0%
Schools/Academic Institutions	5.0%
Workshops	5.0%
Other (please specify)	5.0%
Books	2.5%
Radio Ads	2.5%
Red Cross Information	2.5%
Chamber of Commerce	0.0%

Statistics	
Total Responses	40.0

Other (please specify)
Siren
real-world experience, and computer simulations/AI (convolutional models)

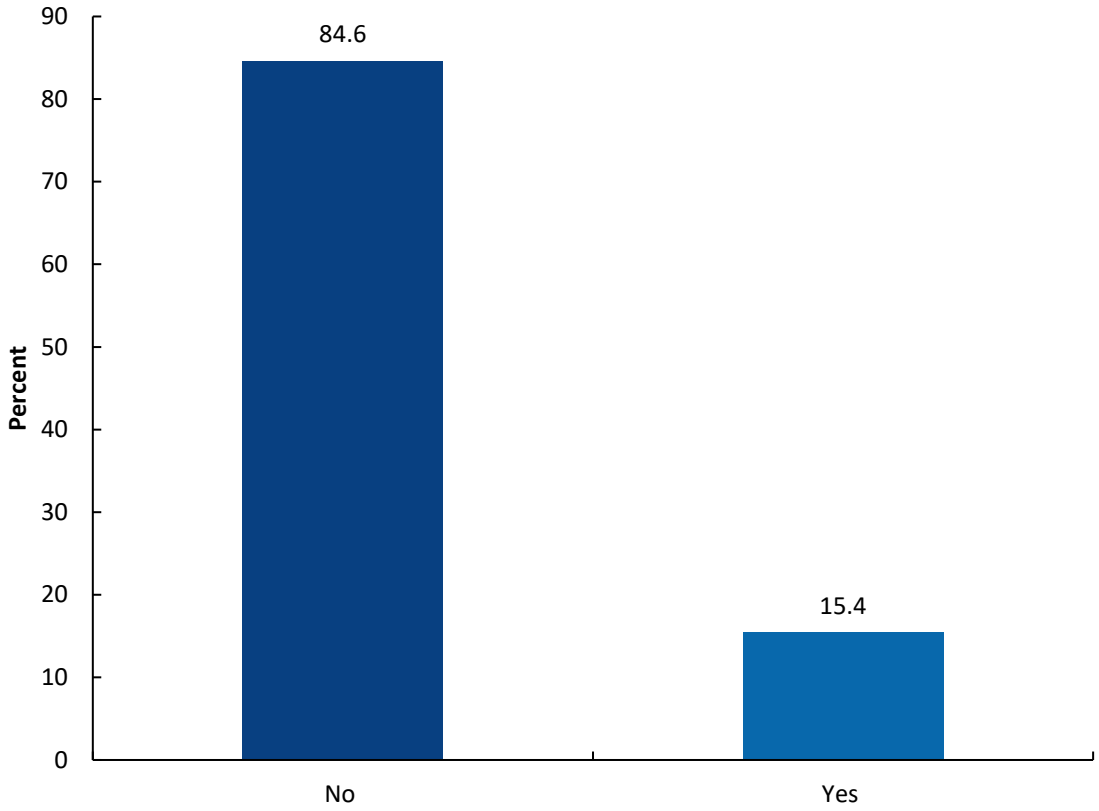
28.Which methods are best for you and your residence or business to receive urgent information or instructions for action? (Check all that apply)



Value	Percent
Text message	72.5%
Cell or mobile phone call	65.0%
Email	50.0%
Radio	32.5%
TV	30.0%
Social network (Twitter/X, Facebook, etc.)	20.0%
Land-line telephone call	17.5%

Statistics	
Total Responses	40.0

29.Do you or anyone at your residence or place of business have any conditions which might limit their ability to take action in an emergency? Public Works wants to ensure that those with access or functional needs (AFN) receive early warning or response during disasters. (Select one)

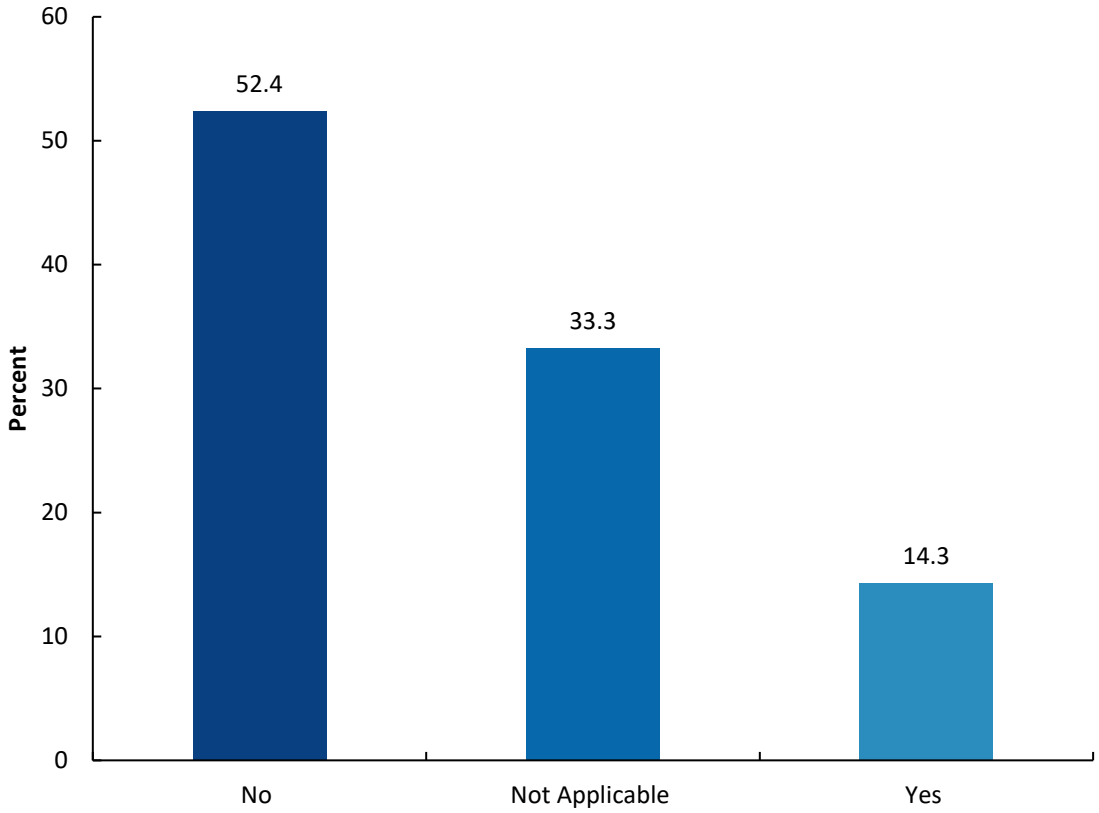


Value	Percent	Count
No	84.6%	33
Yes	15.4%	6
	Totals	39

30.Please describe your access or functional needs.

ResponseID	Response
34	A young child with medical needs
49	Mobility issues without any support.
61	Mobility
72	husband is disabled and has Alzheimers
84	Insulin dependent person. Have to have meds at all times

31.Would you like personnel from the Los Angeles County Office of Emergency Management to contact you regarding your access and functional needs? (Select one)



Value	Percent	Count
No	52.4%	22
Not Applicable	33.3%	14
Yes	14.3%	6
	Totals	42

32.Provide your email below.

ResponseID	Response
49	[REDACTED]
60	[REDACTED]
70	[REDACTED]

33.Do you have any additional comments?

ResponseID	Response
16	na
18	na
30	No
45	There should be warning signs posted in all flood hazard zones similar to The signs showing tsunami danger zones then people will be aware of the flood zone.
48	No
49	Thank you
60	Anecdote idea (AI): ***ANECDOTE*** One time, I drove onto my property in the evening, and it began to rain, by the morning the driveway had washed out in front of and behind my car (this was the rain after the big fire a few years ago). It kept raining for a solid month, so i was just up there in the rain. While observing what was actually going on around me, I traced my property survey data into my computer an ran an erosion simulation (rainfall based) on the resulting computer heightfield. Low and behold, the computer showed EXACTLY the same results as what i was viewing all around me. the roads caved in the exact same places. (I was using VFX software called Side FX Houdini) ... now, 6 years later, some folks have used free Neural Network software (ONNX) trained with the same erosion simulations I was using, and the Neural Network can predict the results of these simulations 50,000 times faster than the computer can run the simulation. ***IDEA*** Therefore, I suggest that it might be a great idea to use this trained Neural Network to suggest minor

	modifications to the surrounding terrain which could best pre-emptively mitigate flooding. ***REFERENCES*** This is the erosion model: https://www.sidefx.com/docs/houdini/nodes/sop/heightfield_erode.html Here is a built in workflow for ML Terrain training from sidefx: https://www.sidefx.com/contentlibrary/ml-terrain/ https://www.sidefx.com/docs/houdini/news/20/ml.html#ml-terrain Here is a Machine Learning plugin for Houdini which was used for the training I mentioned (i think): https://github.com/Bismuth-Consultancy-BV/MLOPs This software is most often used for art, but it turns out the results can be very accurate. You can of course bring in LiDAR or survey data (which is what i used). I do believe we could be using Machine Learning to mitigate flooding and increase catchment (not just make "fake cat videos" :D) Thanks for considering this idea. I think it might be very useful.
61	Work with us tge people don't condemn our properties or buy us out. This seems like a set up. Of course we care for the environment but laws but into place sometimes are a double edged sword and the little guys suffer.
65	I have lived in my house for 40 years and have gone through several floods. Even though I live in a flood zone, I've never had problems at my property and I've never applied for funds because of flooding.
68	Since the county is aware of the danger to floodplain areas, it is their responsibility to spend the tax money they are already taking from us to fix these flood problems and not spend the money on buying the votes of the poor. We pay income tax, sales tax, property tax, gasoline tax, estate tax, and get very little for it at the local level. We have crappy roads that are poorly maintained. We want a fair share of this money to back to the local community.
69	County to clear and clean Old Topanga Creek of debris and growth in the creek that blocks the water flow. Also, illegal unpermitted bridges that block the water flow and constrict the creek in heavy rain storms.
70	I have lived in [REDACTED] since 1997. Medea Creek running through the rear section of my land. I notice the over growing reeds caused water flow to slow down and also trap the debris like sand and small rock to built up the creek bed. I strongly urge you to remove the over grow reed and remove the debris built up annually or every two years. Or grand me and my neighbors the permission to scope up the excess sand and rocks built up in the creek bed. The purpose is to keep water flow smoothly. You can reach me by my e mail, which is [REDACTED]. Or my cell [REDACTED]. Thanks!
71	If your "plan" is to buy out residents, you should be prepared to pay TOP dollar, not bottom. You should be prepared to assist in finding

	alternate, suitable residences (including any livestock, pets, kids, privacy or other needs) & help pay for the physical move. Just pushing more people out to fend for themselves is not right & only exacerbates our current issues with unhoused / homeless, etc.
72	Our home is on bedrock, about 50 feet above the lake which floods everybody below. We are not a flood risk.
73	We have lived in our residence for over 40years and have NEVER been affected by any flooding!! But we are still classified as a flood area. Since the county updated their drainage issues, due to the increased development in our area, the rain water runoff is none existent. Our only issue with rain is a muddy street., but its passable.
75	It would be beneficial if people would stop destroying the water way area because they do not believe it rains enough to have the water basins washes ect. Since moving here more and more people believe that they need more surface area and make the washes smaller and smaller well when the water flows it needs to come some where and not in my house.
77	During the storms, a tree fell in the creek. It had the potential of backing up the creek and causing debris to be caught in it and then flooding our neighborhood and our house. I called multiple agencies and NO ONE would help. At this same time, I watched while public works helped someone in Beverly Hills get their piano out of a mudslide. This does not feel like a good use of time. The government agencies need to do a better job of maintaining the creekbeds, and creek side walls and the retaining walls they already have. We called to have someone look at the retaining wall that supports our road that also backs to the creek, and they came out and did nothing. There's a big hole in it where there used to be concrete. On our street the asphalt has buckled in two places because of the rains, causing a culvert drain to be smashed. No maintenance. I called Cal Trans and Public works for two of these three items. NO repsponse. This is unacceptable. All summer, the creek bed should be maintained and greenery should be cut back, so that water flows correctly come winter. ALso, if you would maintain as you go, these projects wouldn't be so huge when you get to them. Engineers put a lot of thought into how to move the water, and it would be wise to maintain the waterways that run to the ocean. I really feel as if Public Works doesn't care at all about Topanga. They always seem to put beverly Hills or Brentwood or the bigger cities first. That's not fair. We all have to pay state tax and should be treated with respect and fairness. The road closure took community outreach to the federal government and petition signing before any work got underway. It's very frustrating.
82	I would like to know if there are Grants for individual homeowners,

	such as myself, to use to "floodproof" our homes.
84	I would like to see public works better planning for flood. They are doing dumb stuff on East side of P-8 while the west side is going to collapse after next hard rain. Properties are loosing their yards along the P-8 west of 164th St East.
105	Survey is a good process to collect data IF enough people respond. Little is known about flooding risk or preparedness by people in the high dessert.

34.Please provide your zip code, nearest cross streets, and/or neighborhood.

Zip Code

ResponseID	Response
16	11111
17	93510
18	91384
30	91390
31	Red Rover Mine Road
32	91390
34	Green valley
36	93535
37	91342
45	91020
46	91001
48	93510
49	93510
51	91301
55	91301
60	90265
61	90290
64	90290
65	90290

67	90265
68	93536
69	90290
70	91301
71	91390
72	91301
73	93536
75	Sierra hwy
77	90290
81	90290
82	91302
83	91301
84	93591
104	Norwalk Blvd, Whittier, CA
105	West Avenue O between 20th Streedt West and 30th Atreet West.
108	91745

34.Please provide your zip code, nearest cross streets, and/or neighborhood.

Nearest Cross Streets

ResponseID	Response
17	crown valley
18	Chiquito Canyon Road
30	Cliffedge dr. And Calle lagona
31	93510
32	Bouquet Canyon and Vasquez Canyon
34	91390
36	[REDACTED]
37	Spring Trail
45	Montrose
46	ALTADENA DR
48	Indian Oak Road/Calmgarden
49	Country Way
51	lake shore dr lake vista dr
55	Mulholland Hwy
60	Mar Vista Ridge Rd
64	Old Topanga Canyon
65	Bonnell
66	90265

67	Monte Viento X Rambla Pacifico
68	Avenue N and 45th west
69	Valley Dr.
70	Kanan + Castle View drive
72	Crags
73	50th Street West / Ave K10
75	91390
77	Topanga Canyon Blvd/Cheney
81	Old Topanga Canyon Rd and Red Rock Rd
82	Thornhill & Cold Canyon
83	Cornell and E Lakeshore
84	Rawhide Ave
104	90606
105	93551
108	Hacienda

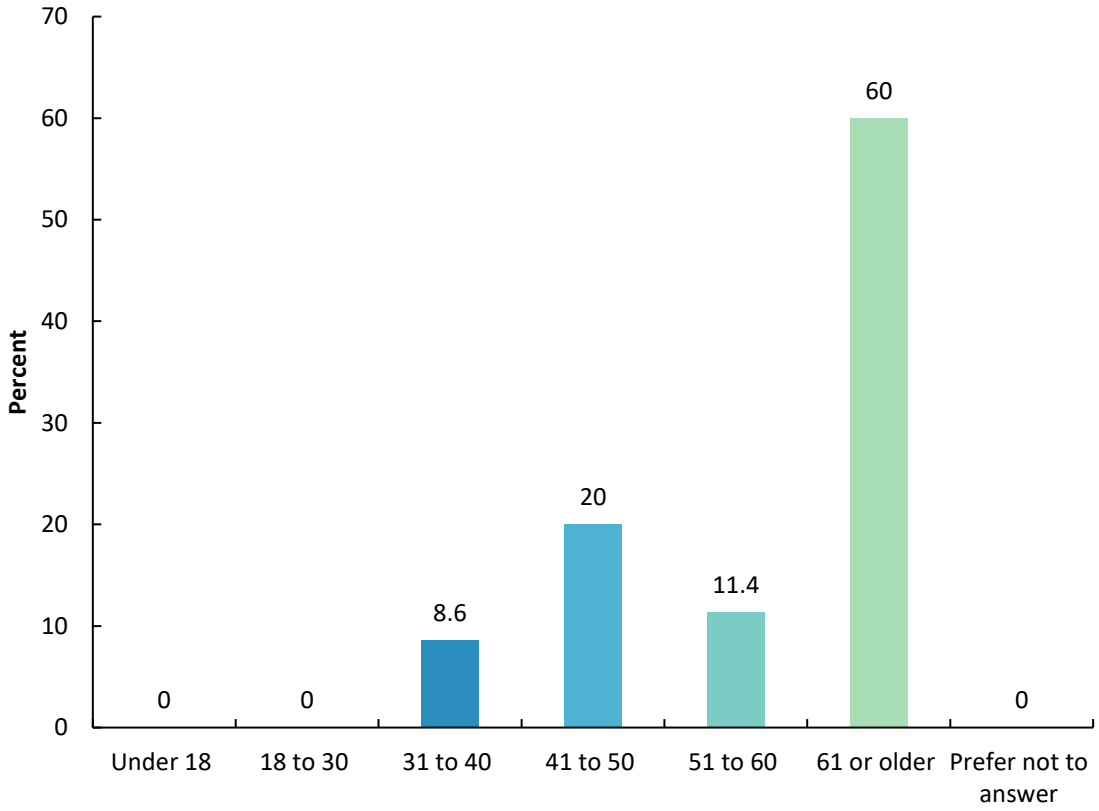
34.Please provide your zip code, nearest cross streets, and/or neighborhood.

Neighborhood

ResponseID	Response
17	acton
18	castaic
30	Green valley
31	Sierra Highway
32	Saugus
34	Spunky canyon rd/san francisquito Cyn rd
36	K12
37	Summit Trail
45	Honolulu
46	ALTADENA
48	Acton
49	Country Way Estates
51	malibou lake
55	Malibou lake
60	Malibu Mar Vista
61	Oakwood Dr/ Topanga Cyn Blvd
67	Monte Viento
68	Quartz Hill

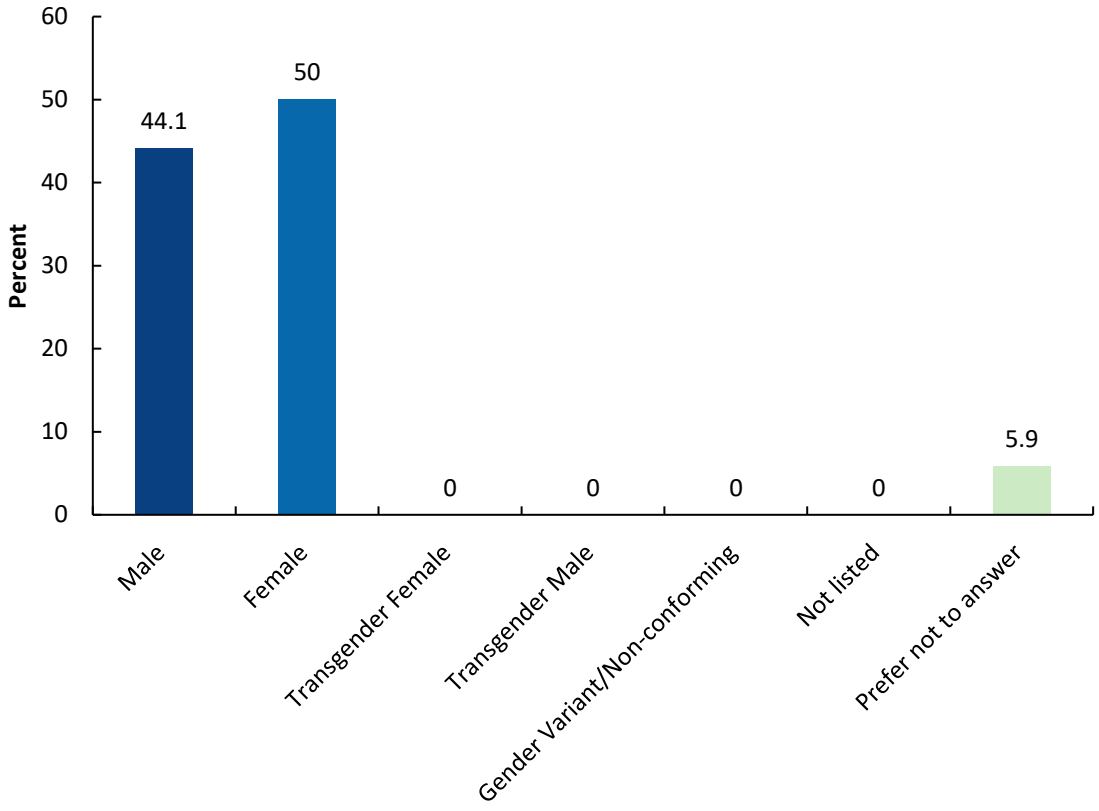
69	Old Topanga
70	Medea Valley Estate
72	Malibou Lake
73	Quaertz Hill
75	Bad
77	Topanga
81	Topanga
82	Monte Nido
83	Malibou Lakes
84	Palmdale side of Lake LA
104	Loch Lomond Ave
108	Tetley

35.Please indicate your age range:



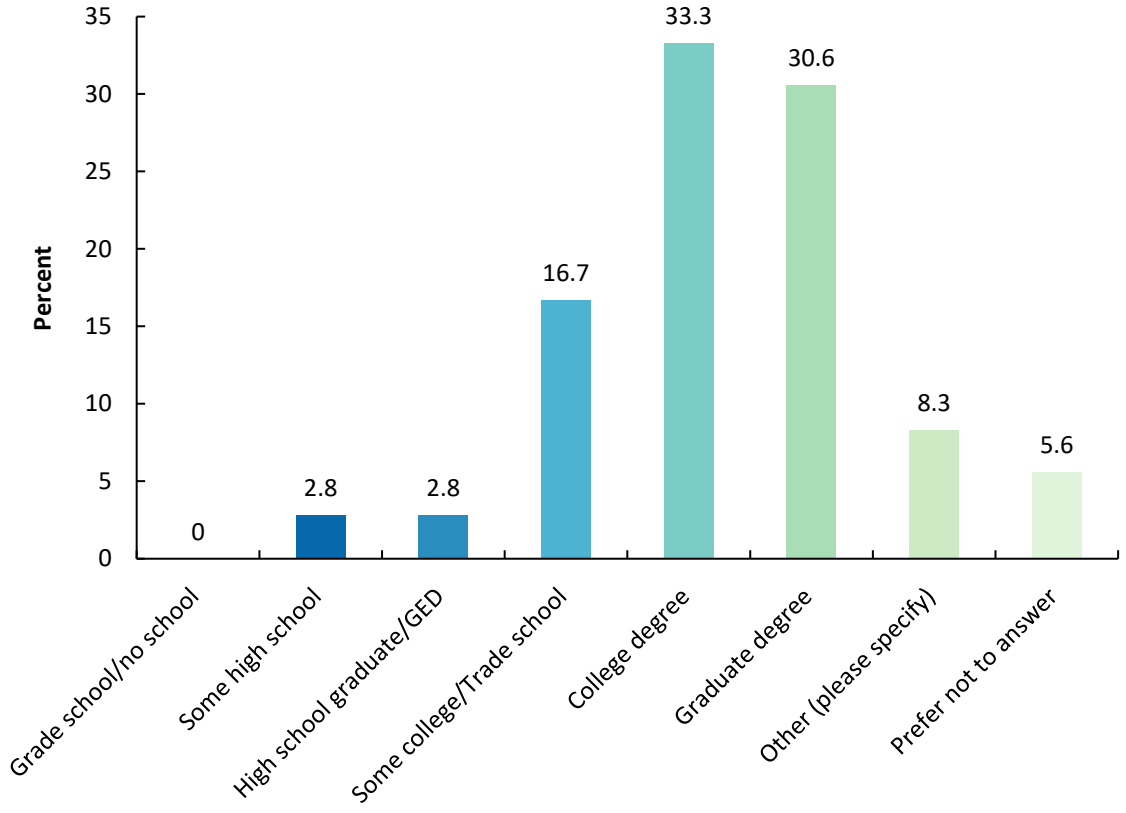
Value	Percent
Under 18	0.0%
18 to 30	0.0%
31 to 40	8.6%
41 to 50	20.0%
51 to 60	11.4%
61 or older	60.0%
Prefer not to answer	0.0%

36.Please indicate your gender:



Value	Percent
Male	44.1%
Female	50.0%
Transgender Female	0.0%
Transgender Male	0.0%
Gender Variant/Non-conforming	0.0%
Not listed	0.0%
Prefer not to answer	5.9%

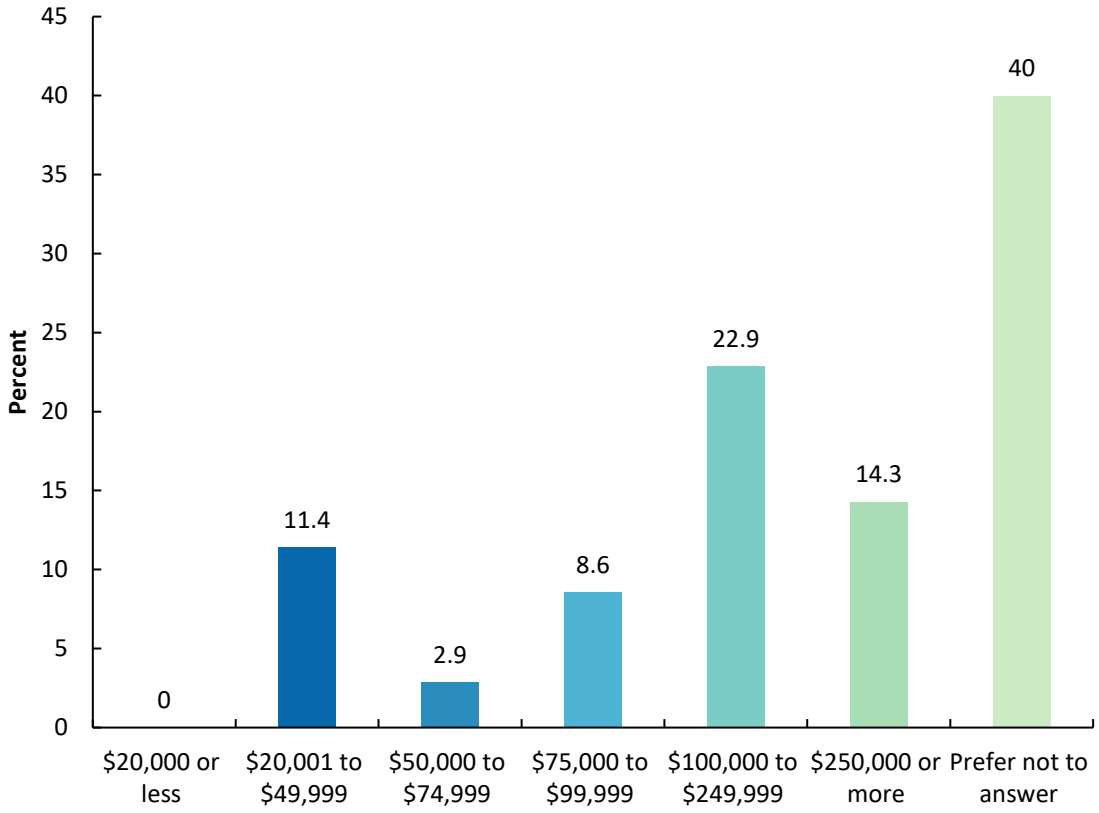
37.Please indicate your highest level of education. (Select one)



Value	Percent
Grade school/no school	0.0%
Some high school	2.8%
High school graduate/GED	2.8%
Some college/Trade school	16.7%
College degree	33.3%
Graduate degree	30.6%
Other (please specify)	8.3%
Prefer not to answer	5.6%

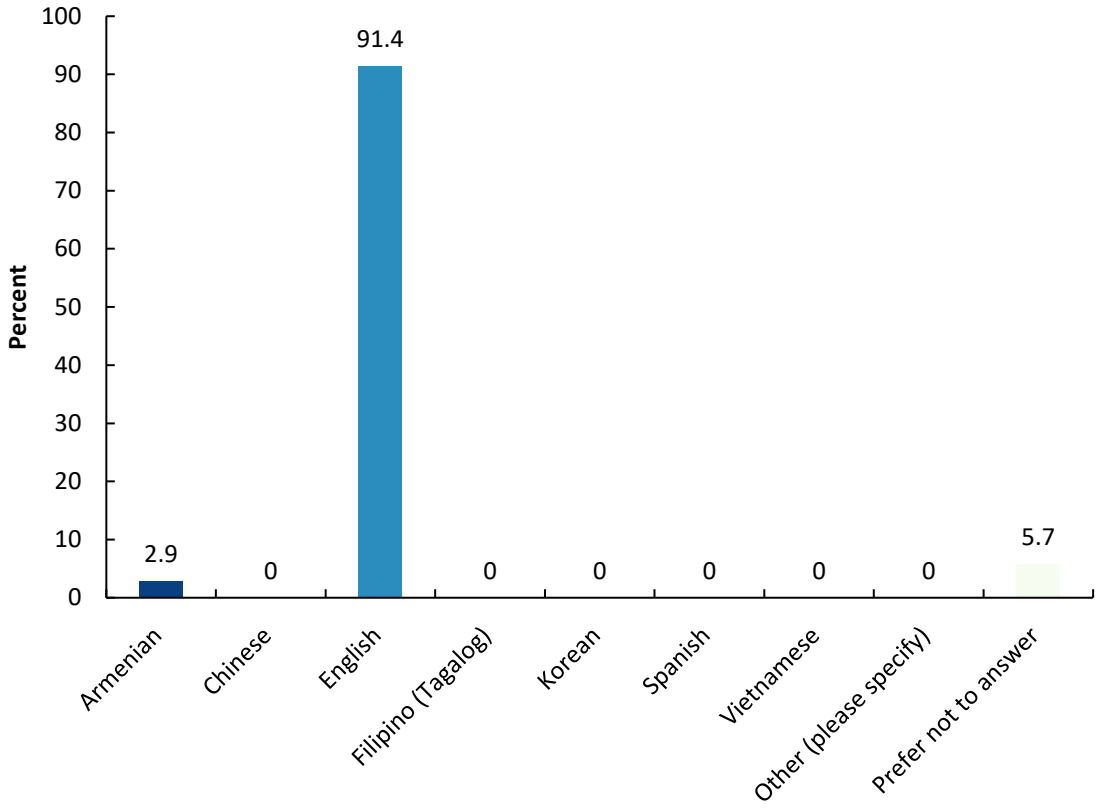
Other (please specify)
CERT/Red Cross/Wilderness training
Doctoral degree
Lots of college... I'm Van Wilder/The Son in Law (but where is my babe, yo?)

38.What is your gross household income?



Value	Percent
$20,000 or less	0.0%
$20,001 to $49,999	11.4%
$50,000 to $74,999	2.9%
$75,000 to $99,999	8.6%
$100,000 to $249,999	22.9%
$250,000 or more	14.3%
Prefer not to answer	40.0%

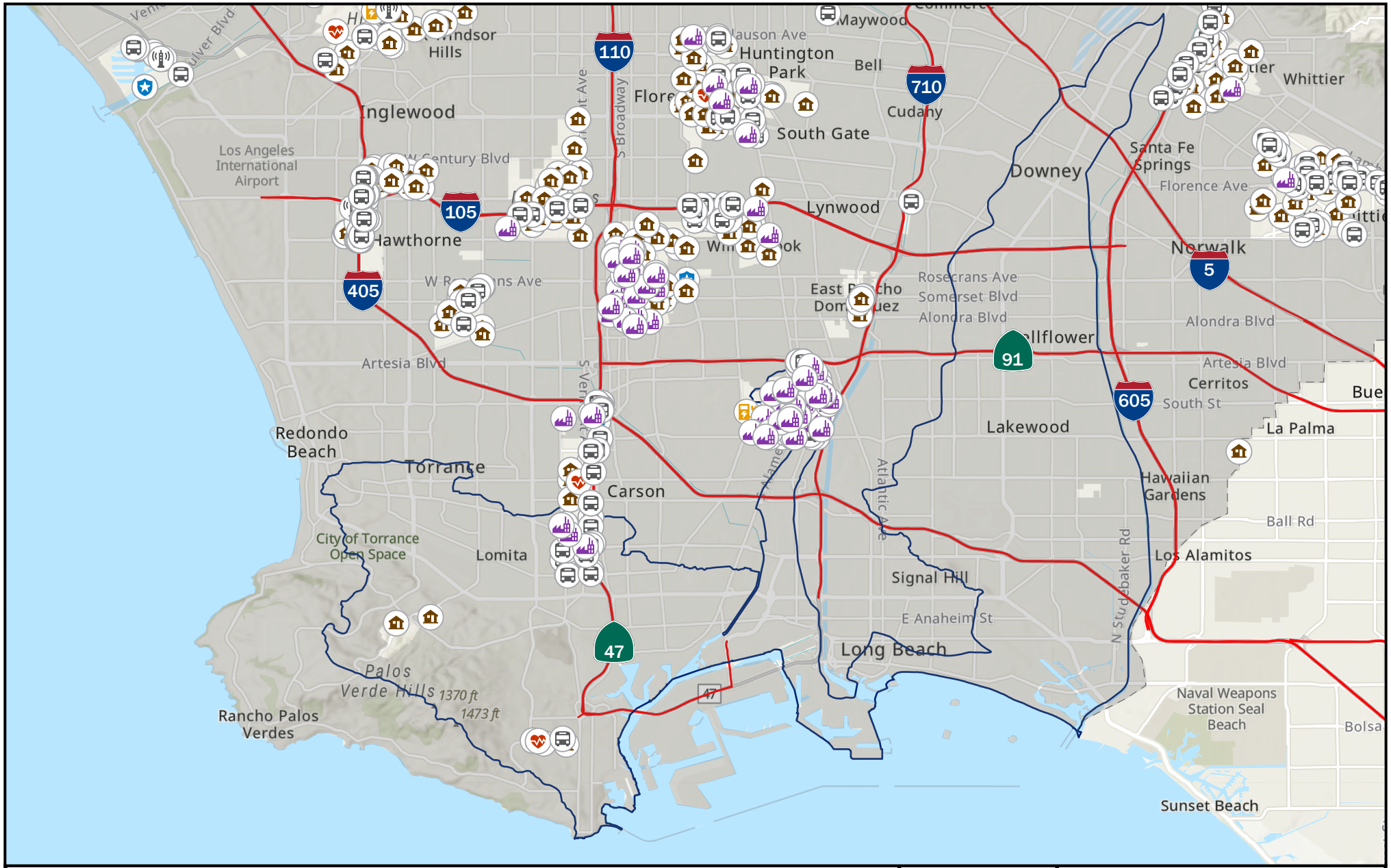
39.Please indicate the primary language spoken in your household. (Select one)



Value	Percent
Armenian	2.9%
Chinese	0.0%
English	91.4%
Filipino (Tagalog)	0.0%
Korean	0.0%
Spanish	0.0%
Vietnamese	0.0%
Other (please specify)	0.0%
Prefer not to answer	5.7%

Other (please specify)

APPENDIX D – CRITICAL FACILITIES AND INFRASTRUCTURE MAPS



Legend

- Alamitos Bay - San Pedro Bay
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

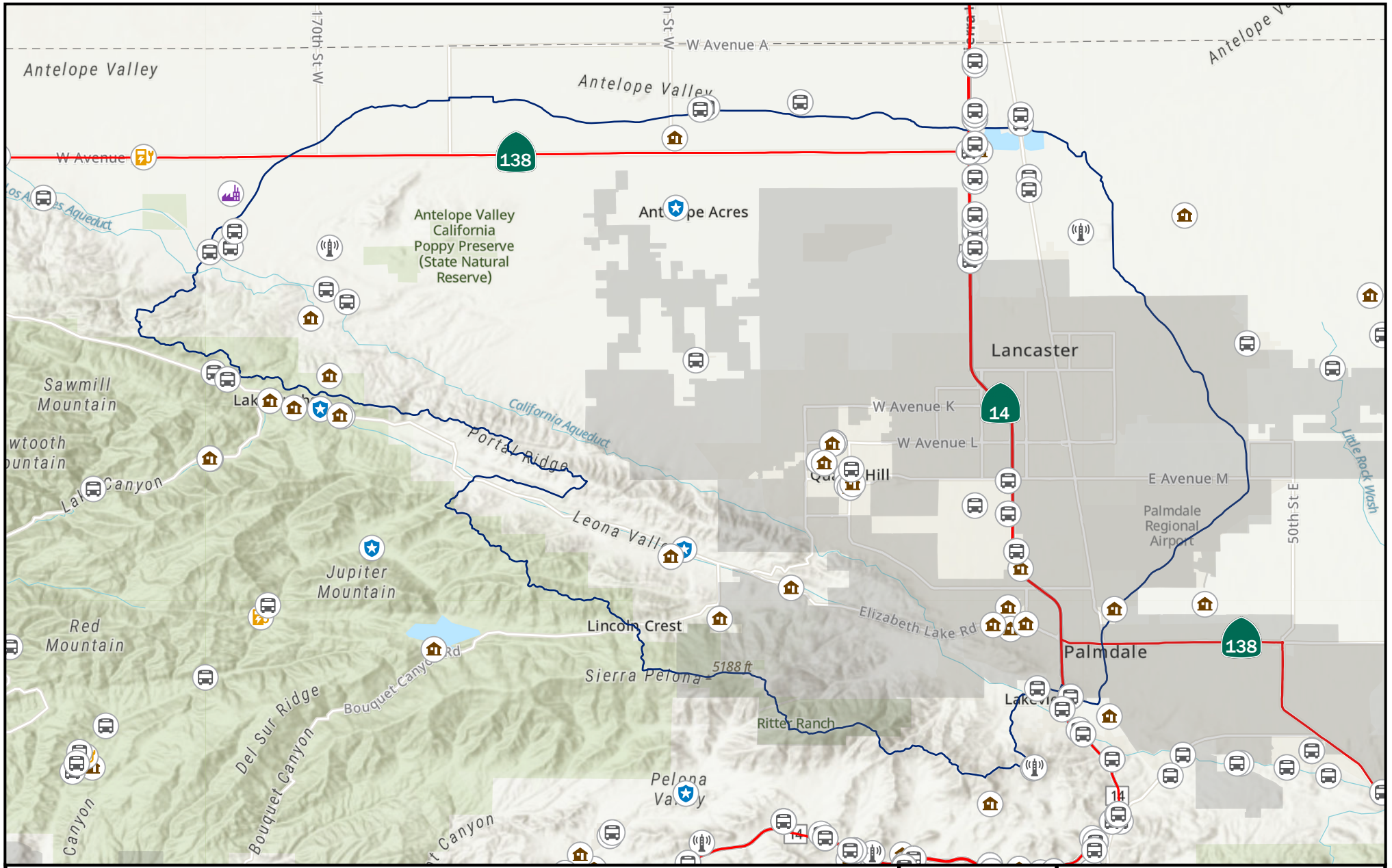
NORTH

2.5 1.25 0 2.5 Miles

Appendix D:
1807010607
Alamitos Bay - San Pedro Bay Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Amargosa Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

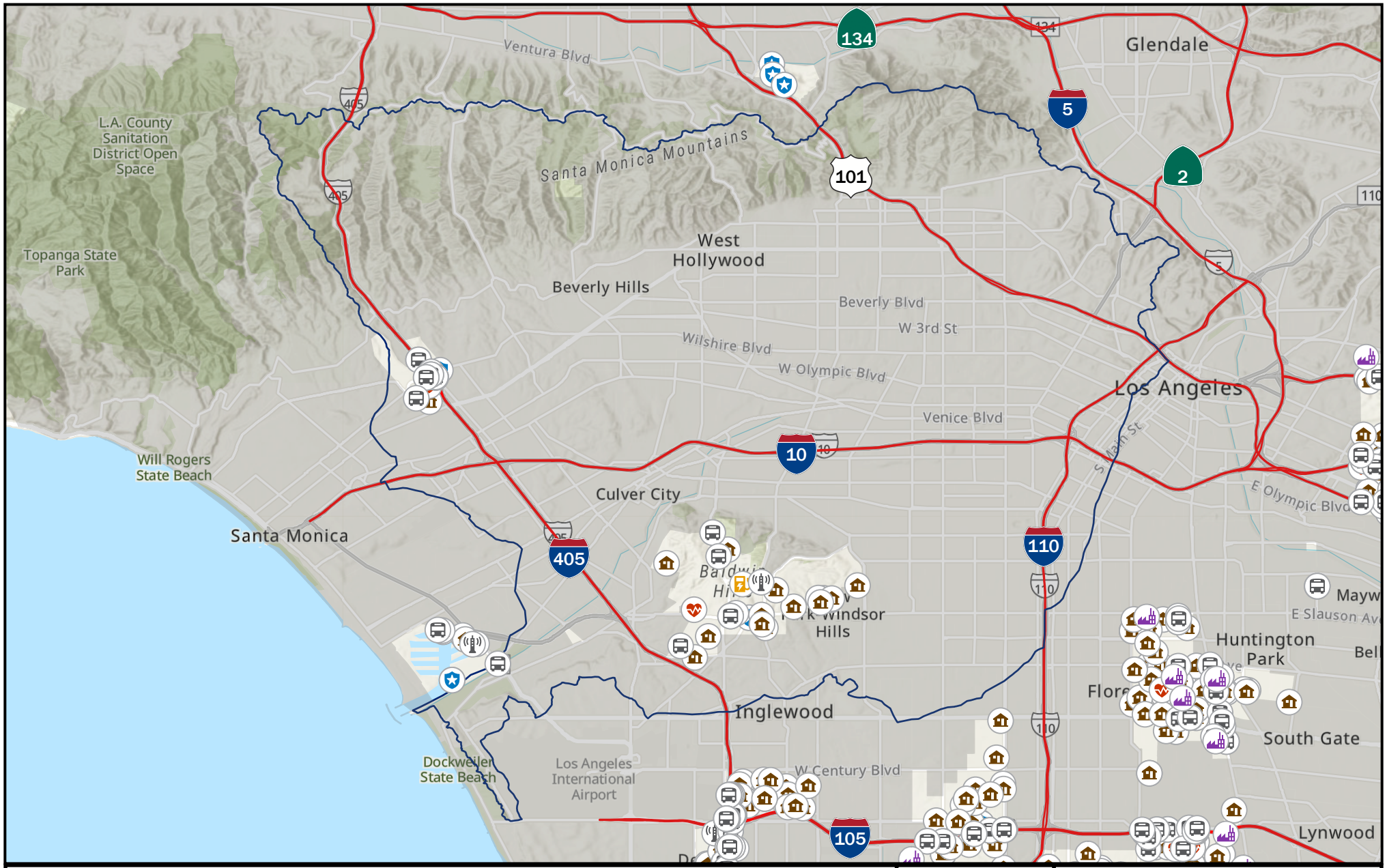
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D: 1809020614 Amargosa Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Ballona Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

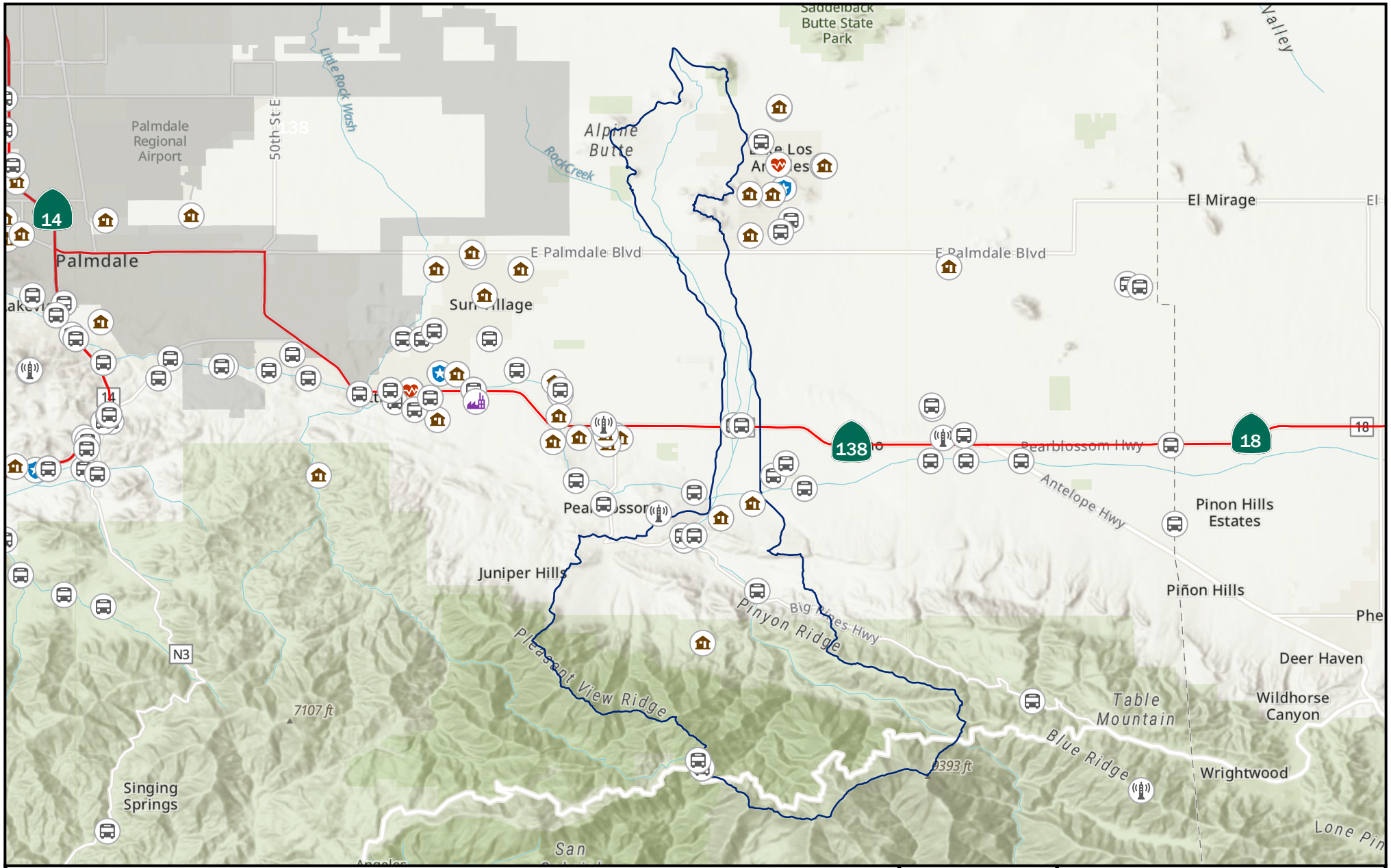
0.3 0.15 0 0.3 Miles

BURNS McDONNELL

Appendix D:
1807010403
Ballona Creek Watershed
Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/12/2025



Legend

- Big Rock Creek - Big Rock Wash Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

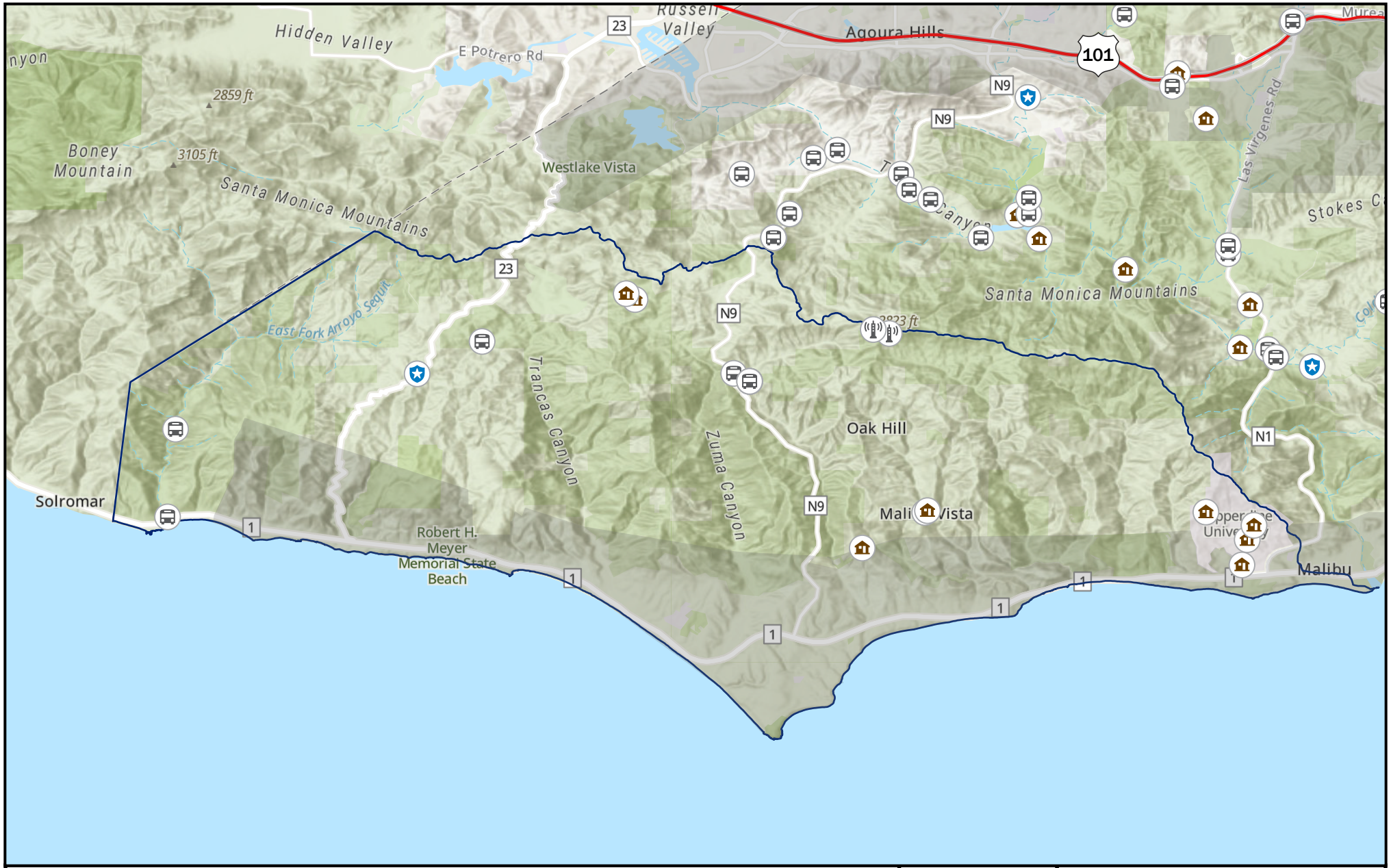
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D: 1809020610 Big Rock Creek - Big Rock Wash Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Big Sycamore Canyon - Frontal Santa Monica Bay Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

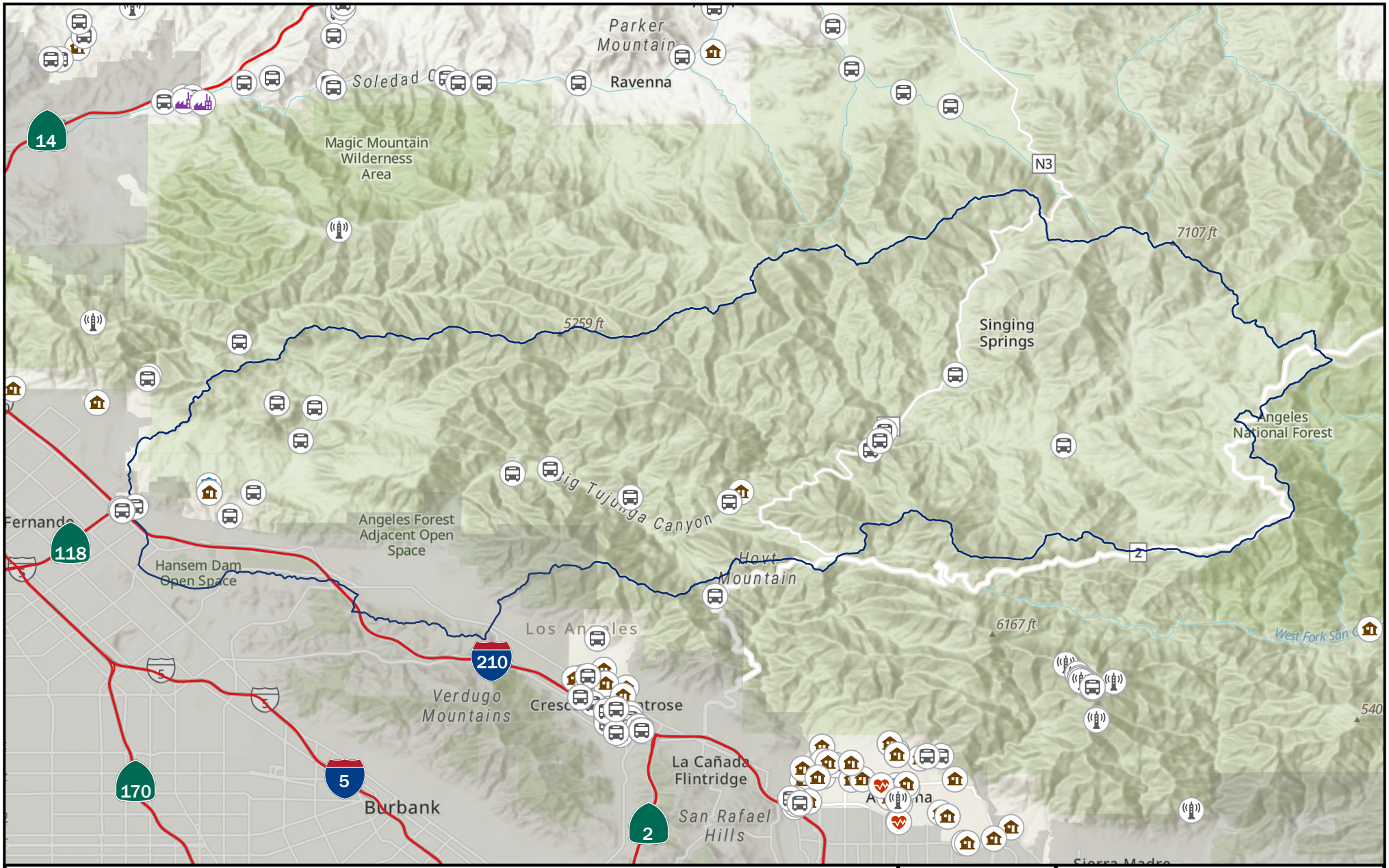
1.5 0.75 0 1.5 Miles

BURNS McDONNELL

Appendix D:
1807010402
Big Sycamore Canyon Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Big Tujunga Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

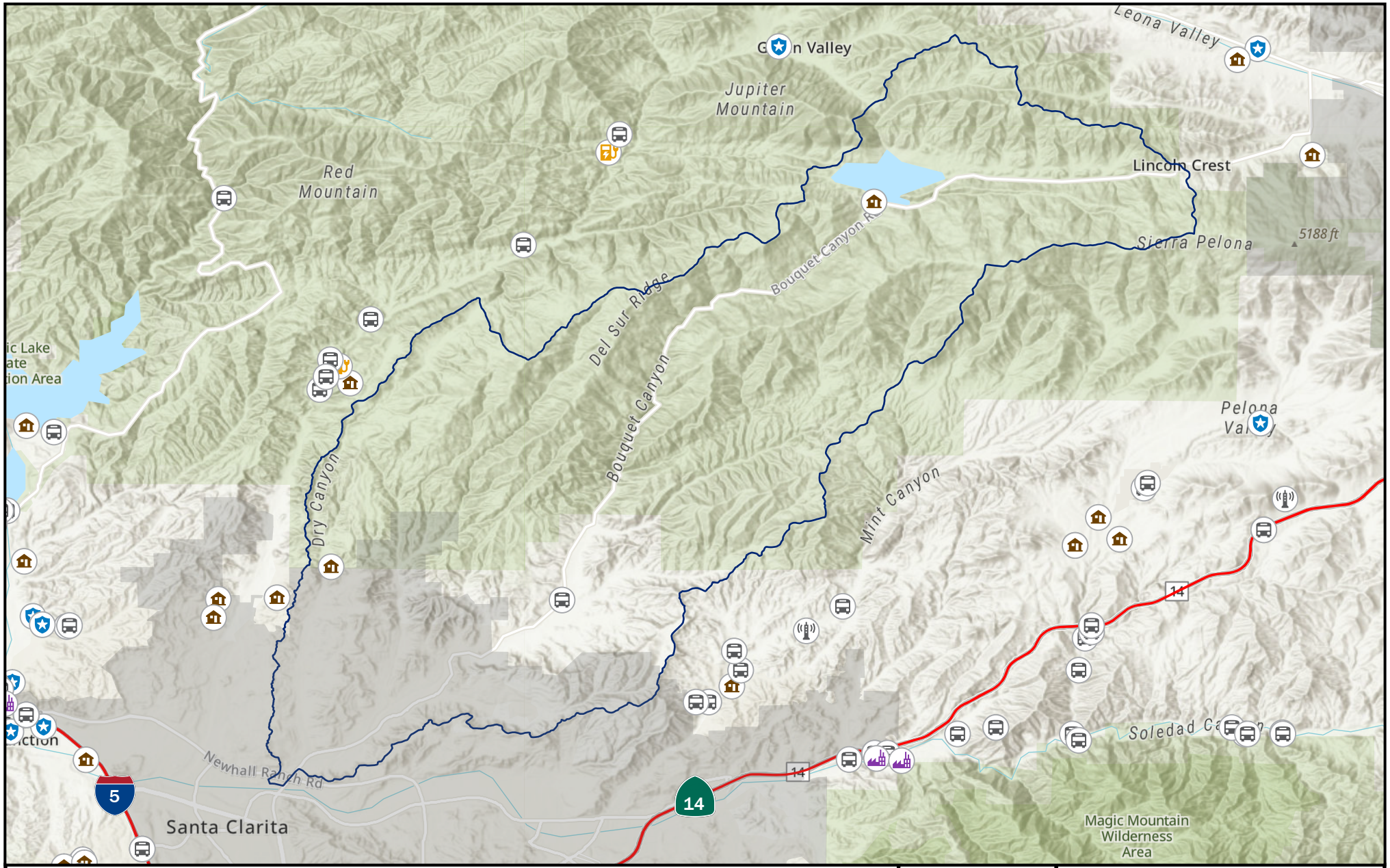
2.5 1.25 0 2.5 Miles

BURNS McDONNELL

Appendix D:
1807010501
Big Tujunga Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Bouquet Canyon Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

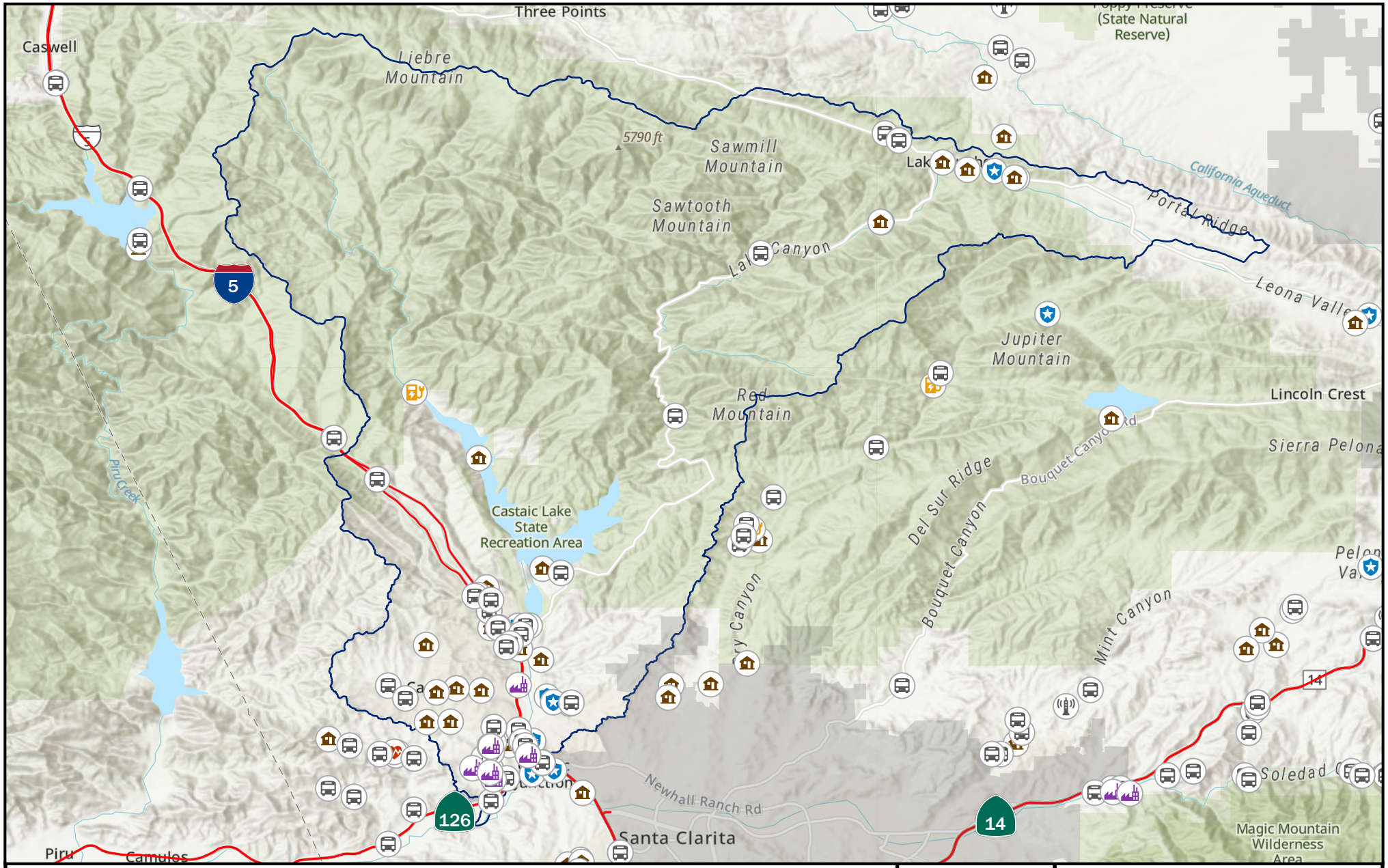
2 1 0 2 Miles

BURNS McDONNELL

Appendix D: 1807010202 Bouquet Canyon Watershed Critical Facilities and Infrastructure

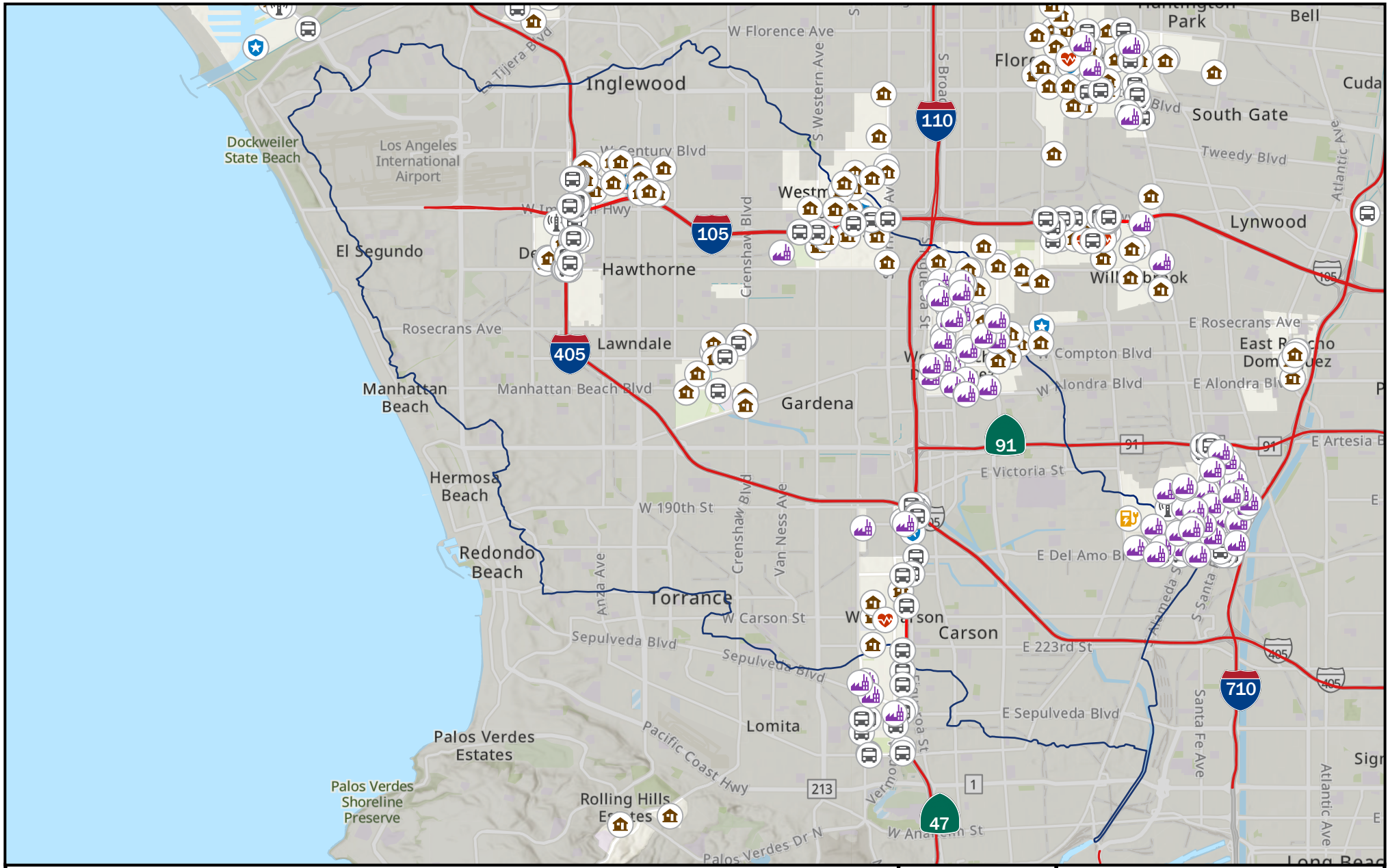
Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Dominguez Channel Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

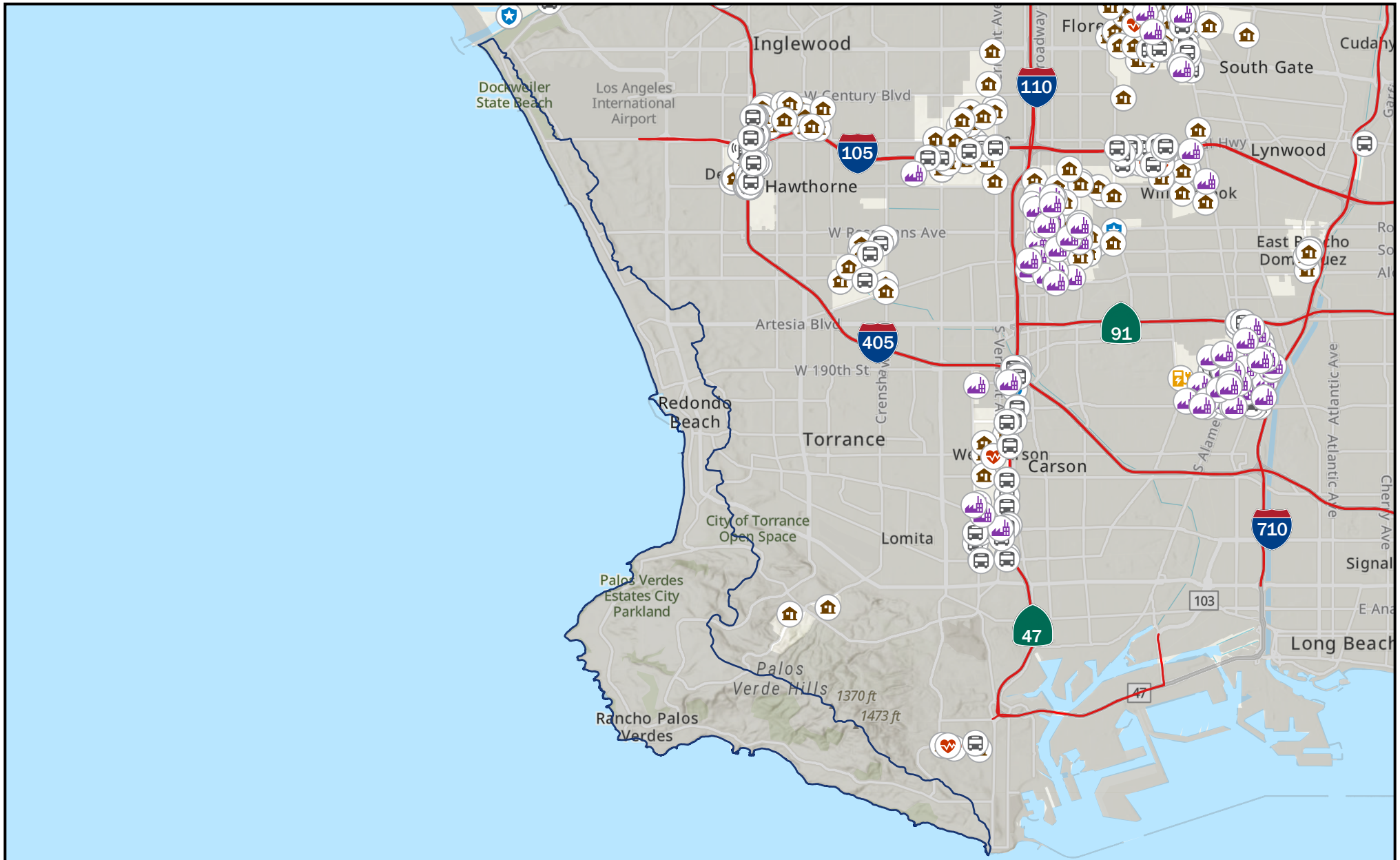
2 1 0 2 Miles

BURNS McDONNELL

Appendix D: 1807010601 Dominguez Channel Watershed Critical Facilities and Infrastructure

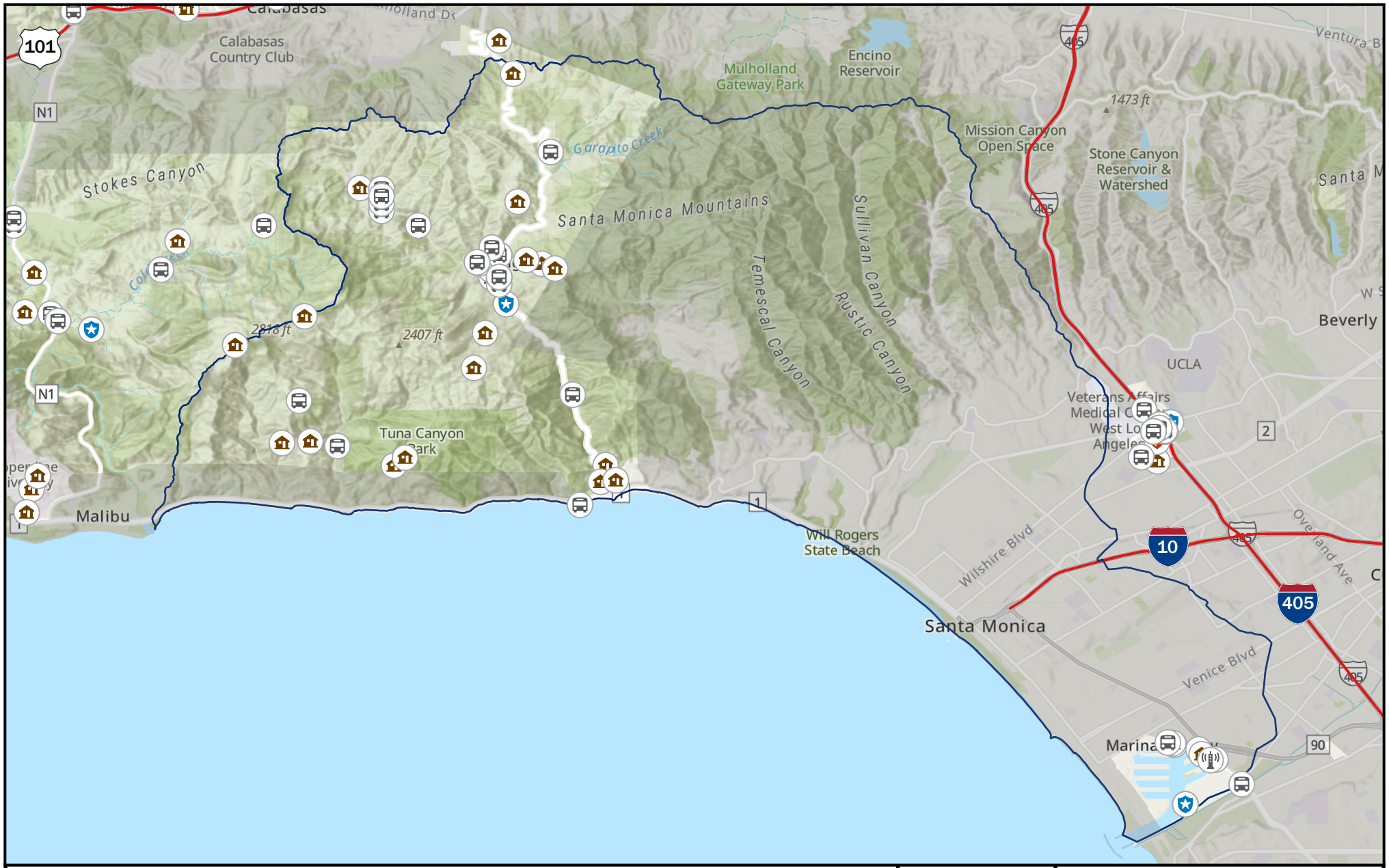
Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Garapito Creek - Frontal Santa Monica Bay Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

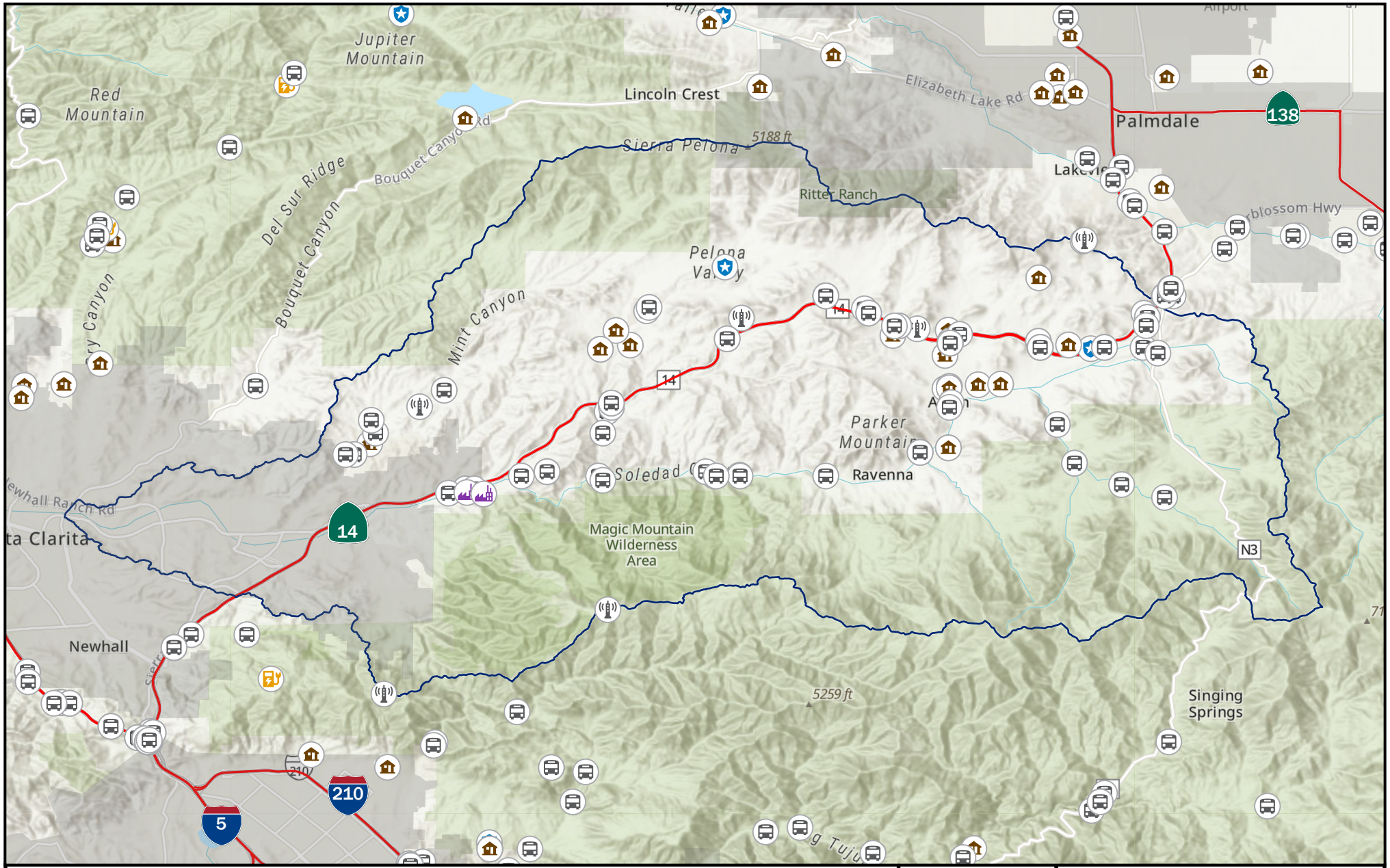
1.5 0.75 0 1.5 Miles

BURNS McDONNELL

Appendix D: 1807010404 Garapito Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Headwaters Santa Clara River Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

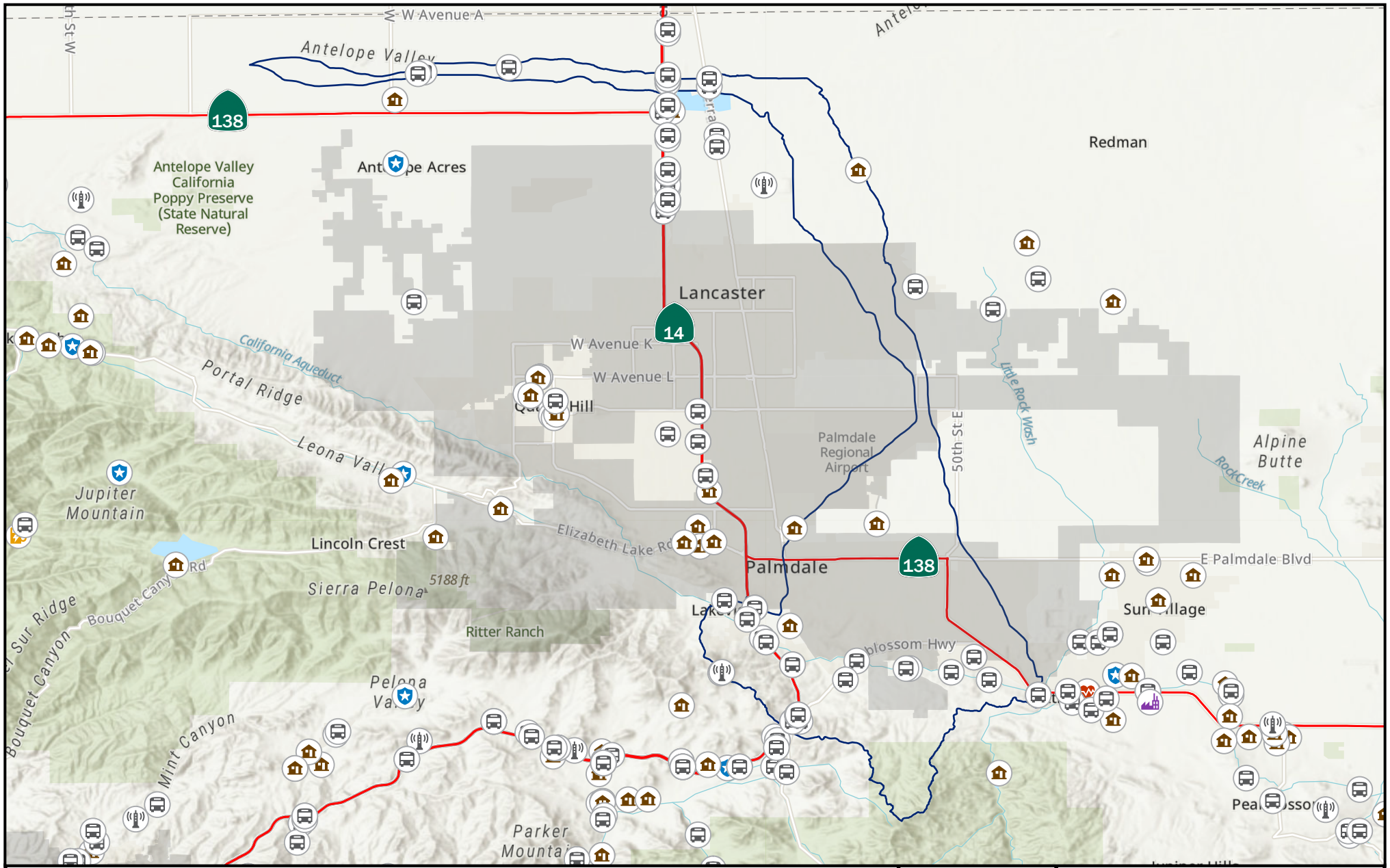
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D: 1807010201 Headwaters Santa Clara River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Lake Palmdale - Piute Ponds Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

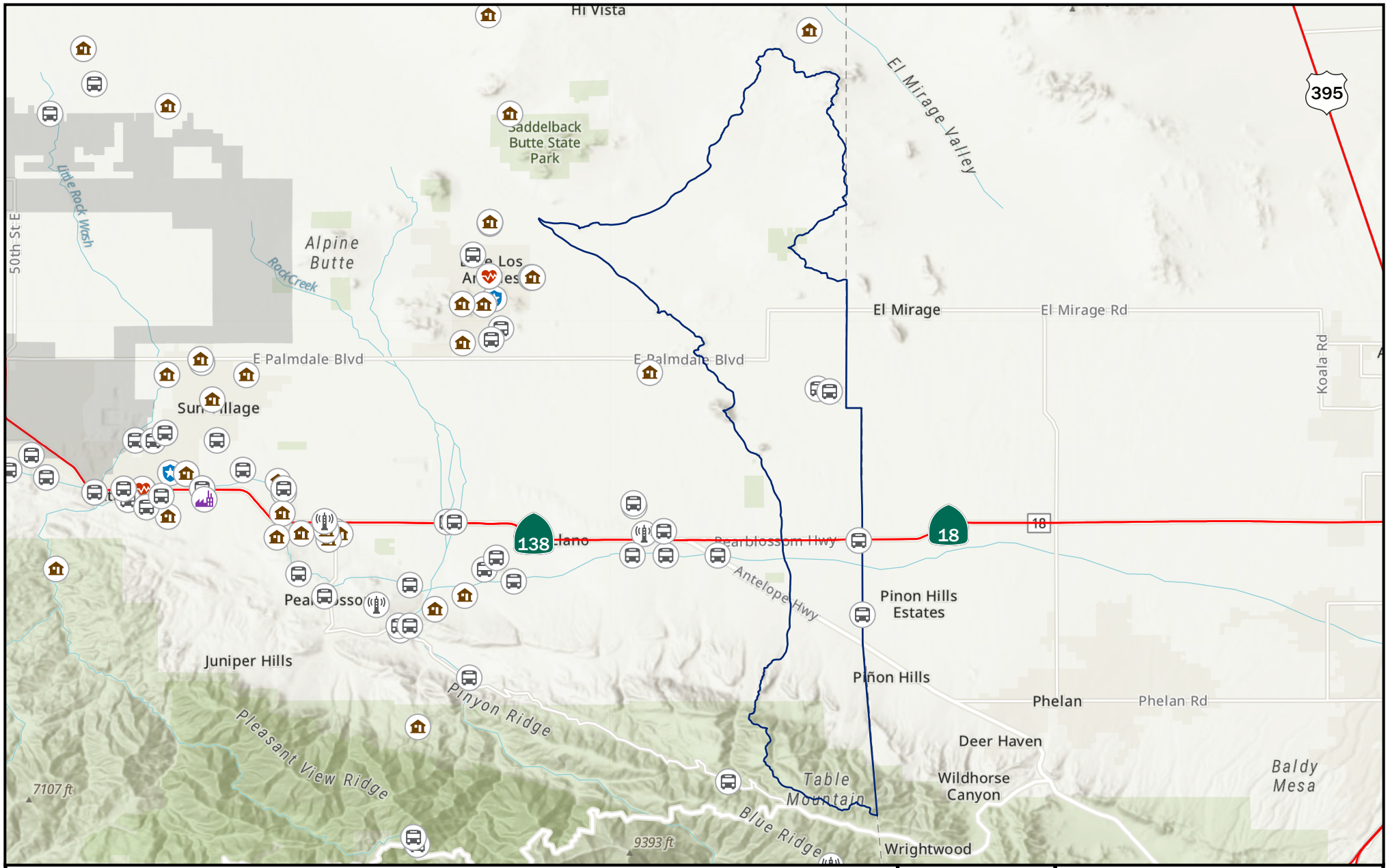
3.5 1.75 0 3.5 Miles

BURNS McDONNELL

Appendix D: 1809020615 Lake Palmdale - Piute Ponds Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024



Legend

- Le Montaine Creek - Eller Slough Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

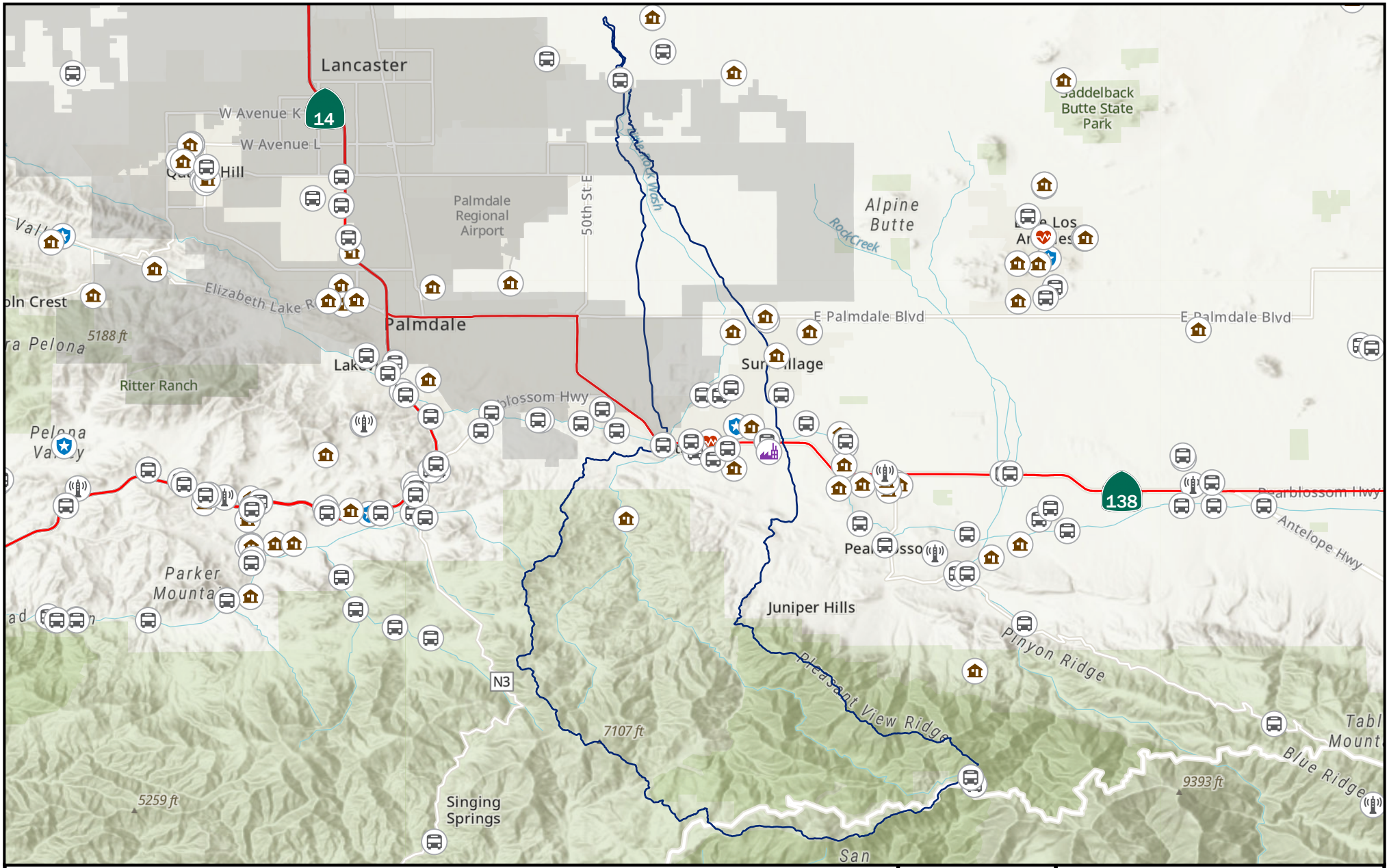
3.5 1.75 0 3.5 Miles

BURNS McDONNELL

Appendix D: 1809020609 Le Montaine Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Little Rock Wash Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

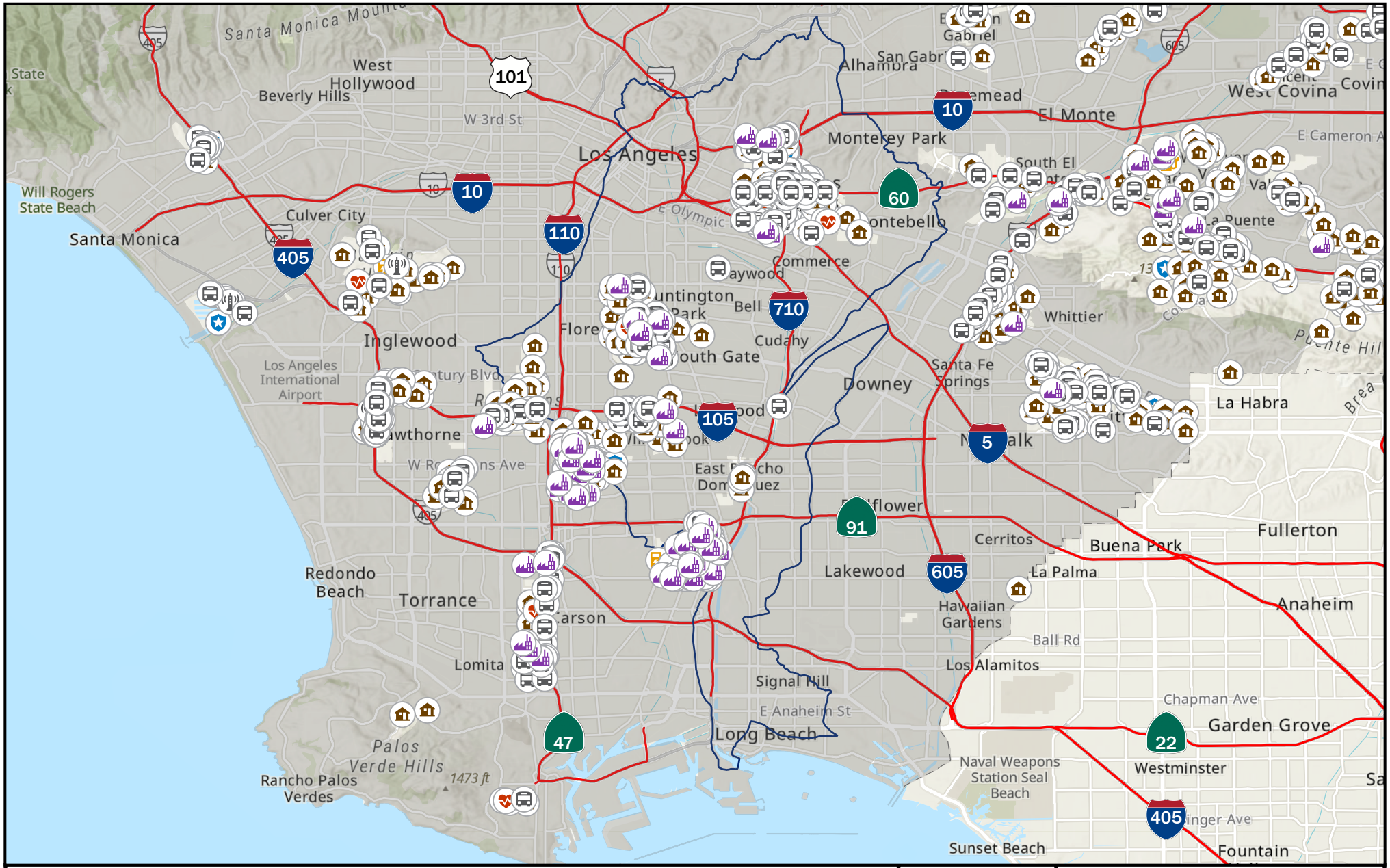
3.5 1.75 0 3.5 Miles

BURNS McDONNELL

Appendix D:
1809020611
Little Rock Wash Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

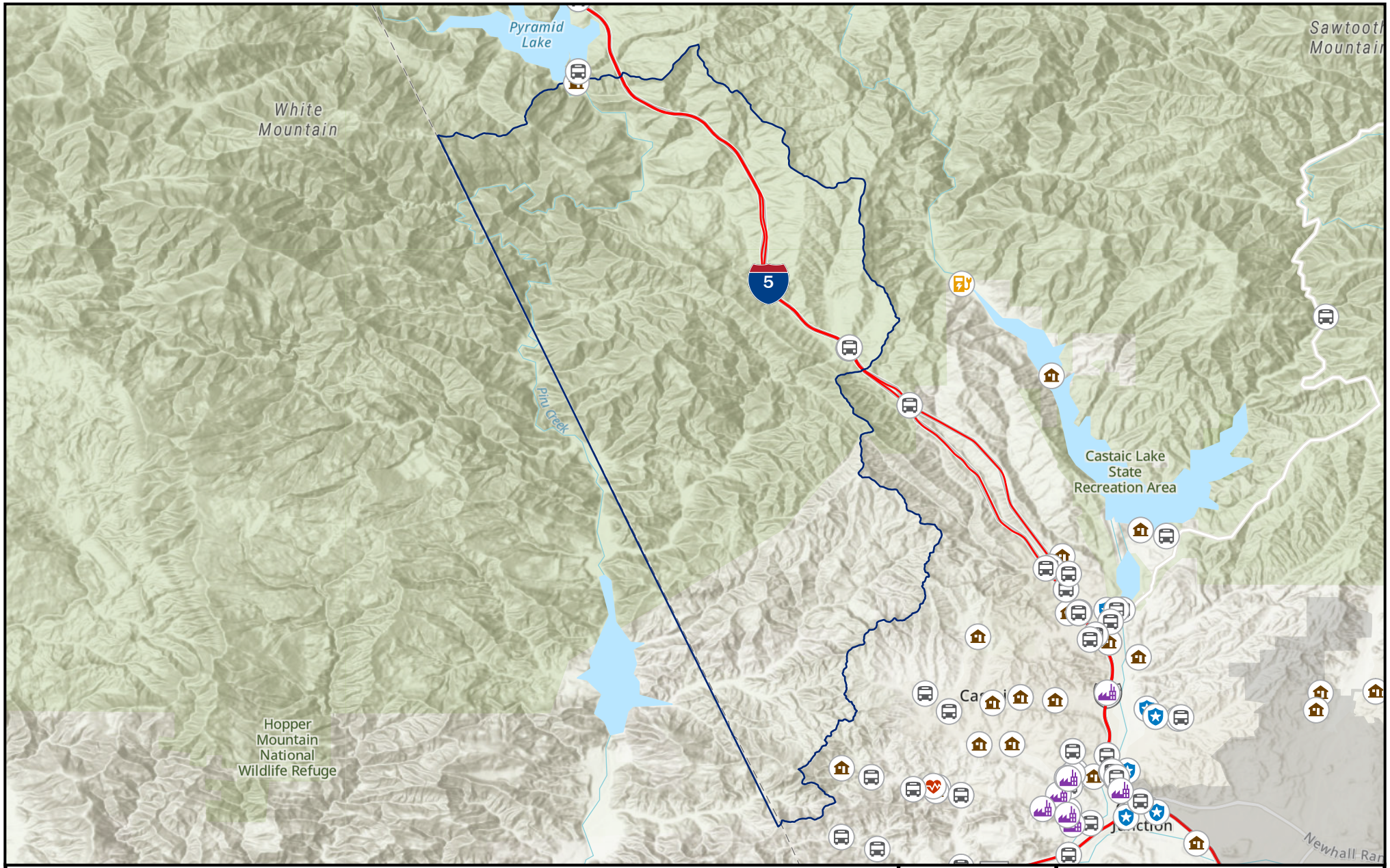
Issued: 3/15/2024



Appendix D:
1807010504
Lower Los Angeles River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Lower Piru Creek
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

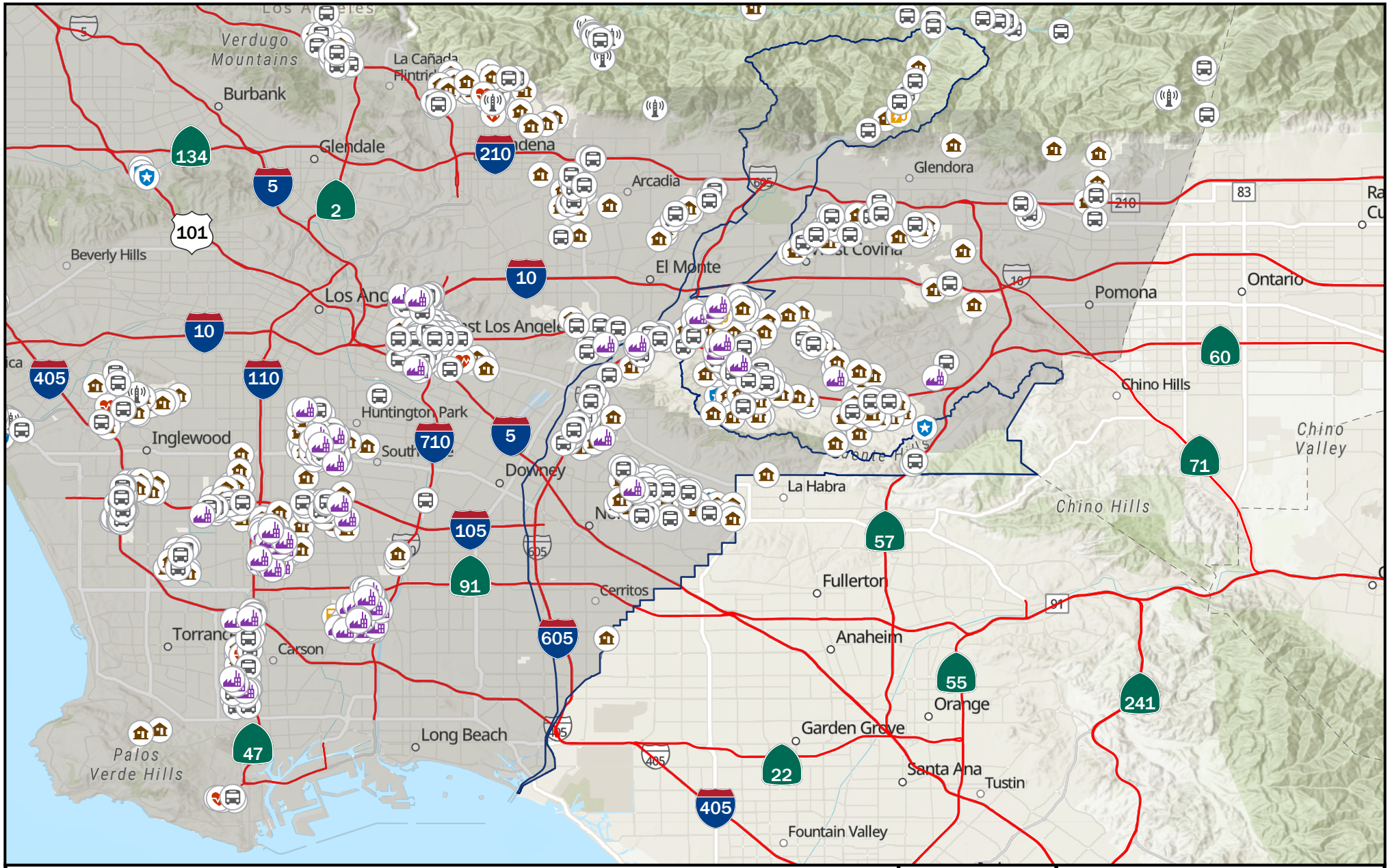
2 1 0 2 Miles

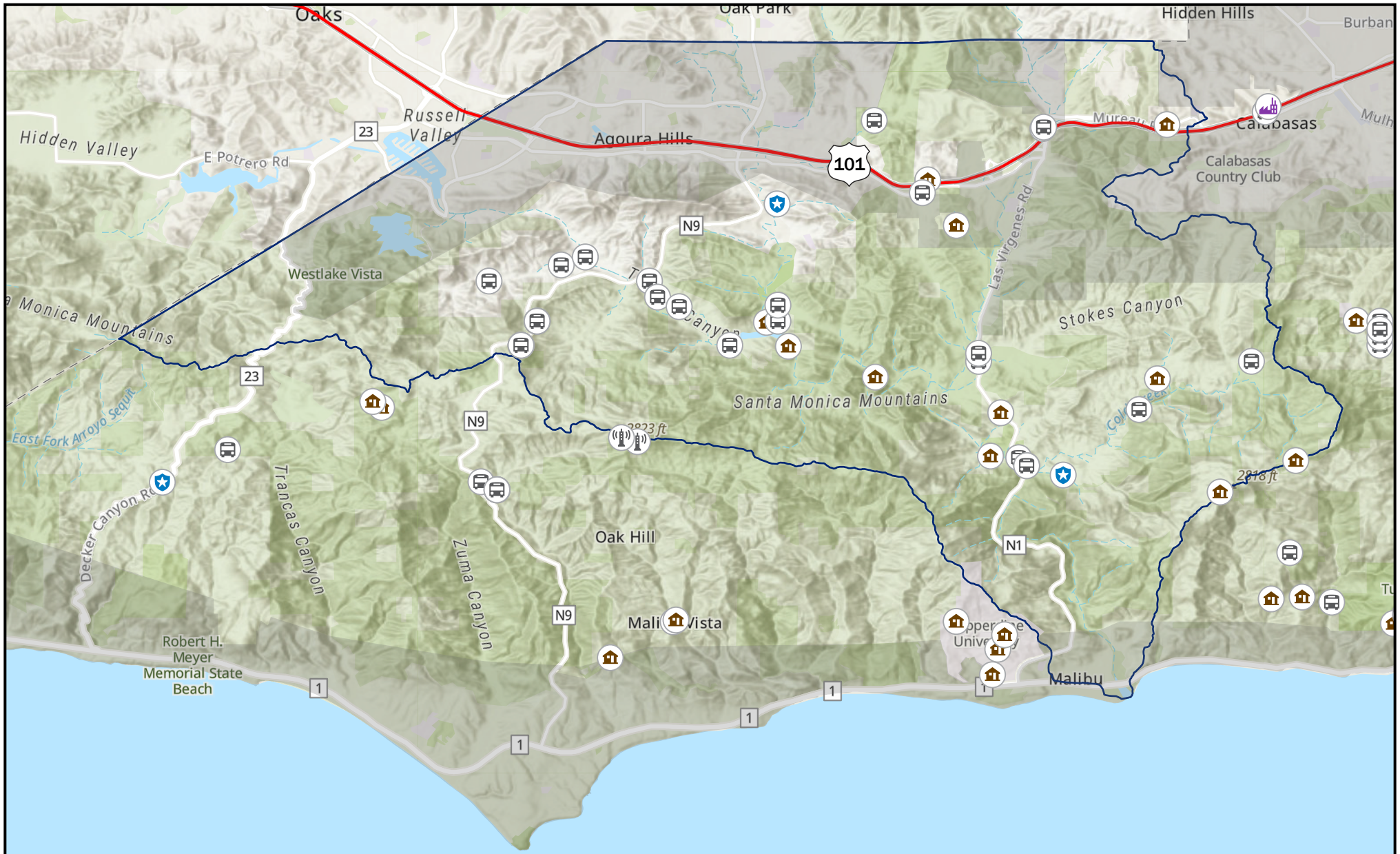
BURNS McDONNELL

Appendix D:
1807010206
Lower Piru Creek
Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/15/2024


Verdugo Mountains
Burbank
Glendale
La Cañada Flintridge
Arcadia
Glendora
El Monte
West Covina
Pomona
Ontario
Chino Hills
Chino Valley
Beverly Hills
Los Angeles
East Los Angeles
Huntington Park
Inglewood
South Gate
Downey
La Habra
Norwalk
Fullerton
Cerritos
Anaheim
Orange
Garden Grove
Santa Ana
Tustin
Fountain Valley
Torrance
Carson
Long Beach
Palos Verde Hills
134
5
2
101
210
10
405
110
710
105
91
605
57
55
241
22
47
60
71
83
Legend
Lower San Gabriel River Watershed
Los Angeles Incorporated Cities
Safety and Security
Food, Water and Sheltering
Health and Medical
Energy
Communications
Transportation
Hazardous Materials
NORTH
4.5 2.25 0 4.5
Miles
BURNS McDONNELL
Appendix D:
1807010606
Lower San Gabriel River Watershed Critical Facilities and Infrastructure
Source: Los Angeles County, 2020
Map Projection: NAD 1983
Issued: 3/21/2024



Legend

- Malibu Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

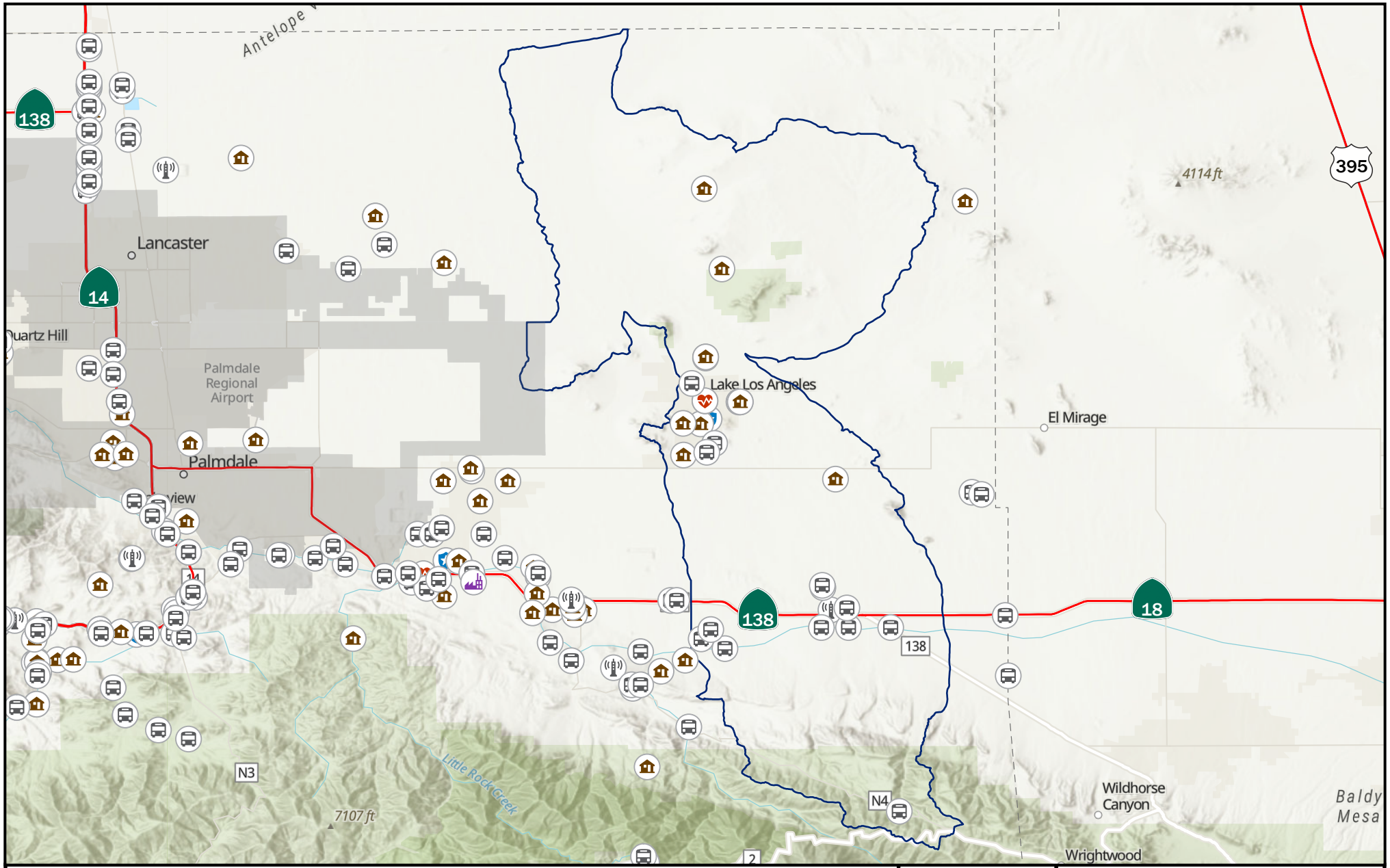
1.5 0.75 0 1.5 Miles

BURNS McDONNELL

Appendix D:
1807010401
Malibu Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/19/2024



Legend

- Mescal Creek - Rocky Buttes Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

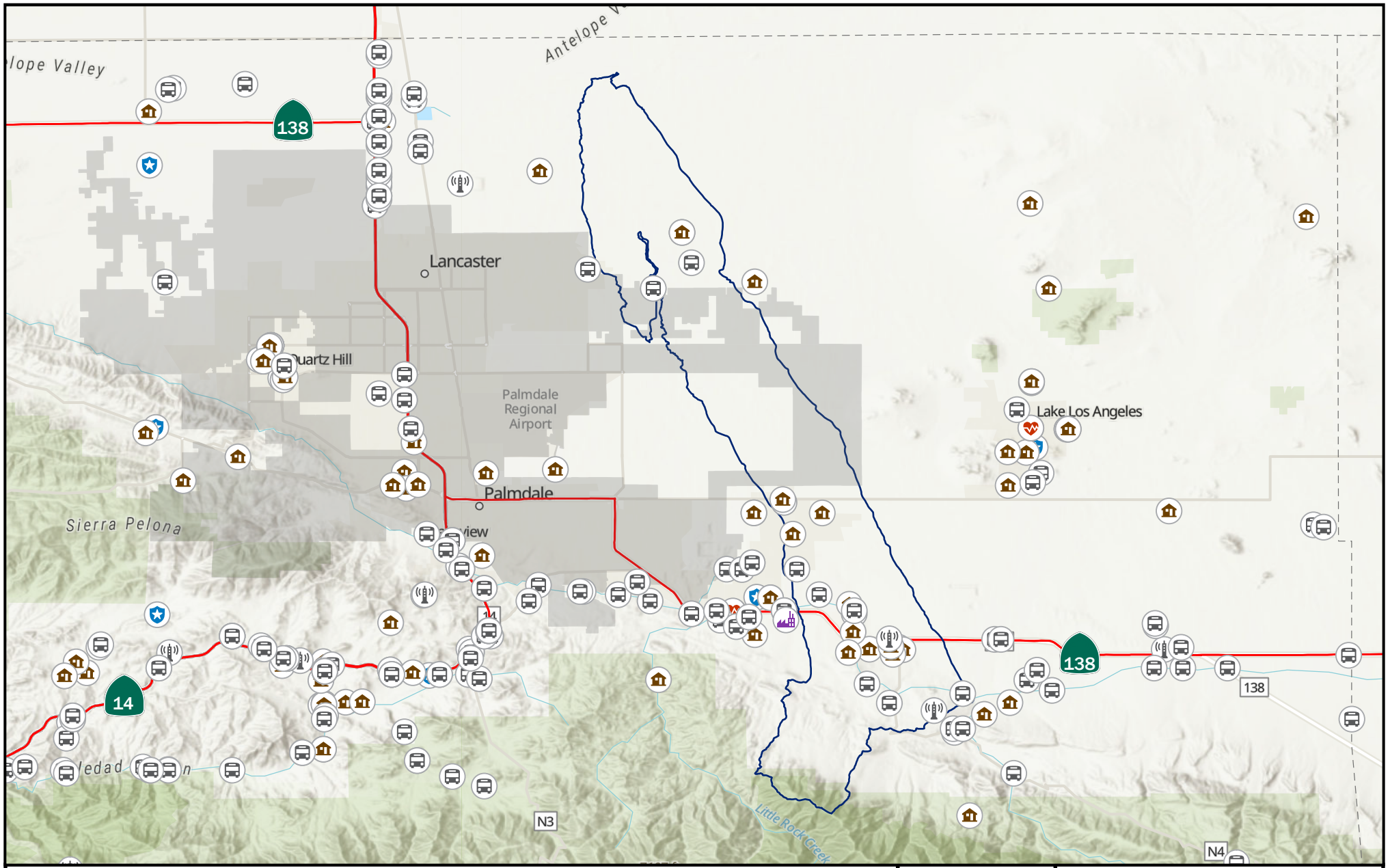
4 2 0 4 Miles

BURNS McDONNELL

Appendix D:
1809020619
Mescal Creek - Rocky Buttes Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Pearblossom Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

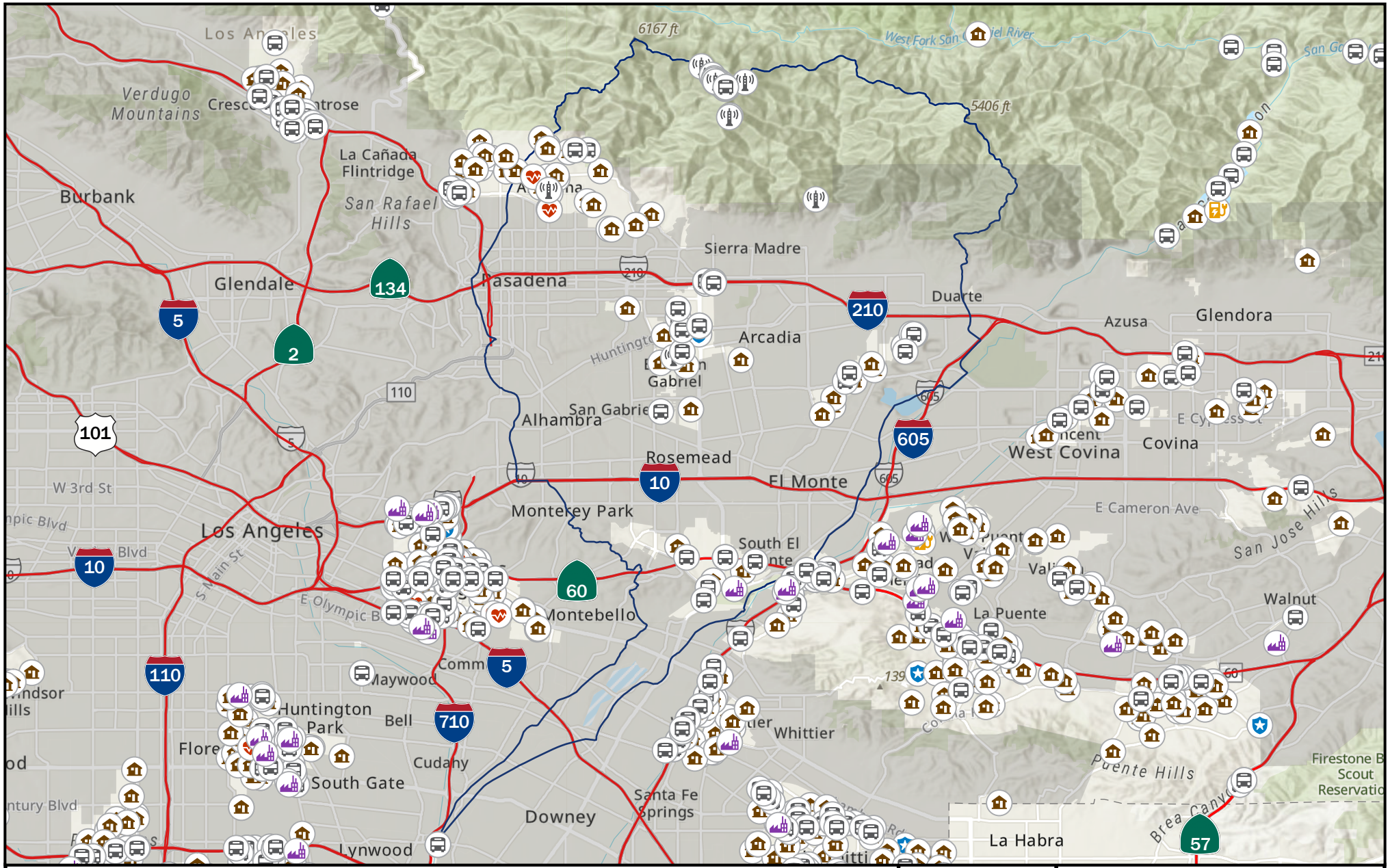
4 2 0 4 Miles

BURNS McDONNELL

Appendix D: 1809020616 Pearblossom Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/20/2024



Legend

- Rio Hondo Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

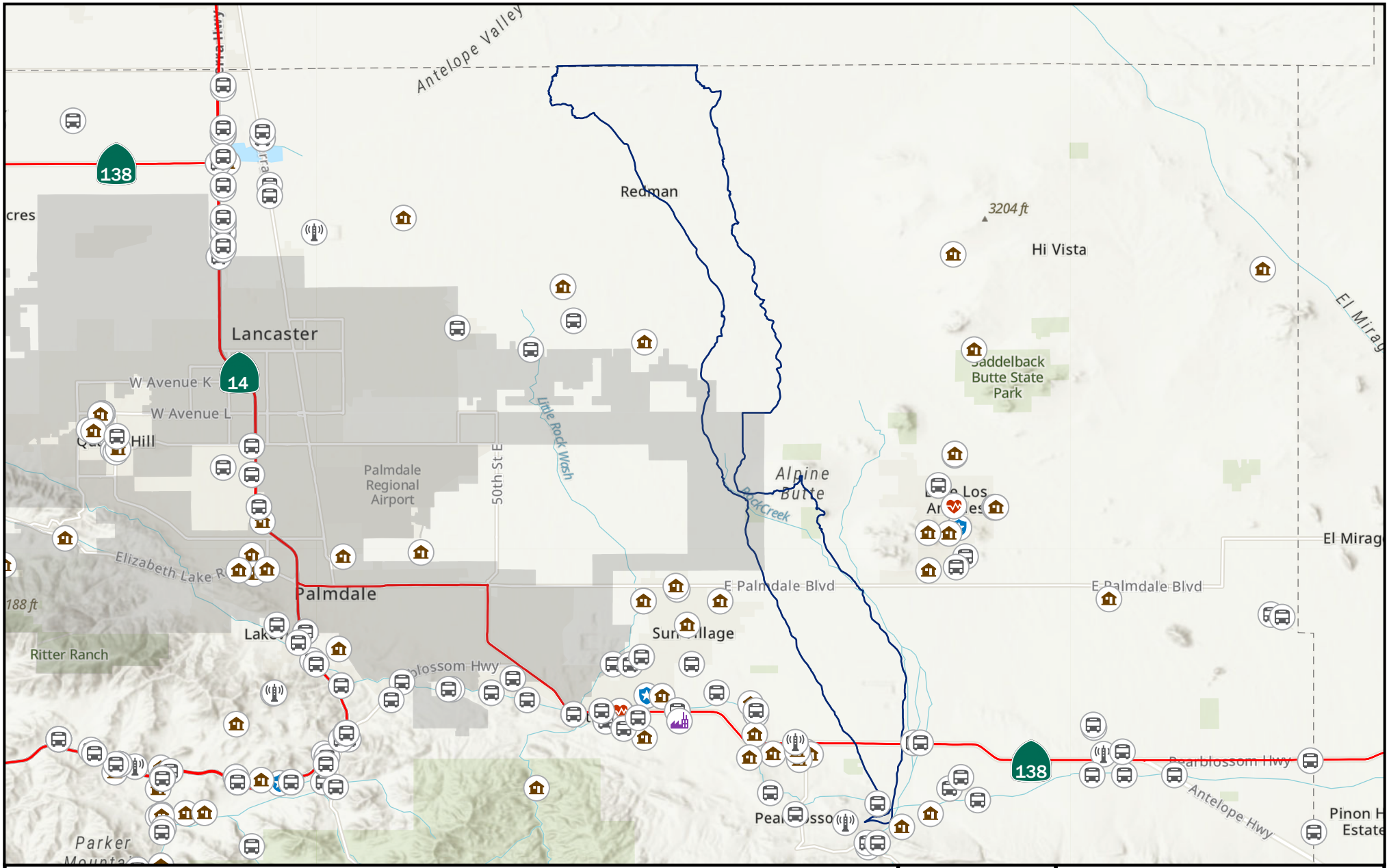
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D: 1807010503 Rio Hondo Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Rock Creek - Buckhorn Lake Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

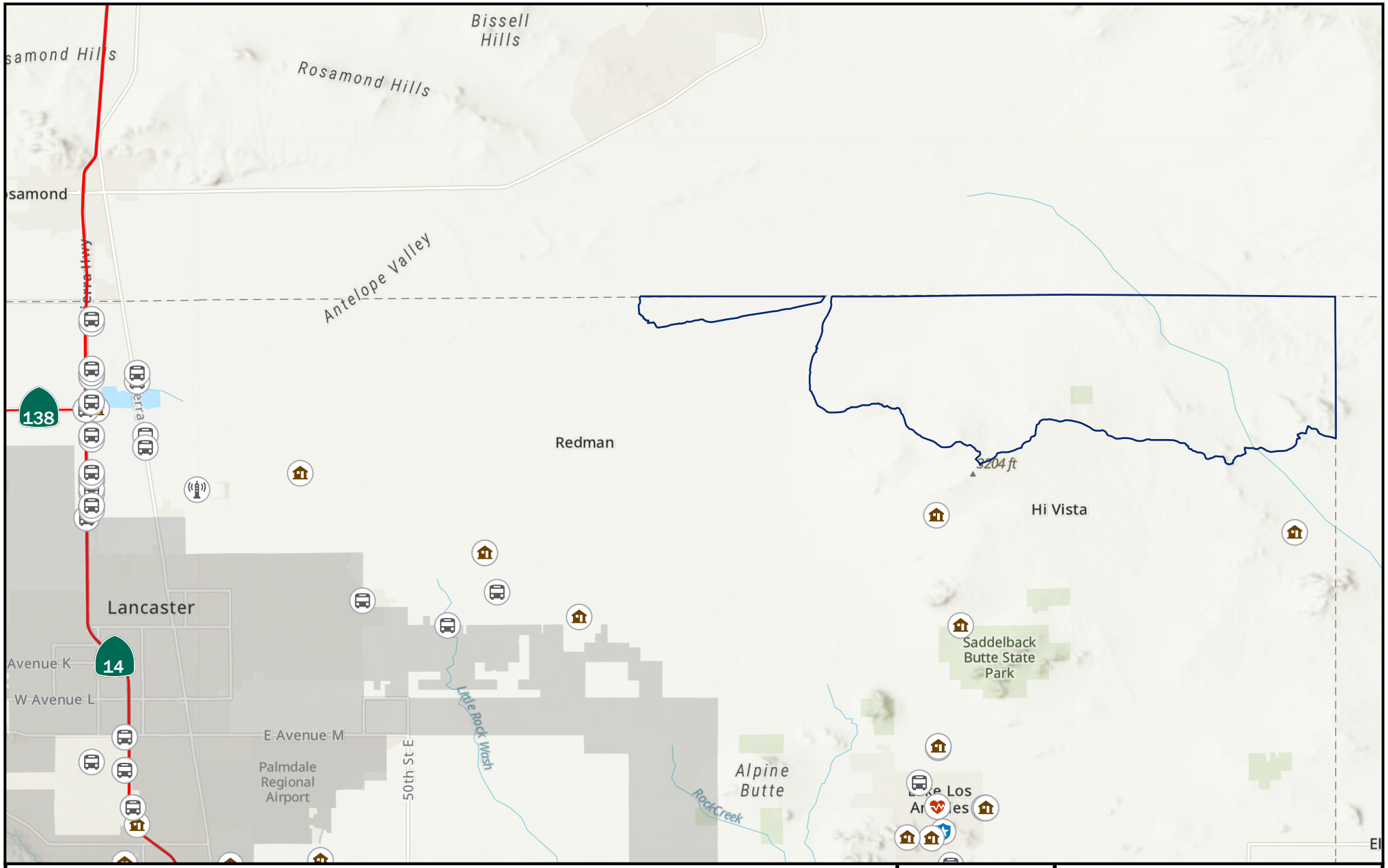
3.5 1.75 0 3.5 Miles

BURNS McDONNELL

Appendix D: 1809020623 Rock Creek - Buckthorn Lake Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/19/2024



Legend

- Rogers Lake Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

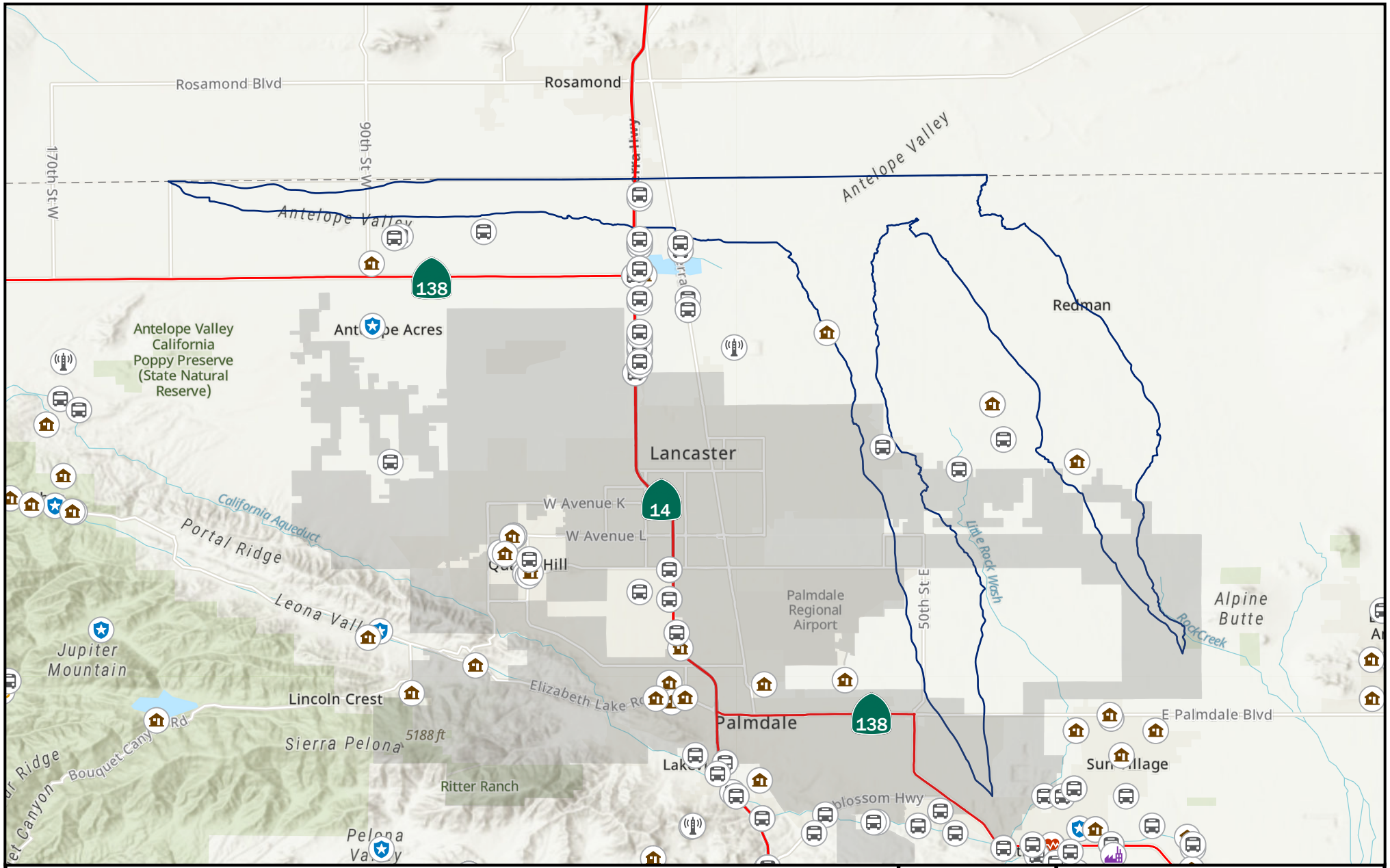
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D: 1809020622 Rogers Lake Watershed Critical Facilities and Infrastructure

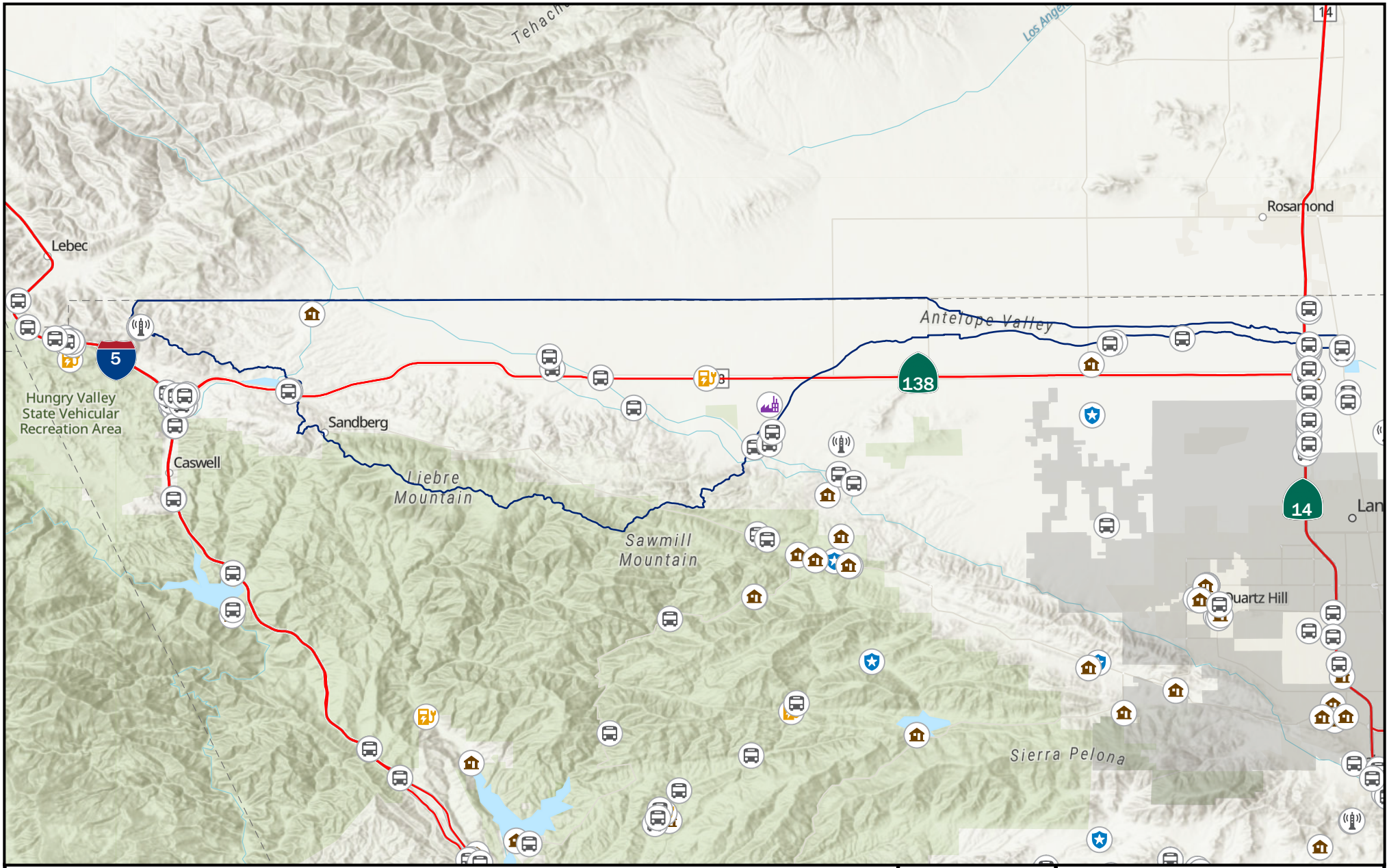
Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/19/2024



Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/19/2024



Legend

- Sacatara Creek - Kings Canyon Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

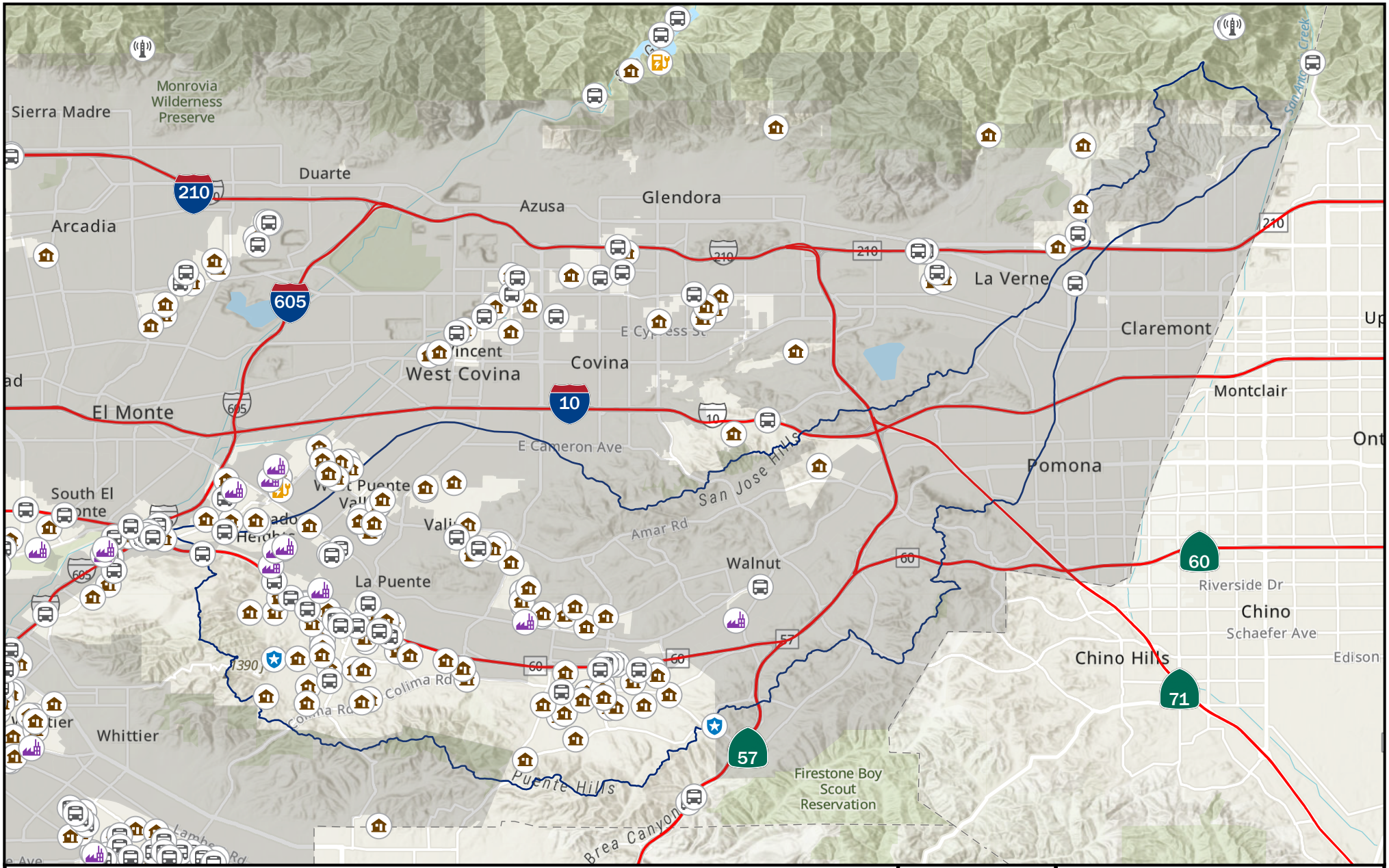
4 2 0 4 Miles

BURNS McDONNELL

Appendix D: 1809020613 Sacatara Creek - Kings Canyon Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/19/2024



Legend

- San Jose Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

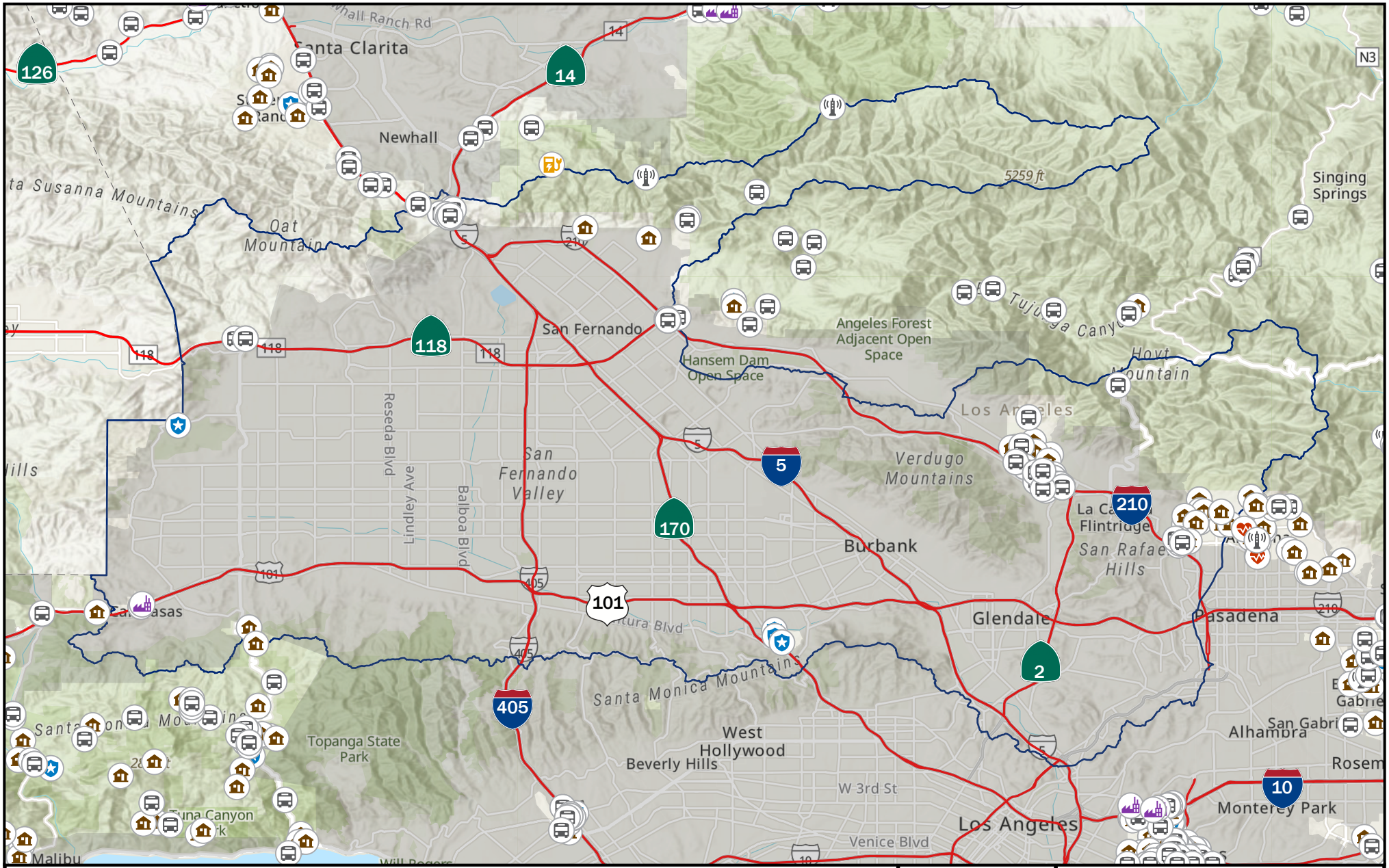
2 1 0 2 Miles

BURNS McDONNELL

Appendix D: 1807010605 San Jose Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Upper Los Angeles River Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

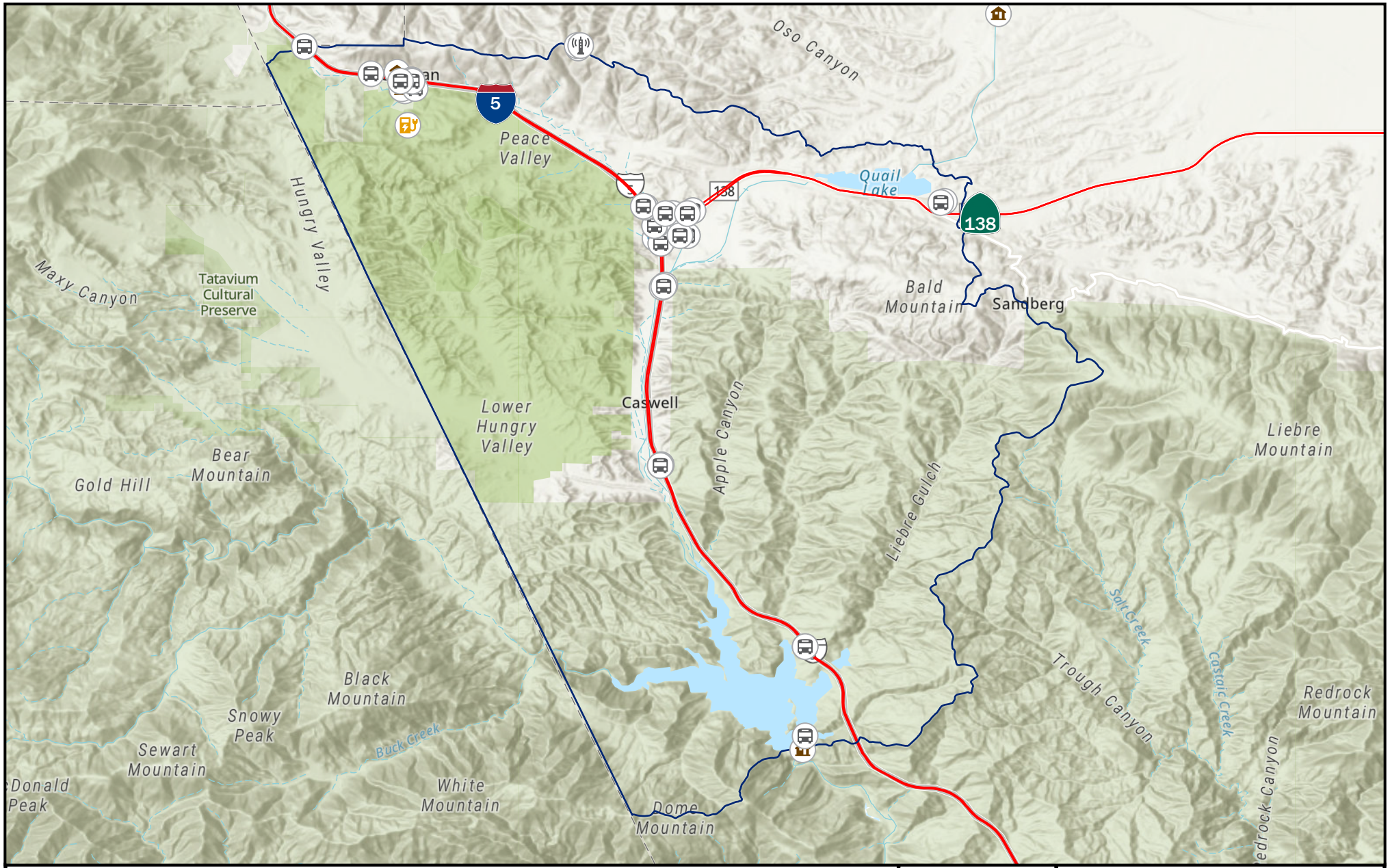
3 1.5 0 3 Miles

BURNS McDONNELL

Appendix D:
1807010502
Upper Los Angeles River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/22/2024



Legend

- Upper Piru Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

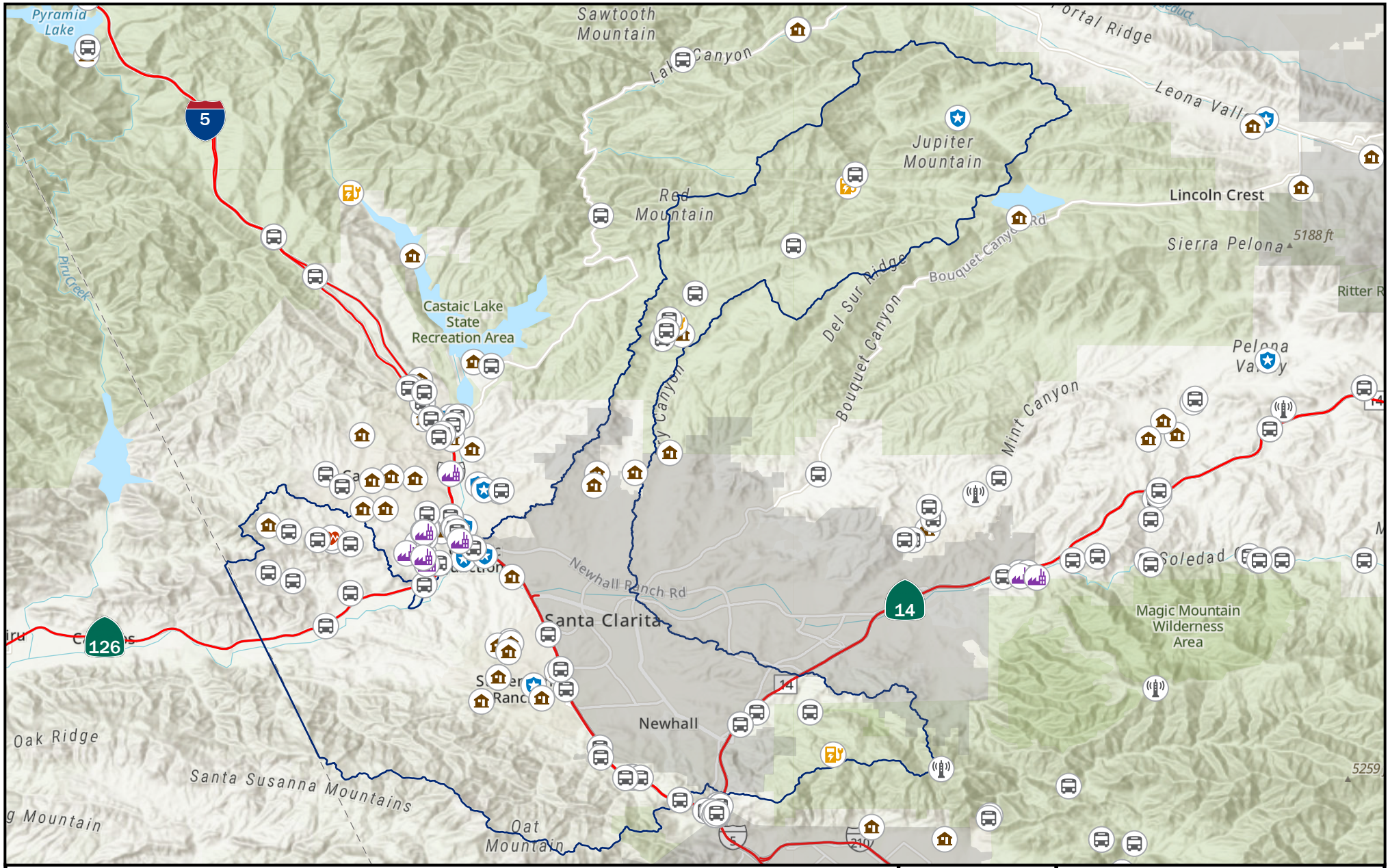
1.5 0.75 0 1.5 Miles

BURNS McDONNELL

Appendix D:
1807010205
Upper Piru Creek
Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/18/2024



Legend

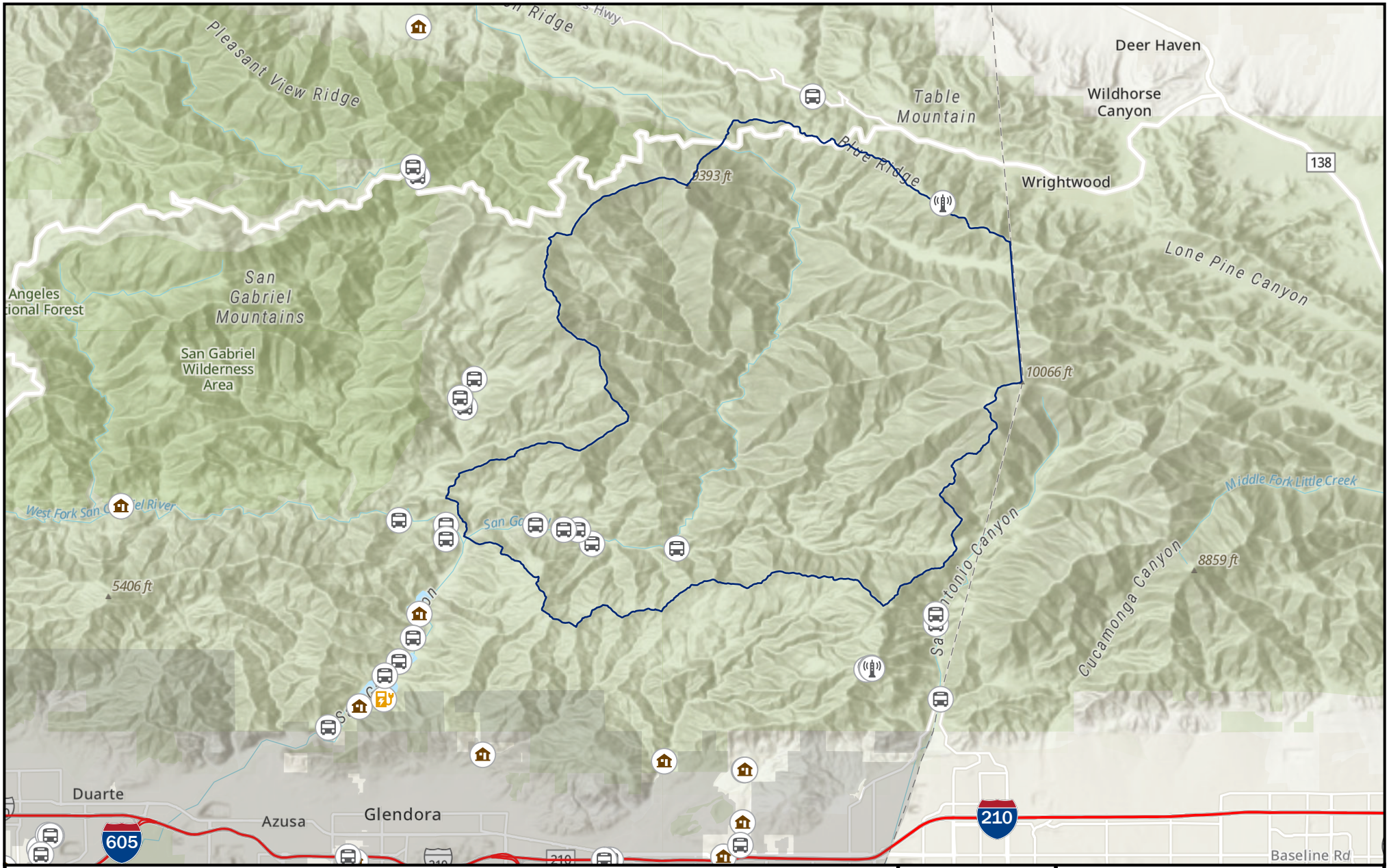
- Upper Santa Clara River Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

BURNS McDONNELL

Appendix D: 1807010204 Upper Santa Clara River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/22/2024



Legend

- Upper San Gabriel River Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

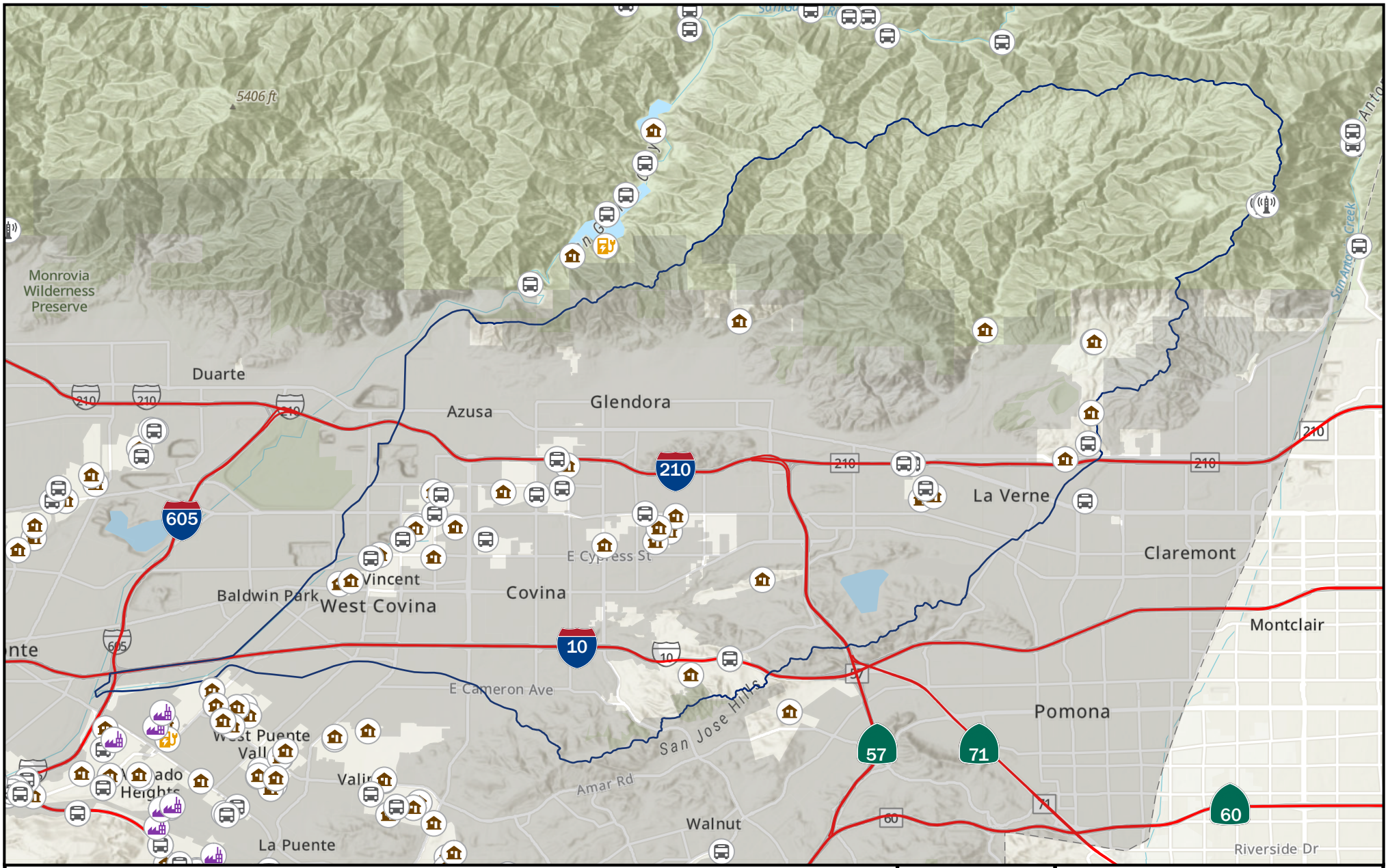
2.5 1.25 0 2.5 Miles

BURNS McDONNELL

Appendix D:
1807010603
Upper San Gabriel River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024



Legend

- Walnut Creek Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

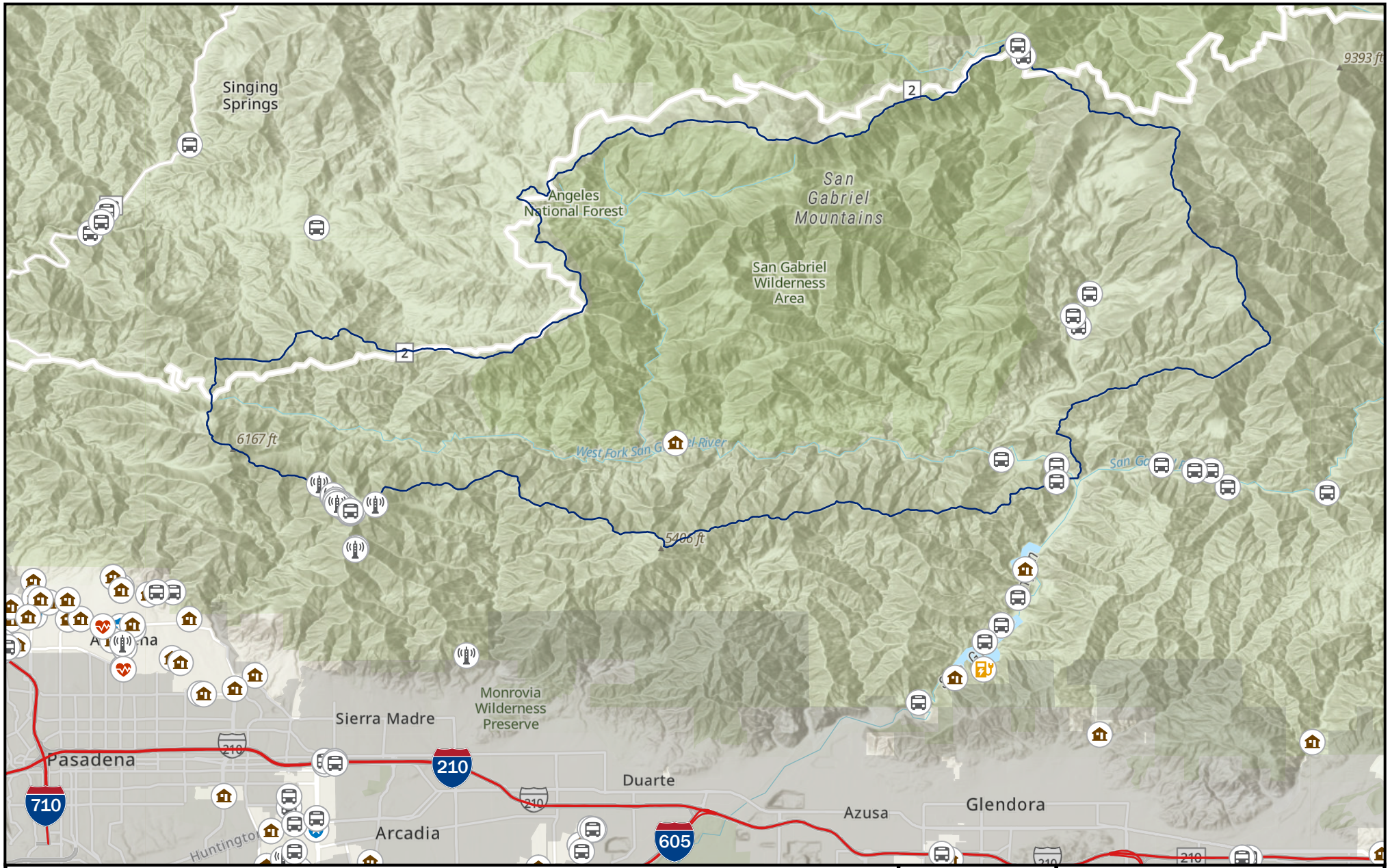
2 1 0 2 Miles

BURNS McDONNELL

Appendix D: 1807010604 Walnut Creek Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/22/2024



Legend

- West Fork San Gabriel River Watershed
- Los Angeles Incorporated Cities
- Safety and Security
- Food, Water and Sheltering
- Health and Medical
- Energy
- Communications
- Transportation
- Hazardous Materials

NORTH

2 1 0 2 Miles

BURNS McDONNELL

Appendix D:
1807010602
West Fork San Gabriel River Watershed Critical Facilities and Infrastructure

Source: Los Angeles County, 2020
Map Projection: NAD 1983

Issued: 3/21/2024

APPENDIX E – FEDERAL AND STATE AGENCIES, PROGRAMS, AND REGULATIONS

LOS ANGELES COUNTY

FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

COMPREHENSIVE FLOODPLAIN MANAGEMENT PLAN

PROJECT NO. 163333

DECEMBER 12, 2024

CONTENTS

Federal 1

National Flood Insurance Program 1

Community Rating System 1

Disaster Mitigation Act of 2000 2

Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014 2

Executive Order 11988 Floodplain Management 3

Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input 3

Executive Order 14030: Climate-Related Financial Risk 3

Endangered Species Act 3

Clean Water Act 3

National Incident Management System 4

Americans with Disabilities Act 4

Public Law 8499, Flood Control and Coastal Emergencies 4

State 5

California General Planning Law 5

California Environmental Quality Act 5

Porter-Cologne Act 6

AB 162: Flood Planning, Chapter 369, Statutes of 2007 6

AB 2140: General Plans- Safety Element 7

AB 747: General Plans- Safety Element 7

AB 2800: Climate Change- Infrastructure Planning 7

SB 92 and New Standards for Submitting Dam Inundation Maps 7

SB 379: Land Use, General Plan, Safety Element 8

California State Building Code 8

Standardized Emergency Management System 8

California State Hazard Mitigation Plan 8

Governor's Executive Order S-13-08 9

California Civil Code 1102 9

Local Flood Protection Planning Act 10

Water Code Division 5, Part 2, Chapter 4, Article 4 10

California Coastal Management Program 10

References 11

TABLES

Table 1. CRS Classes and Premium Discounts..... 2

Federal

Existing laws, ordinances, plans and programs at the federal level can support or impact flood hazard mitigation actions identified in this plan. The following federal programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1 percent annual chance (100-year) flood (or base flood) and the 500-year flood. Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the primary tools for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a flood-prone area, participating jurisdictions must, at a minimum, ensure that the project meets the following criteria (44 CFR Part 60, Section 60.3):

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- Be constructed with materials resistant to flood damage
- Be constructed by methods and practices that minimize flood damage
- Be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Additional criteria apply depending on the availability of information about the flood hazard.

Community Rating System

The Community Rating System (CRS) is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent, as shown in Table 1 below:

Table 1. CRS Classes and Premium Discounts

CRS Class	1	2	3	4	5	6	7	8	9	10
CRS Discount (Premium Reduction)	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%

The CRS classes for local communities are based on 18 creditable activities in the following categories:

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

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 70 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks (FEMA, 2021).

Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA replaced previous federal mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The DMA established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014

The Biggert-Waters Flood Insurance Reform Act of 2012 authorized and funded a national mapping program. It also authorized insurance premium rate increases to ensure the fiscal soundness of the NFIP by transitioning the program from subsidized rates, also known as artificially low rates, to offer full actuarial rates reflective of risk.

The Homeowner Flood Insurance Affordability Act of 2014 repealed parts of Biggert-Waters, restoring grandfathering, putting limits on certain rate increases and updating the approach to ensuring the fiscal soundness of the fund by applying an annual surcharge to all policyholders.

Certain provisions in these acts were codified in July 2020 to clarify certain existing NFIP rules relating to NFIP operations and the Standard Flood Insurance Policy as per §44 CFR 61.

Executive Order 11988 Floodplain Management

Executive Order 11988 requires Federal agencies to avoid long and short-term adverse impacts due to occupancy and modification of floodplains to the extent possible. They are also required to avoid direct or indirect support of floodplain development whenever a practicable alternative is feasible.

Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input

Executive Order 13690 establishes the Federal Flood Risk Management Standard which is a framework to increase resilience against flooding as well as preserve the floodplains' natural values. The Executive Order also sets a process for further consideration of public input.

Executive Order 14030: Climate-Related Financial Risk

This Executive Order requires the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President and National Climate Advisor to develop in coordination with the Secretary of the Treasury and the Director of the Office of Management and Budget, a comprehensive Government-wide strategy climate-related financial risk.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

In some parts of the country, including the Pacific Northwest and the Sacramento-San Joaquin Delta area, court rulings have found that floodplain management measures can be in conflict with the goals of the endangered species act. Those rulings have required FEMA and local governments to engage in a consultation process with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects.

Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source,pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving floods and other hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across this spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (Public Law 110-325). Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations. The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals. The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

Public Law 8499, Flood Control and Coastal Emergencies

Federal law that gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood

damage reduction projects that have been damaged by floods. Under Public Law 8499, the Corps' Chief of Engineers is authorized to undertake activities including disaster preparedness, advance measures to prevent or reduce damage when there is an imminent threat of unusual flooding, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provision of emergency water in the event of drought or contaminated source.

State

Existing laws, ordinances, plans and programs at the state level can support or impact flood hazard mitigation actions identified in this plan. The following state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. County actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

Porter-Cologne Act

The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality. The act uses National Pollutant Discharge Elimination System permits for point source discharges and waste discharge to keep people from degrading the water quality of the state. The policy states:

- The quality of all waters of the state shall be protected
- All activities and factors affecting the quality of water will be regulated in order to attain the highest water quality within reason.
- The state must be prepared to exercise its fullest power and jurisdiction in order to protect the quality of water in the state from degradation.

AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources. The conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including (California Legislature, 2007):

- Flood hazard zones
- Maps published by FEMA, California Department of Water Resources, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, the Governor's Office of Emergency Services, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones. The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:
- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or California Department of Water Resources has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

AB 2140: General Plans- Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires the California Office of Emergency Services to give preference for federal mitigation funding to cities and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

AB 747: General Plans- Safety Element

This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills the goals and objectives of this law may comply with this requirement by summarizing and incorporating by reference the other plan or document in the safety element.

In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years.

AB 2800: Climate Change- Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

SB 92 and New Standards for Submitting Dam Inundation Maps

On June 27, 2017, significant legislative changes related to dam safety were adopted by California through the passing of Senate Bill 92 (SB 92, part of the 2017-18 budget package). The bill requires the following changes which will affect dam owners:

- Inundation Maps
- Emergency Action Plans
- Fees and Enforcement

SB 379: Land Use, General Plan, Safety Element

This California Senate Bill establishes provisions that require the safety element in local general plans to be reviewed and updated to address climate adaptation and resiliency strategies. The safety element must include a vulnerability assessment, adaptation goals, policies and objectives, and implementation measures. A safety element update to comply with the law is due at the time of a jurisdiction's first local hazard mitigation plan adoption after January 1, 2017, or if no such FEMA plan has been adopted, by January 1, 2022. The bill also references specific sources of useful climate information to consult, such as Cal-Adapt.

California State Building Code

California Code of Regulations Title 24, also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

Standardized Emergency Management System

California Code of Regulations Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The Standardized Emergency Management System is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system in order to be eligible for state funding of response-related personnel costs under California Code of Regulations Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State

Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Local hazard mitigation plans developed in response to the Disaster Mitigation Act in the State of California are to be consistent with the provisions of the approved State Hazard Mitigation Plan.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

California Civil Code 1102

Article 1102 of the California Civil Code establishes requirements for disclosure of information as part of real estate transactions. It applies to any transfer of real property or residential stock cooperative with one to four dwelling units, by sale, exchange, installment land sale contract, lease with an option to purchase, other option to purchase, or ground lease coupled with improvements. The code imposes disclosure duties on the seller, the seller's agent, or both. Provisions of this code require disclosure of information regarding the proximity of the subject property to areas of natural hazards, including flood, wildfire and earthquake.

Local Flood Protection Planning Act

This statute provides guidance on what a flood mitigation plan should include.

Water Code Division 5, Part 2, Chapter 4, Article 4

This code provides flood plain regulations established for public agencies within flood plain or a flood plain management plan.

California Coastal Management Program

This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.

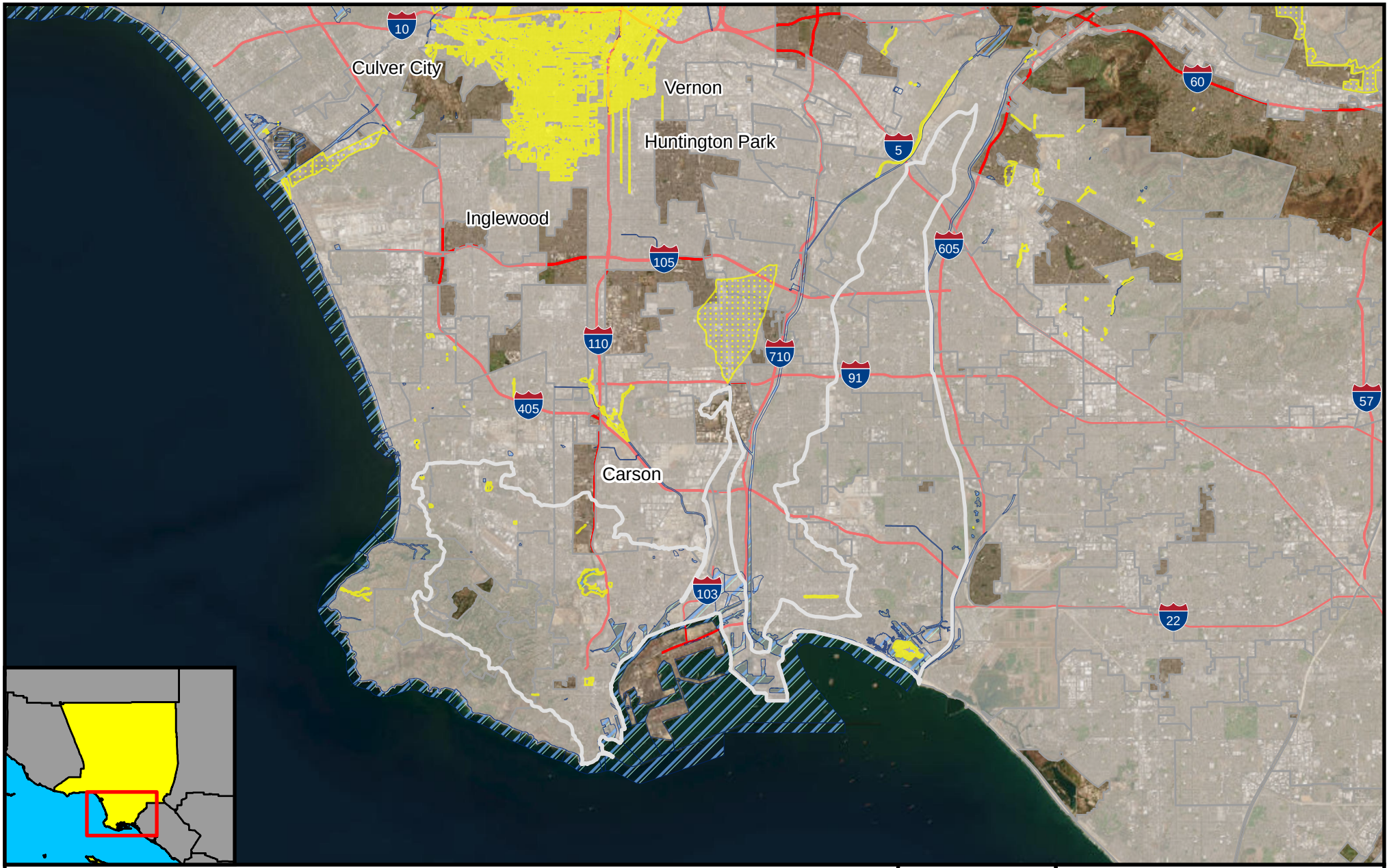
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APPENDIX F – FEMA FLOOD ZONE AND CAPITAL FLOODPLAIN MAPS



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

4 2 0 4

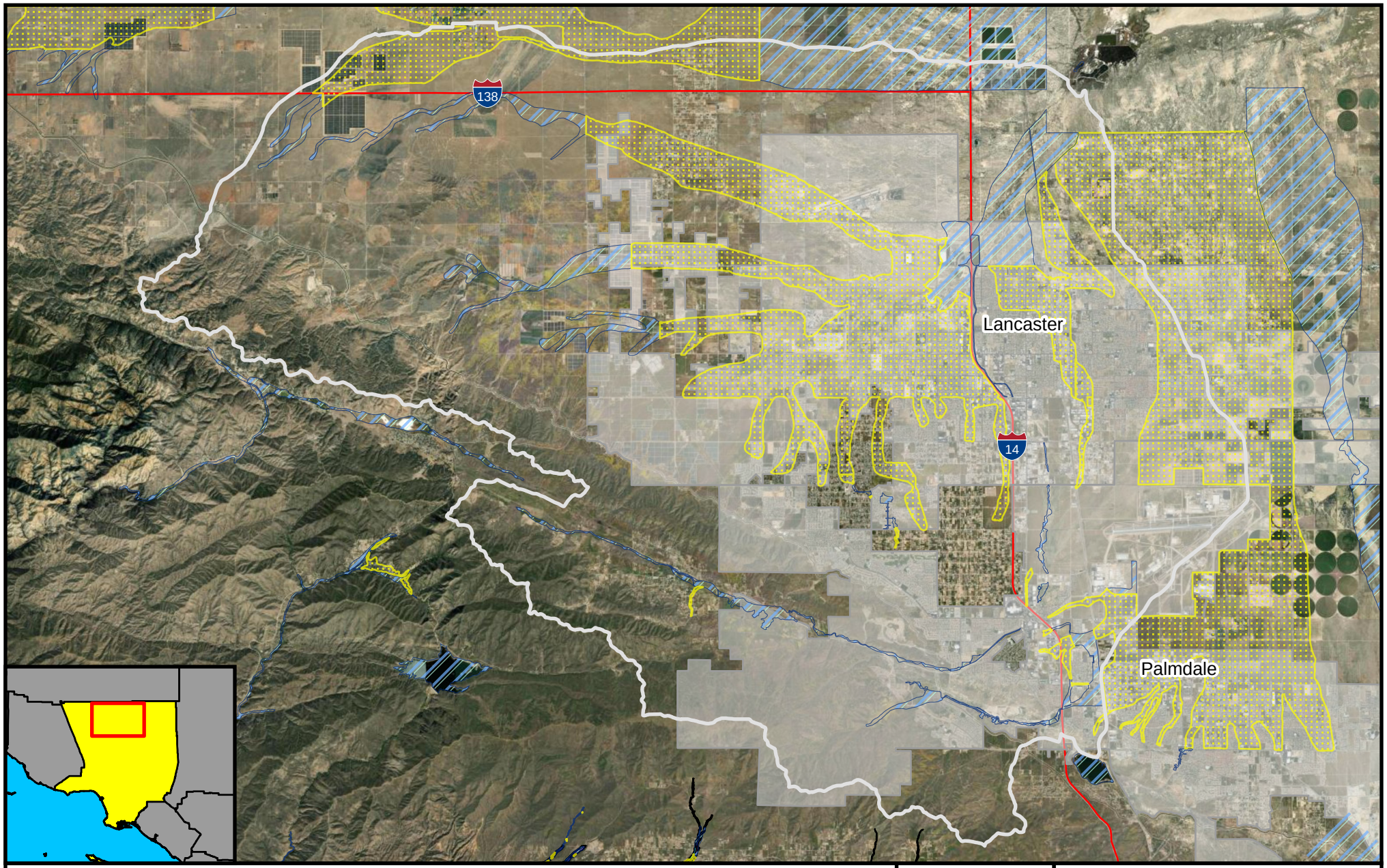
Scale in Miles

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Alamitos Bay-San Pedro Bay Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

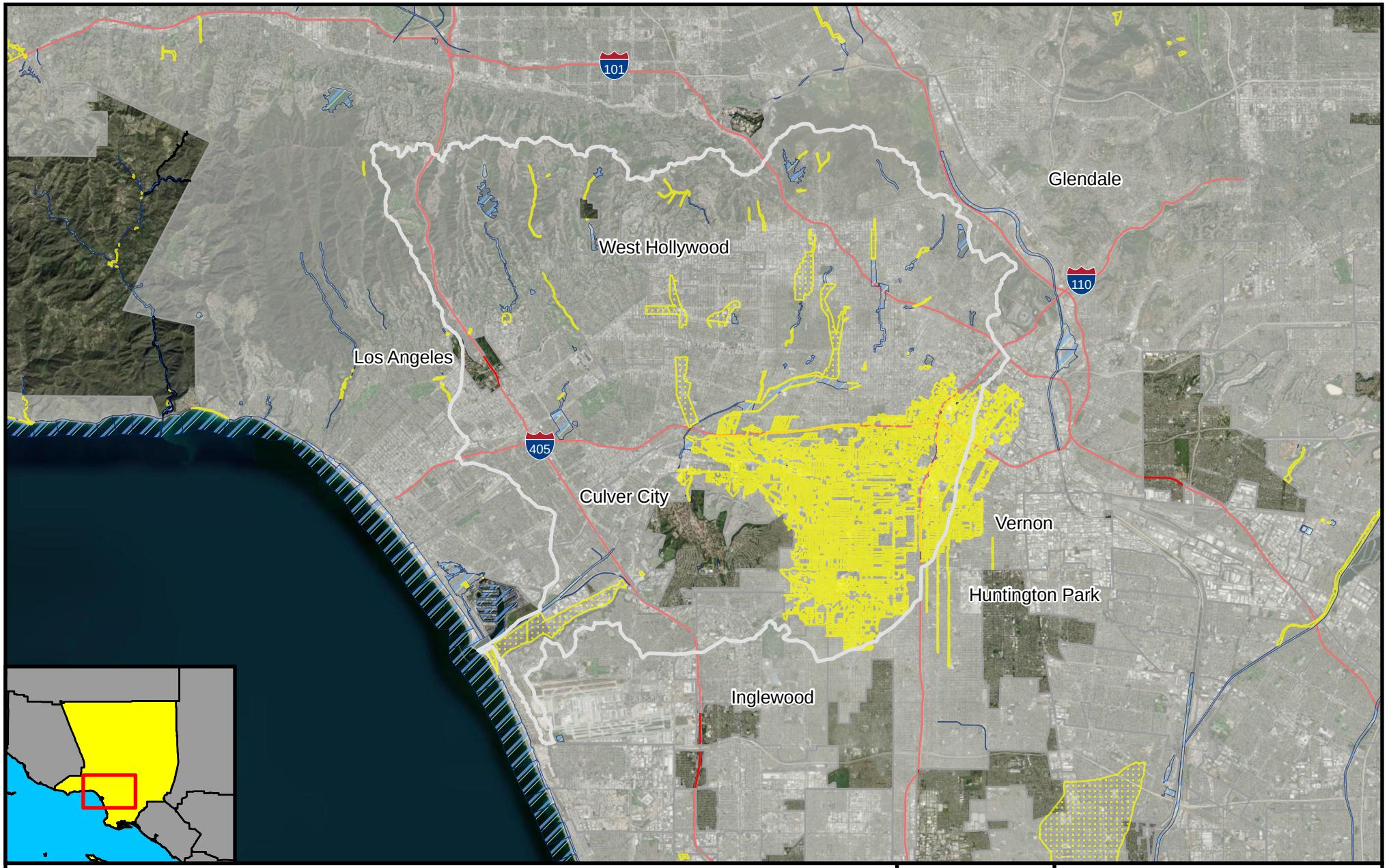
3 1.5 0 3
Scale in Miles

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Amargosa Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/20/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

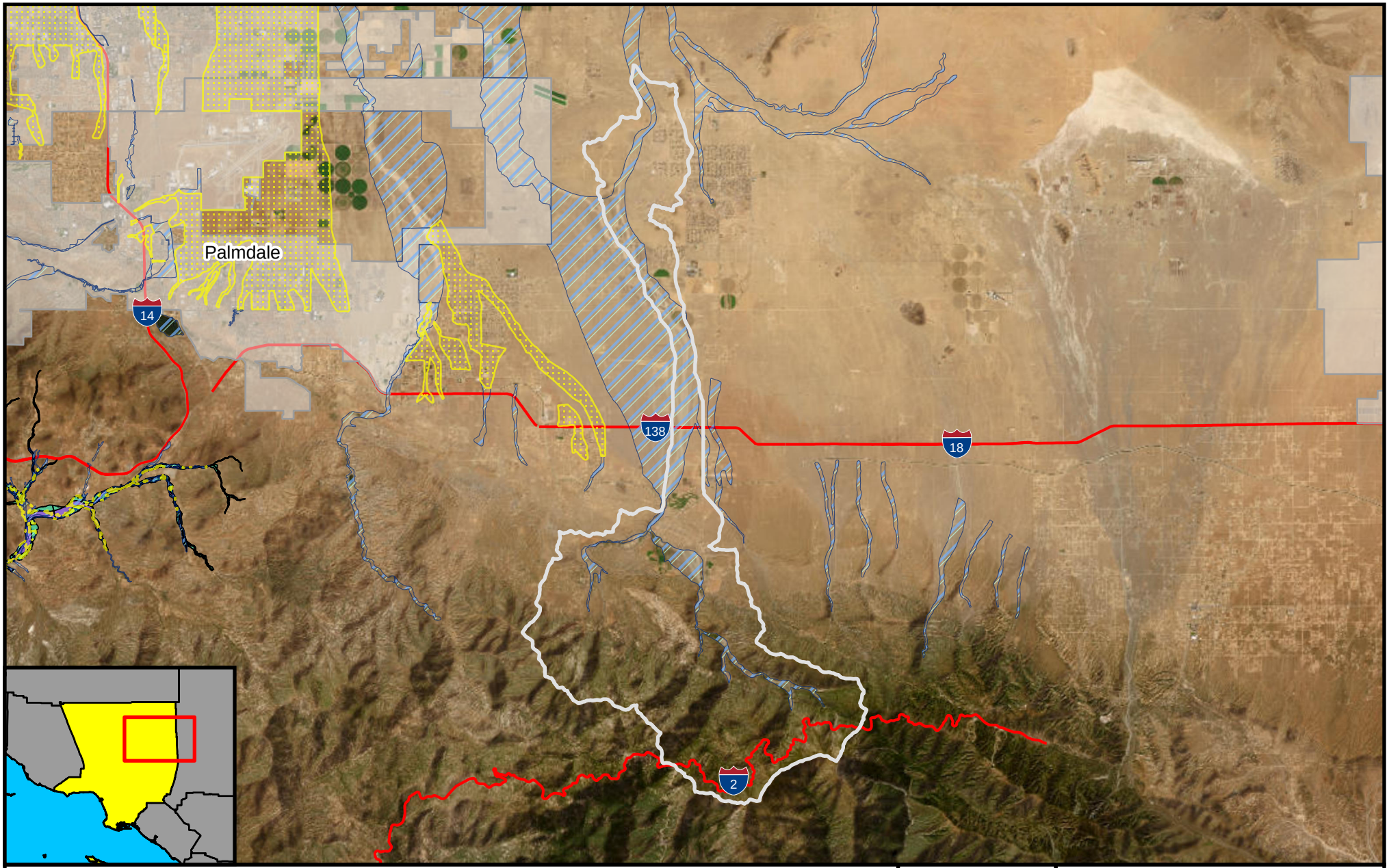
3 1.5 0 3
Scale in Miles

BURNS McDONNELL℠

Ballona Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

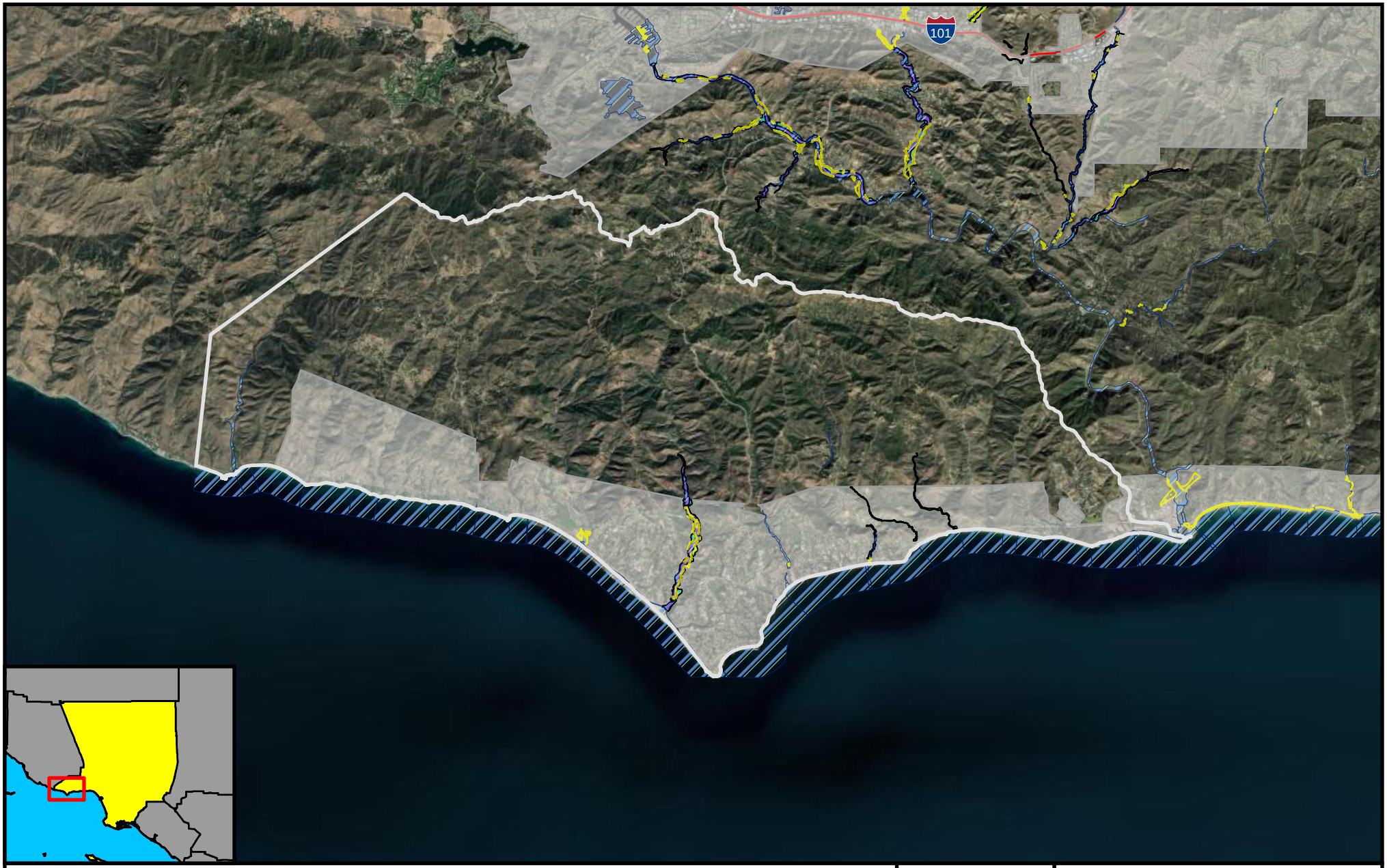
4 2 0 4
Scale in Miles

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Big Rock Creek-Big Rock Wash Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

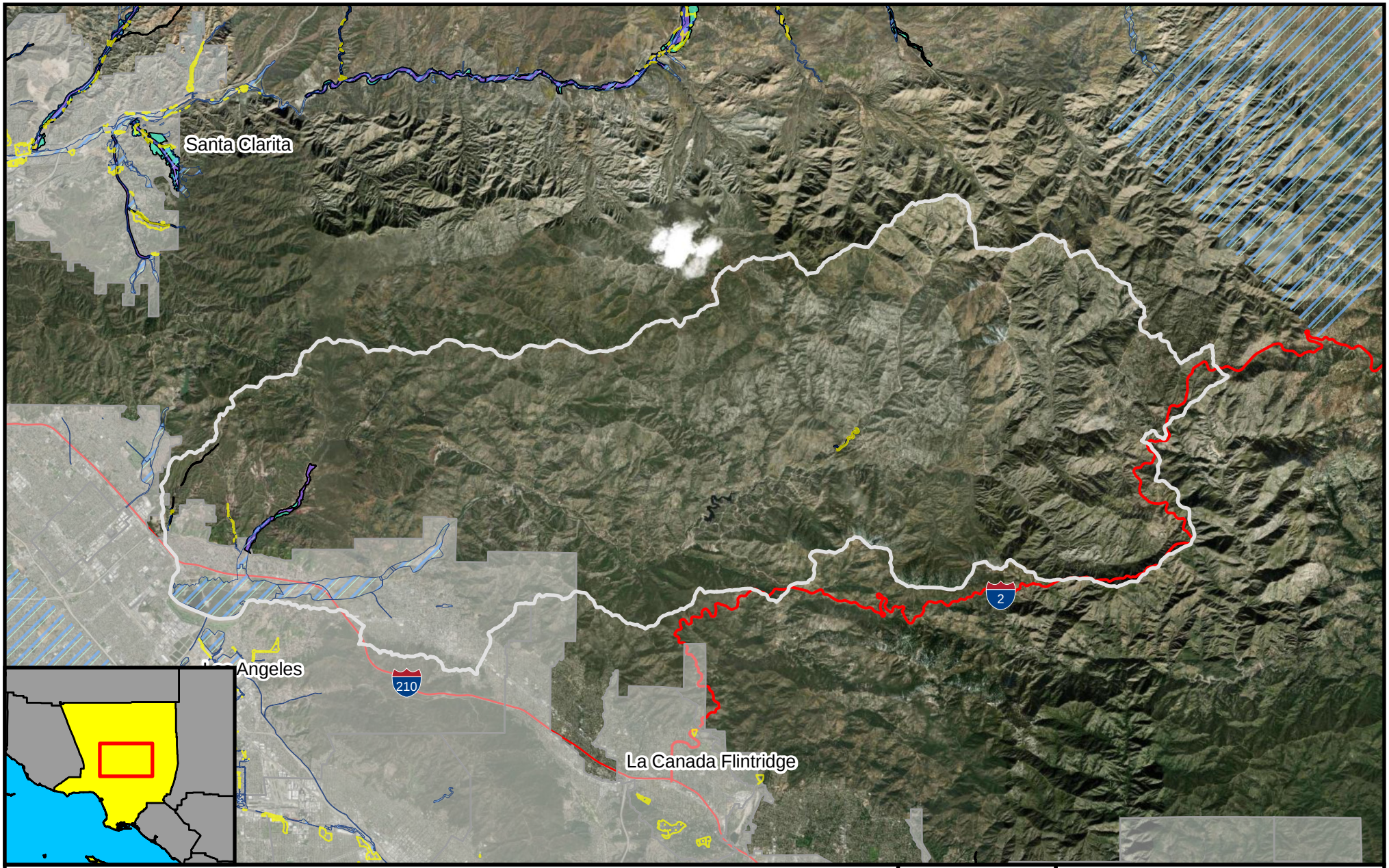
2 1 0 2
Scale in Miles

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Big Sycamore Canyon-Frontal Santa Monica Bay Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

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Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

3 1.5 0 3
Scale in Miles

BURNS McDONNELL℠

Big Tujunga Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

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Watershed Boundary

Incorporated Cities

NORTH

100 50 0 100

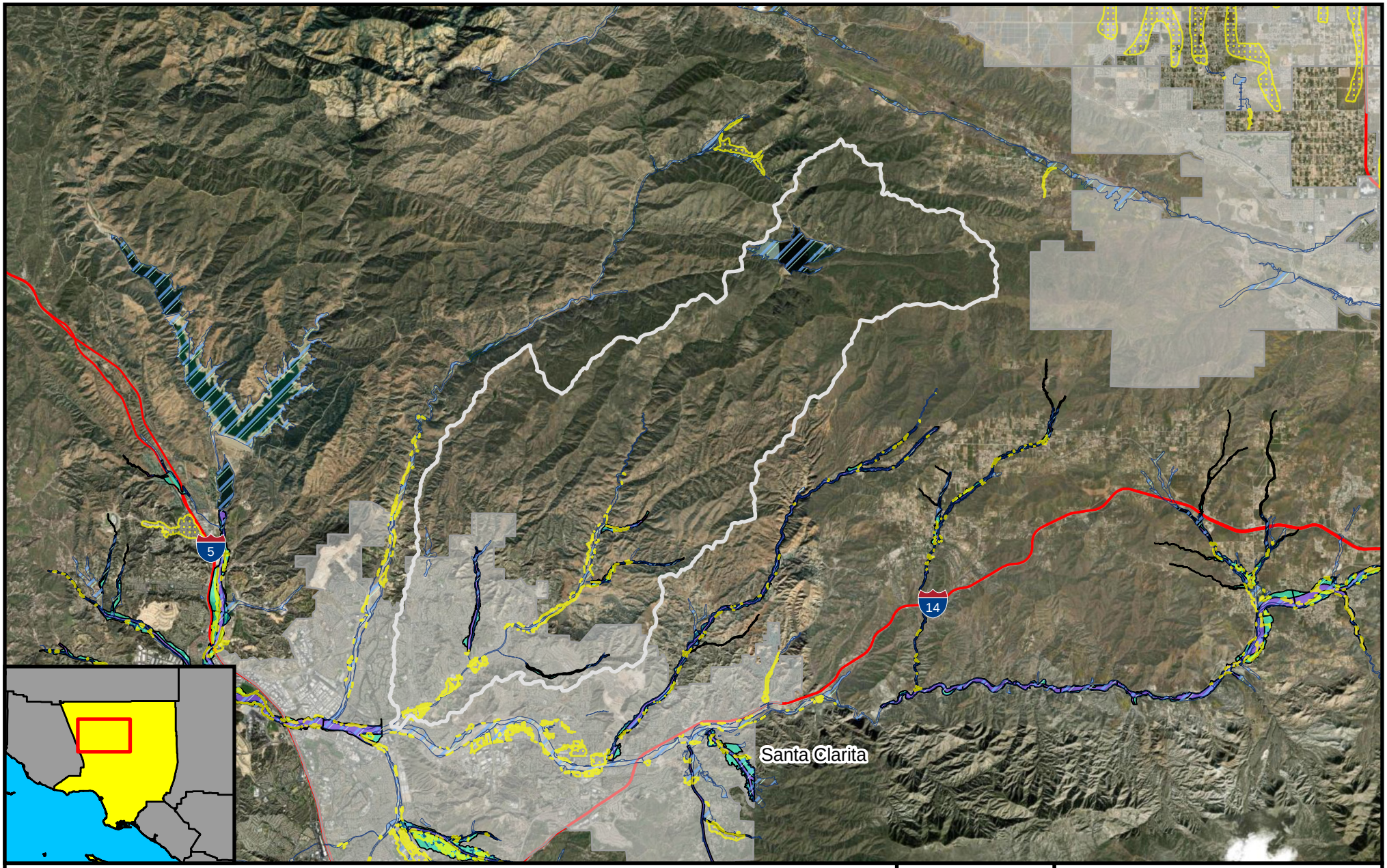
Scale in Feet

BURNS McDONNELL℠

Bolsa Chica Channel-Frontal Hunington Harbour Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

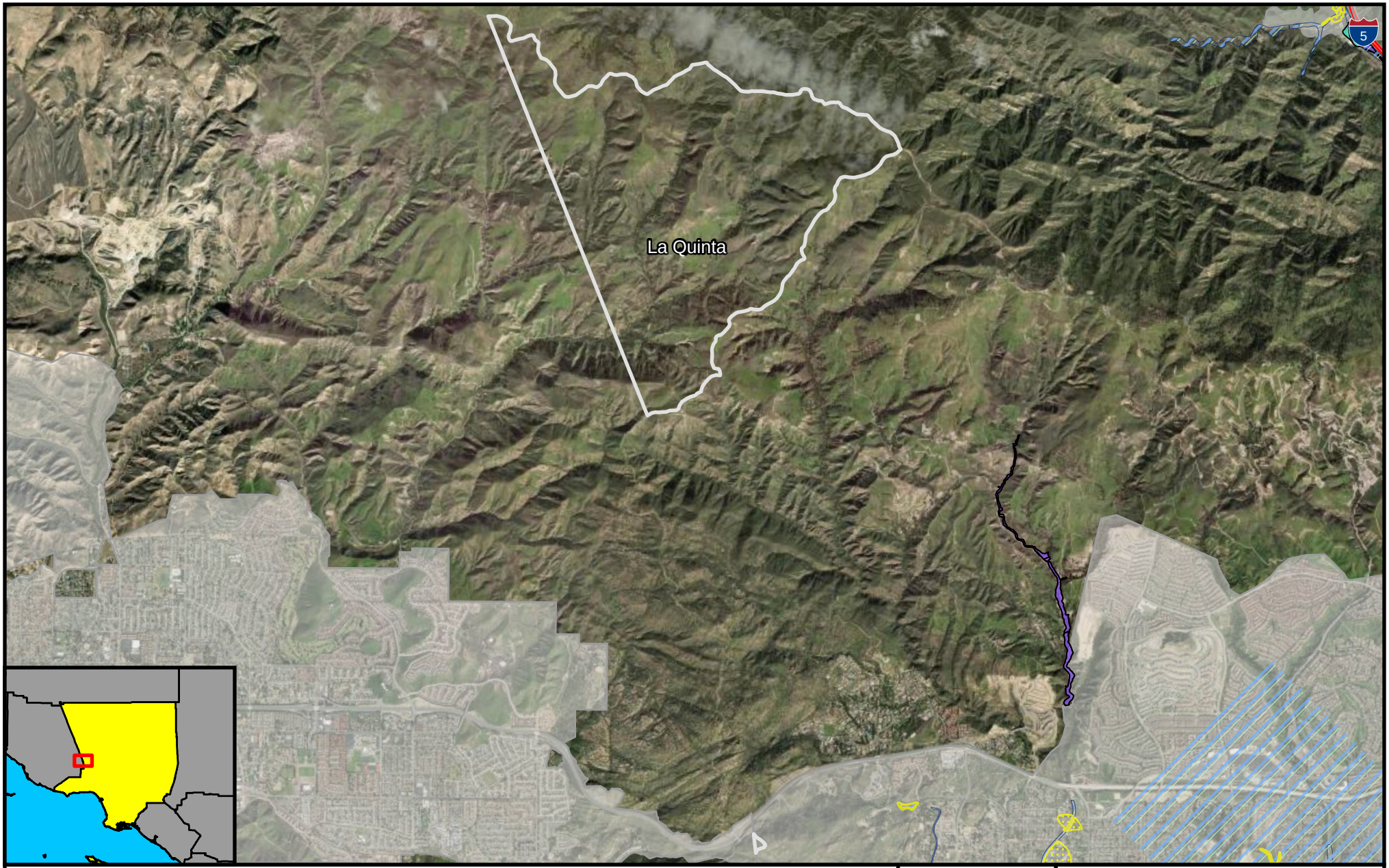
3 1.5 0 3
Scale in Miles

BURNS McDONNELL℠

Bouquet Canyon Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

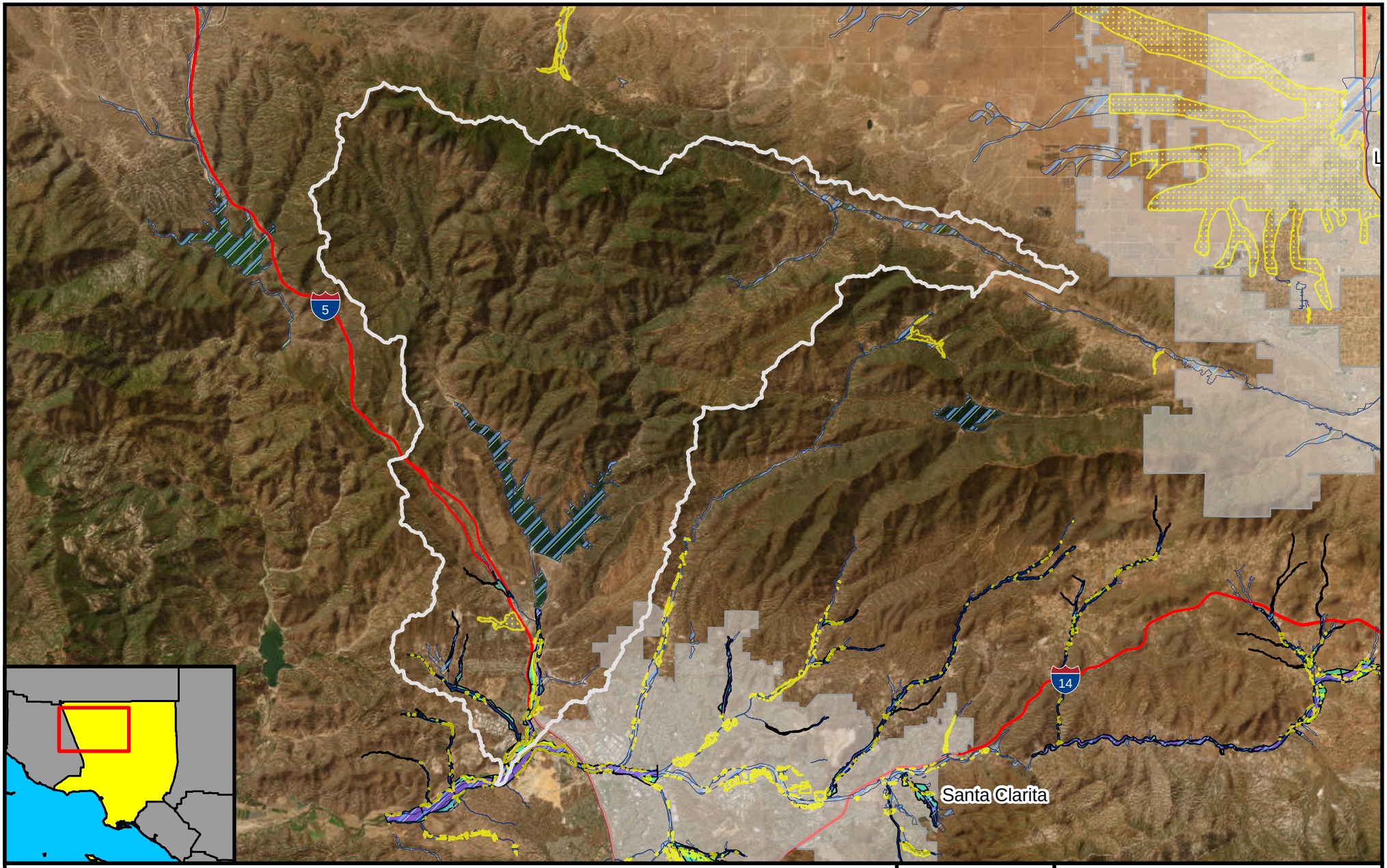
1 0.5 0 1
Scale in Miles

BURNS McDONNELL℠

Calleguas Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

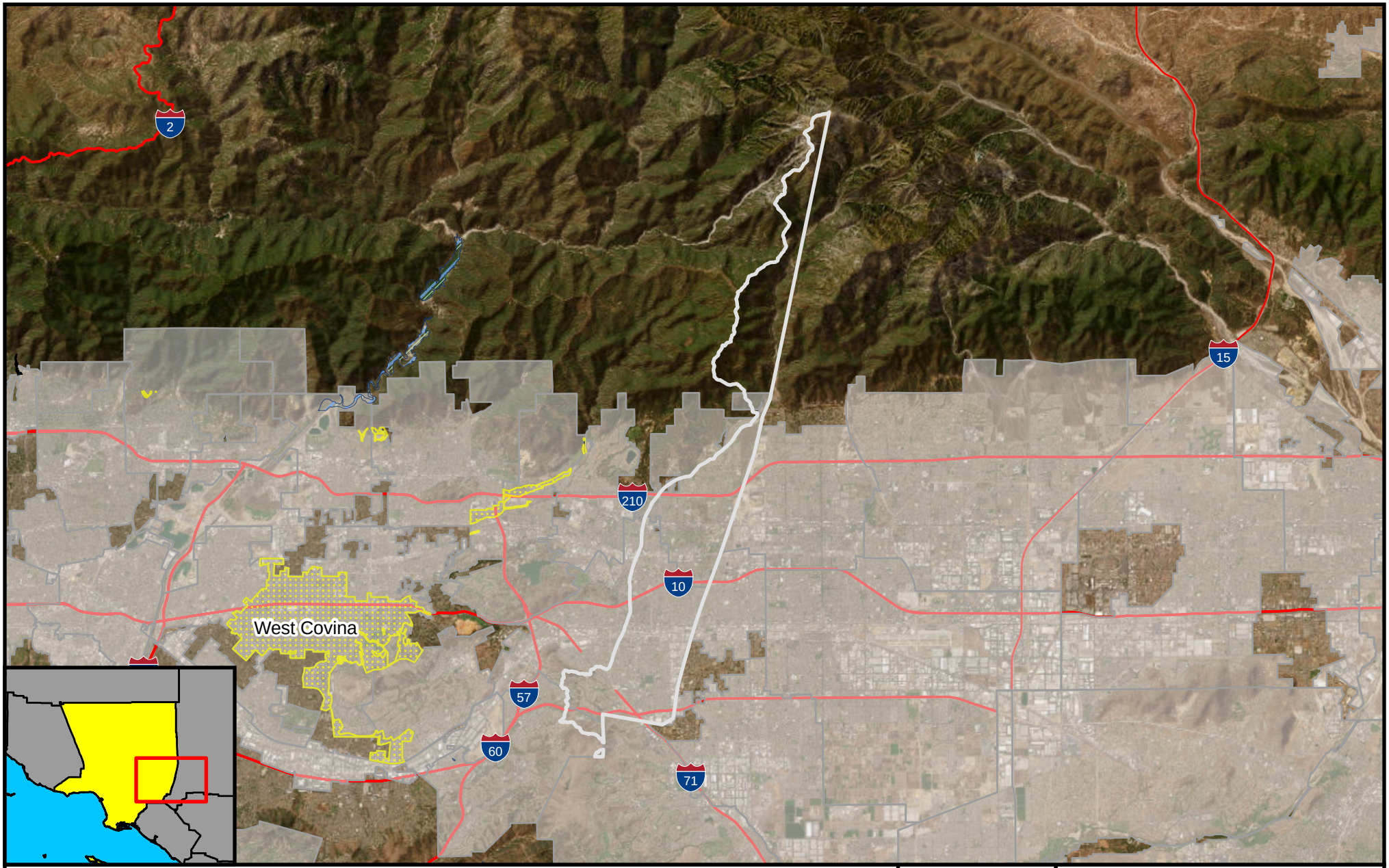
4 2 0 4
Scale in Miles

BURNS McDONNELL℠

Castaic Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

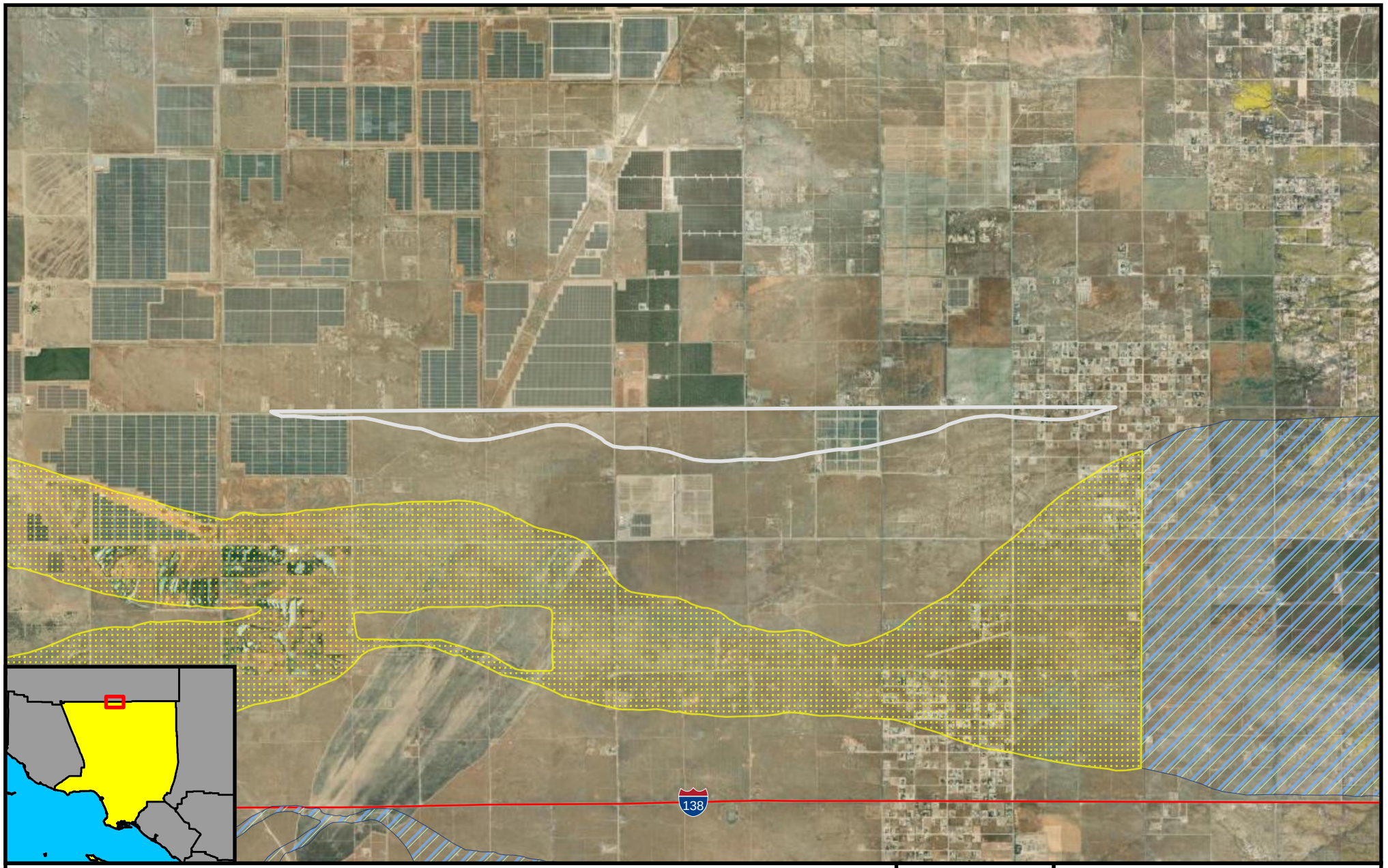
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Scale in Miles

BURNS McDONNELL℠

Chino Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

1 0.5 0 1

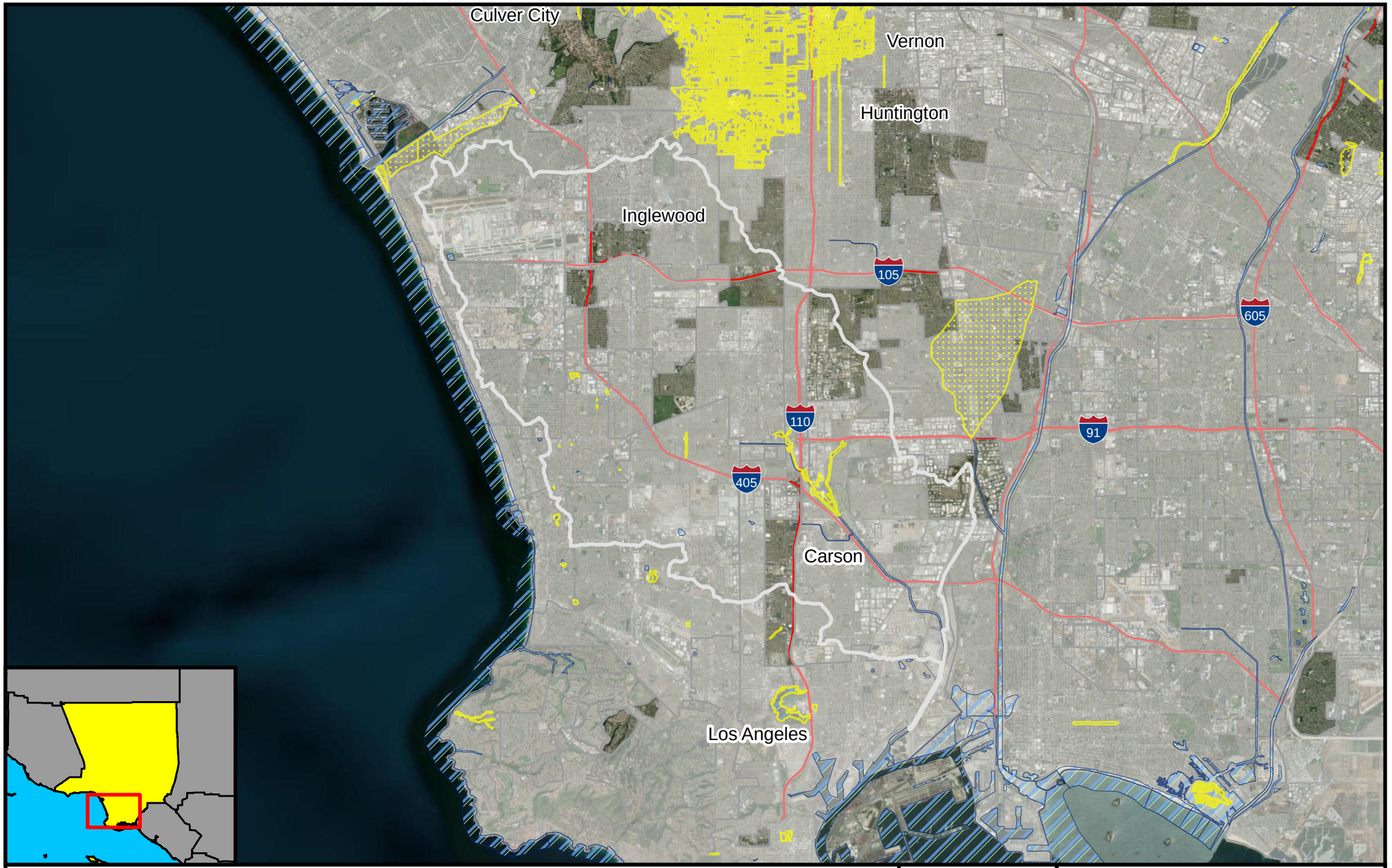
Scale in Miles

BURNS McDONNELL℠

Cottonwood Creek-Tylerhorse Canyon Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary

Incorporated Cities

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

3 1.5 0 3

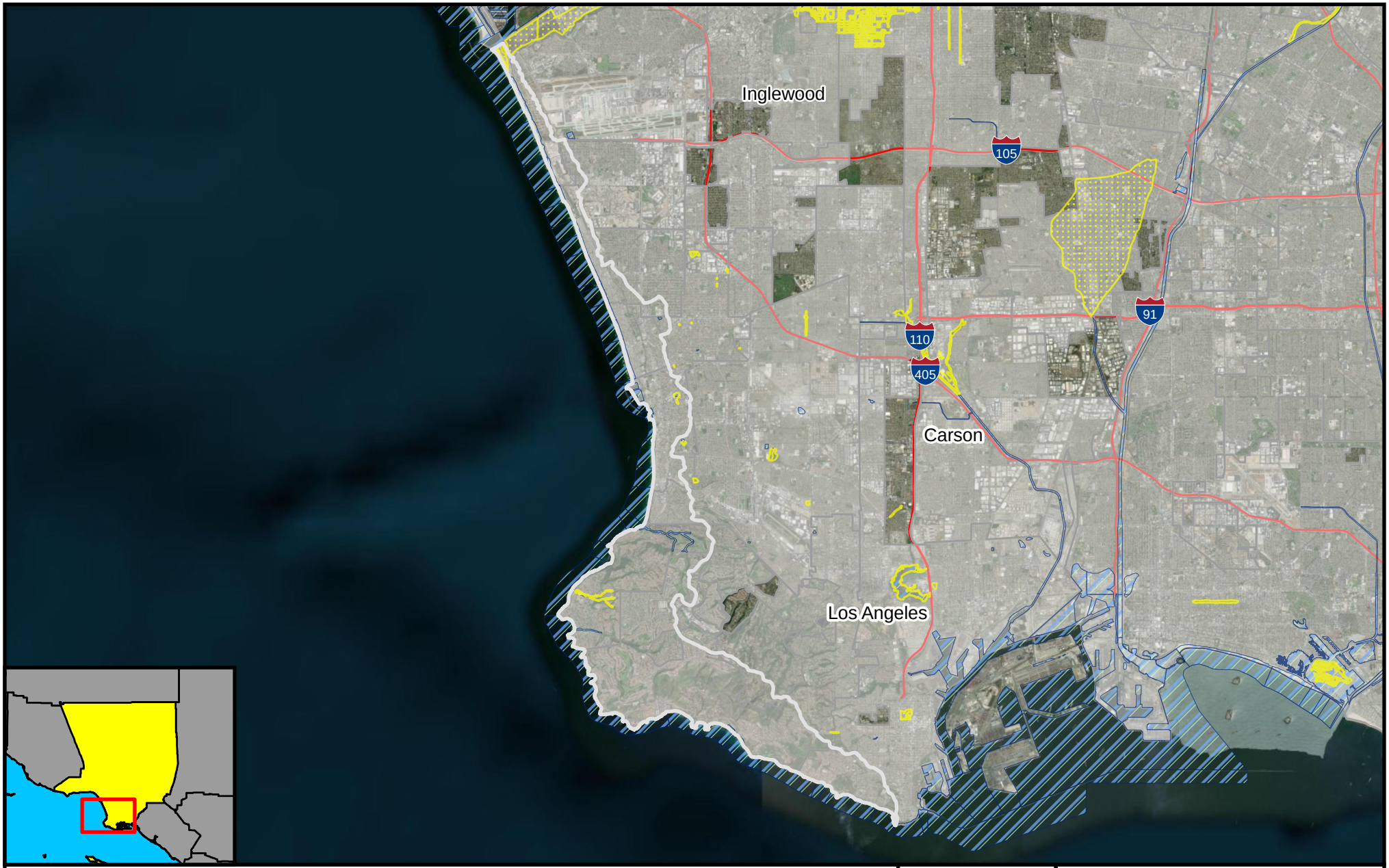
Scale in Miles

BURNS McDONNELL℠

Dominguez Channel Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Incorporated Cities

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

3 1.5 0 3

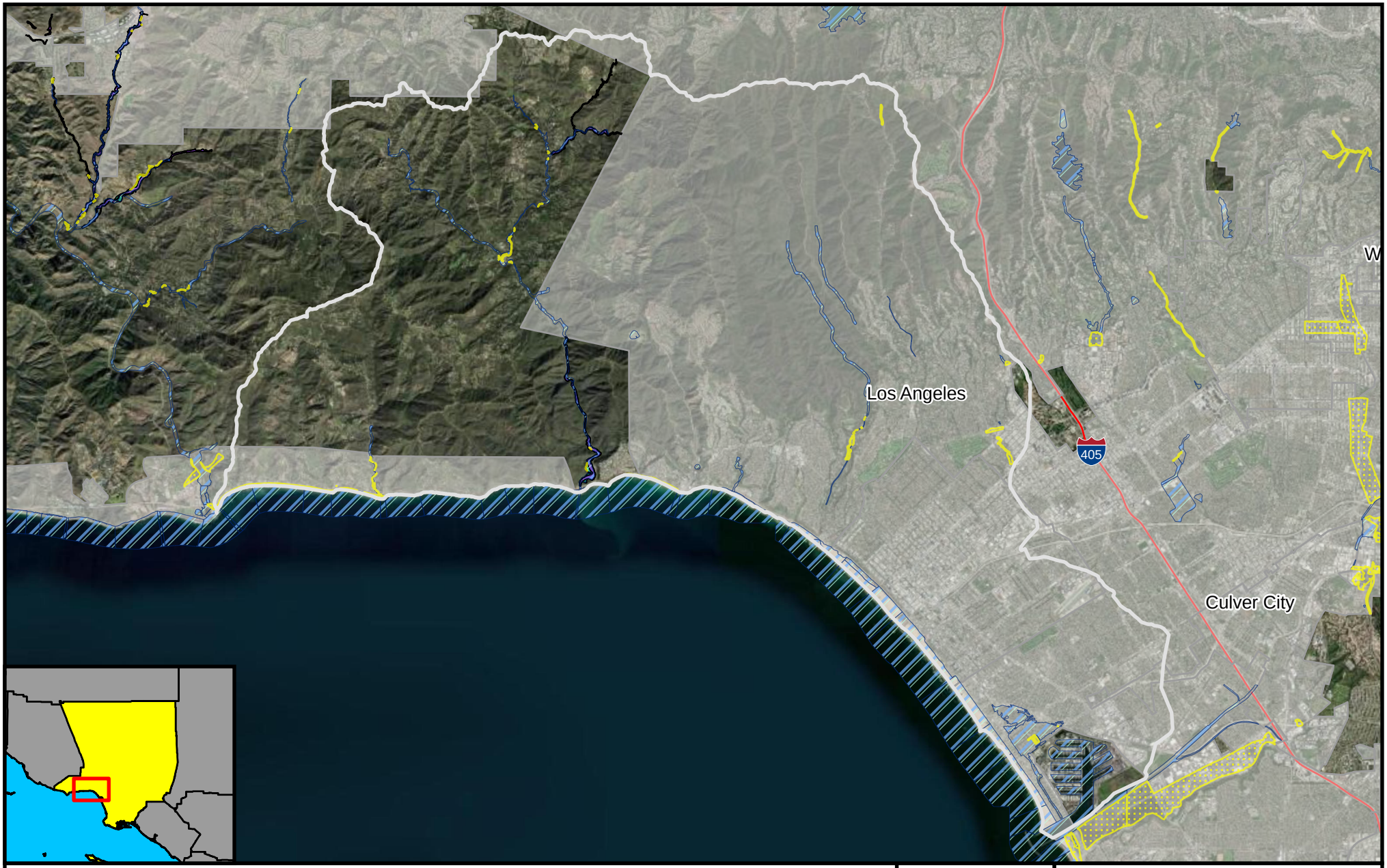
Scale in Miles

BURNS McDONNELL

Frontal Santa Monica Bay-San Pedro Bay Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

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Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

2 1 0 2
Scale in Miles

BURNS McDONNELL℠

Garapito Creek-Frontal Santa Monica Bay Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

1 0.5 0 1

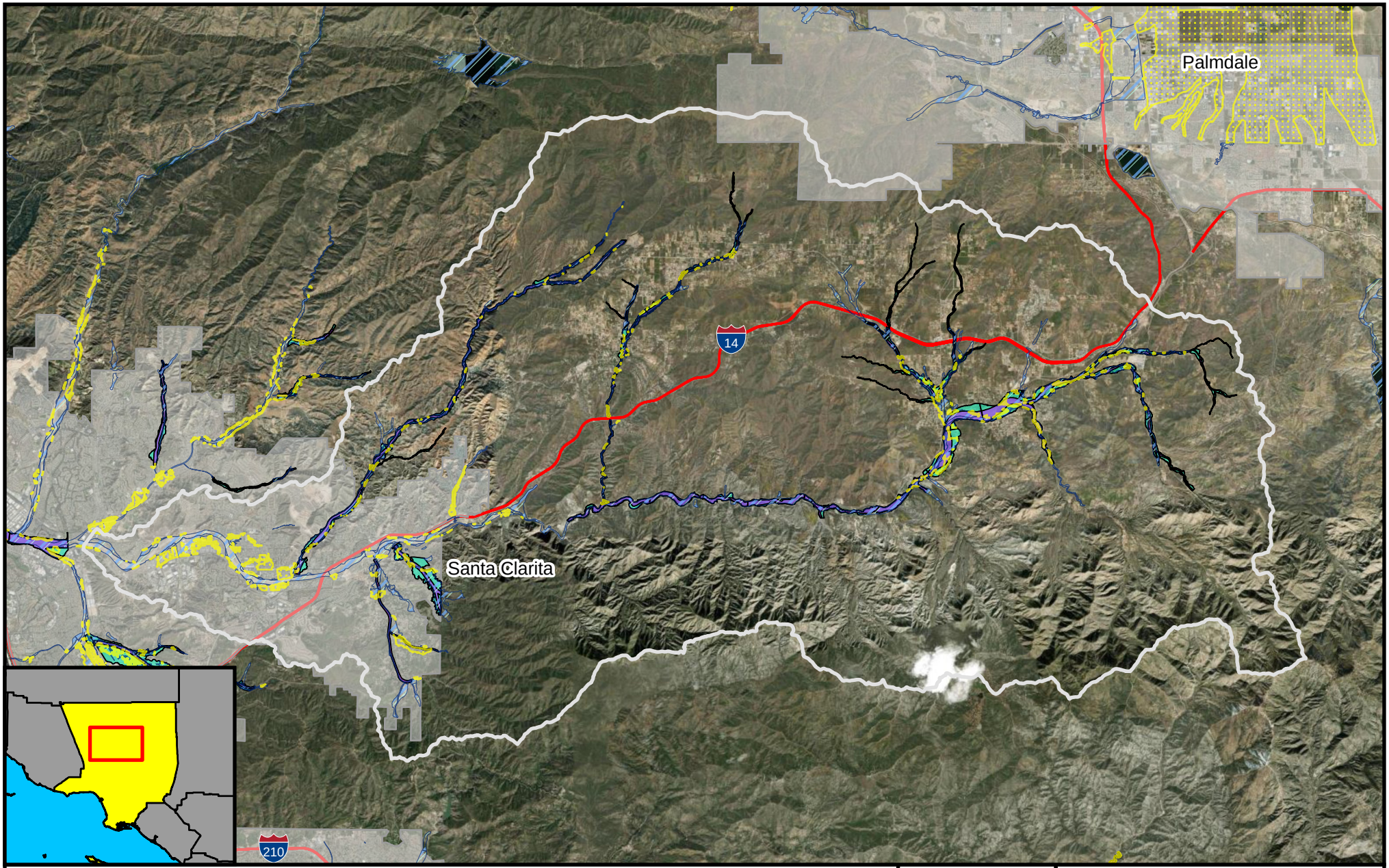
Scale in Miles

BURNS McDONNELL℠

Grapevine Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

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Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

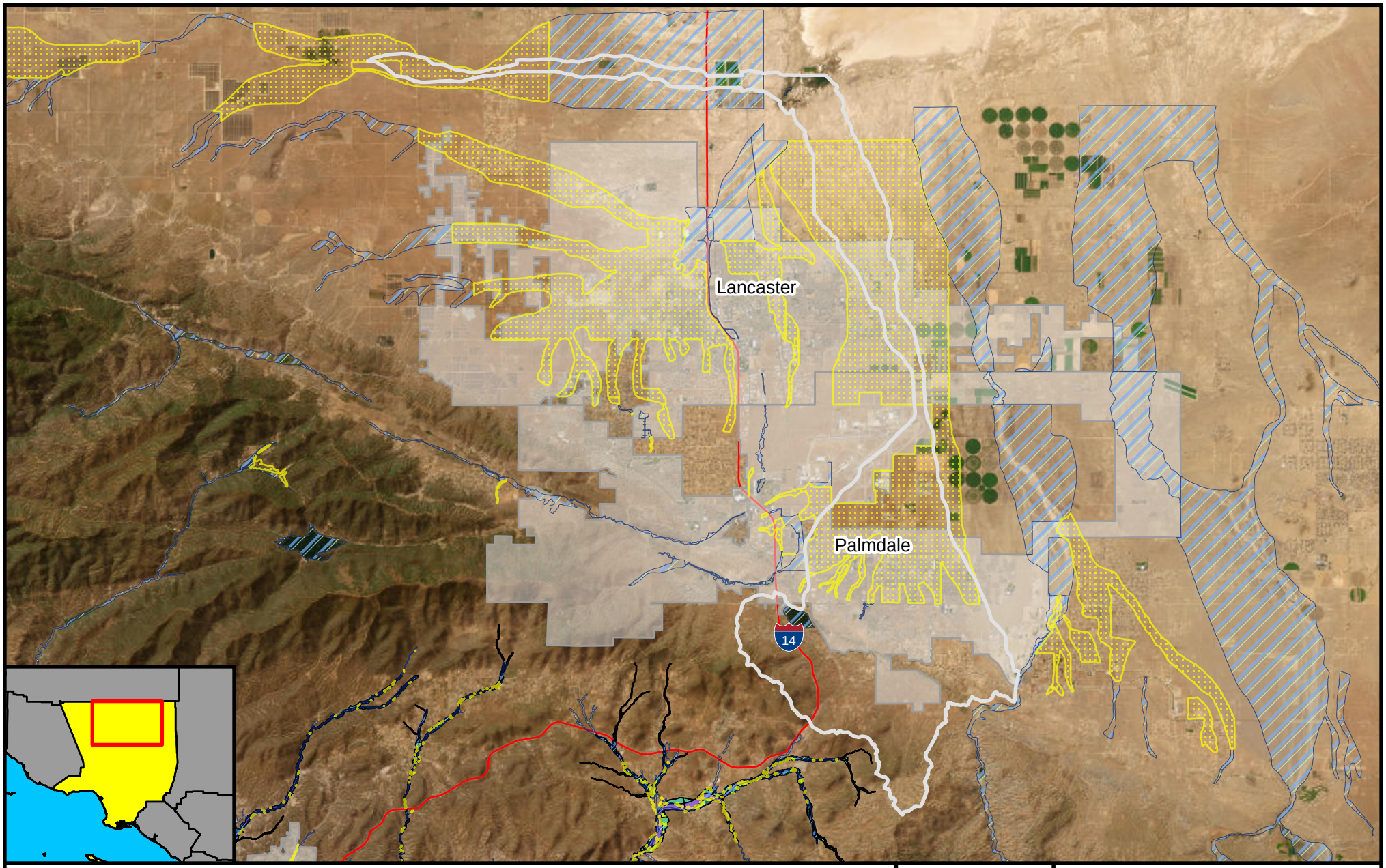
3 1.5 0 3
Scale in Miles

BURNS McDONNELL℠

Headwaters Santa Clara River Watershed
Los Angeles County Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

4 2 0 4

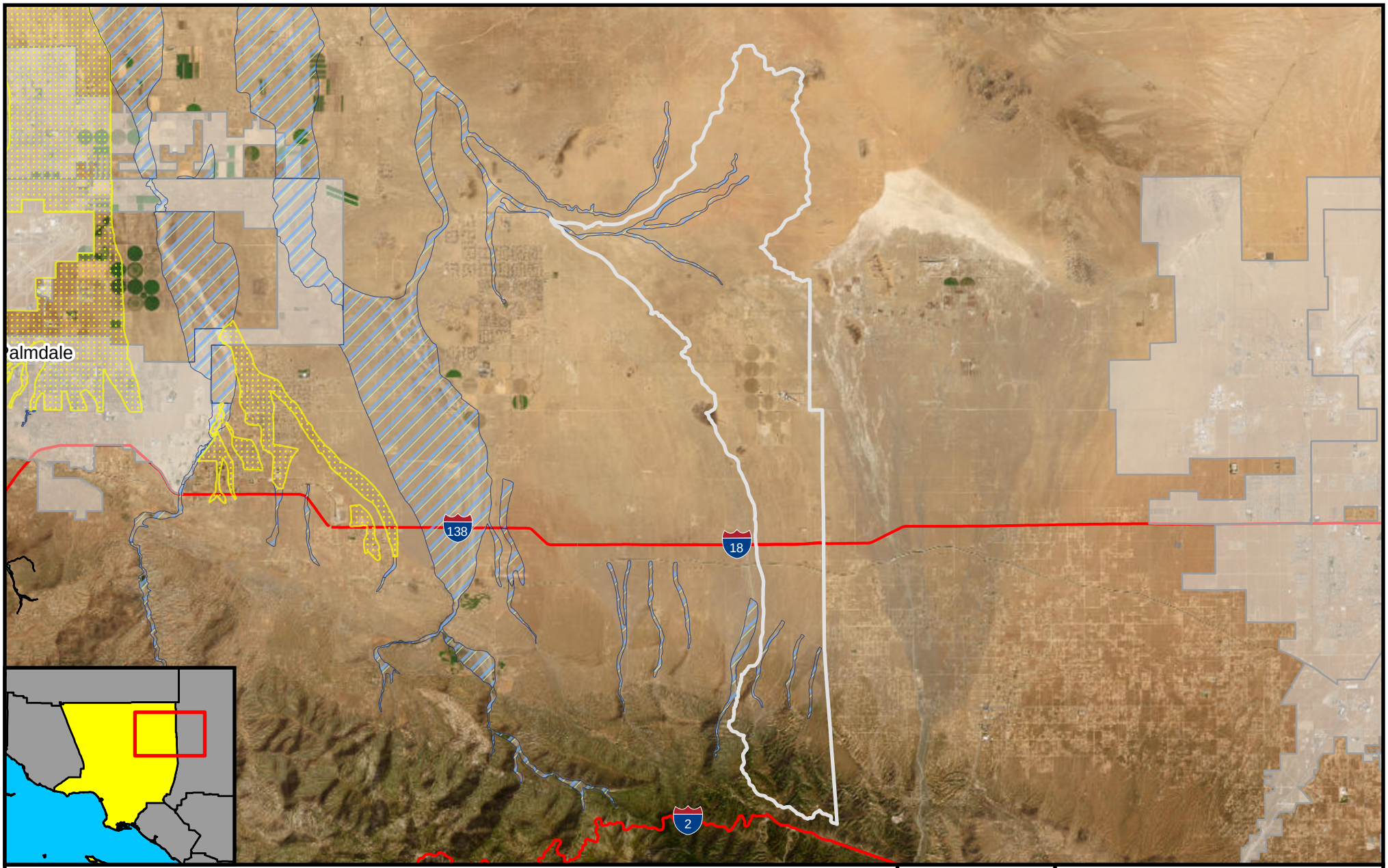
Scale in Miles

BURNS McDONNELL℠

Lake Palmdale-Piute Ponds Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

4 2 0 4

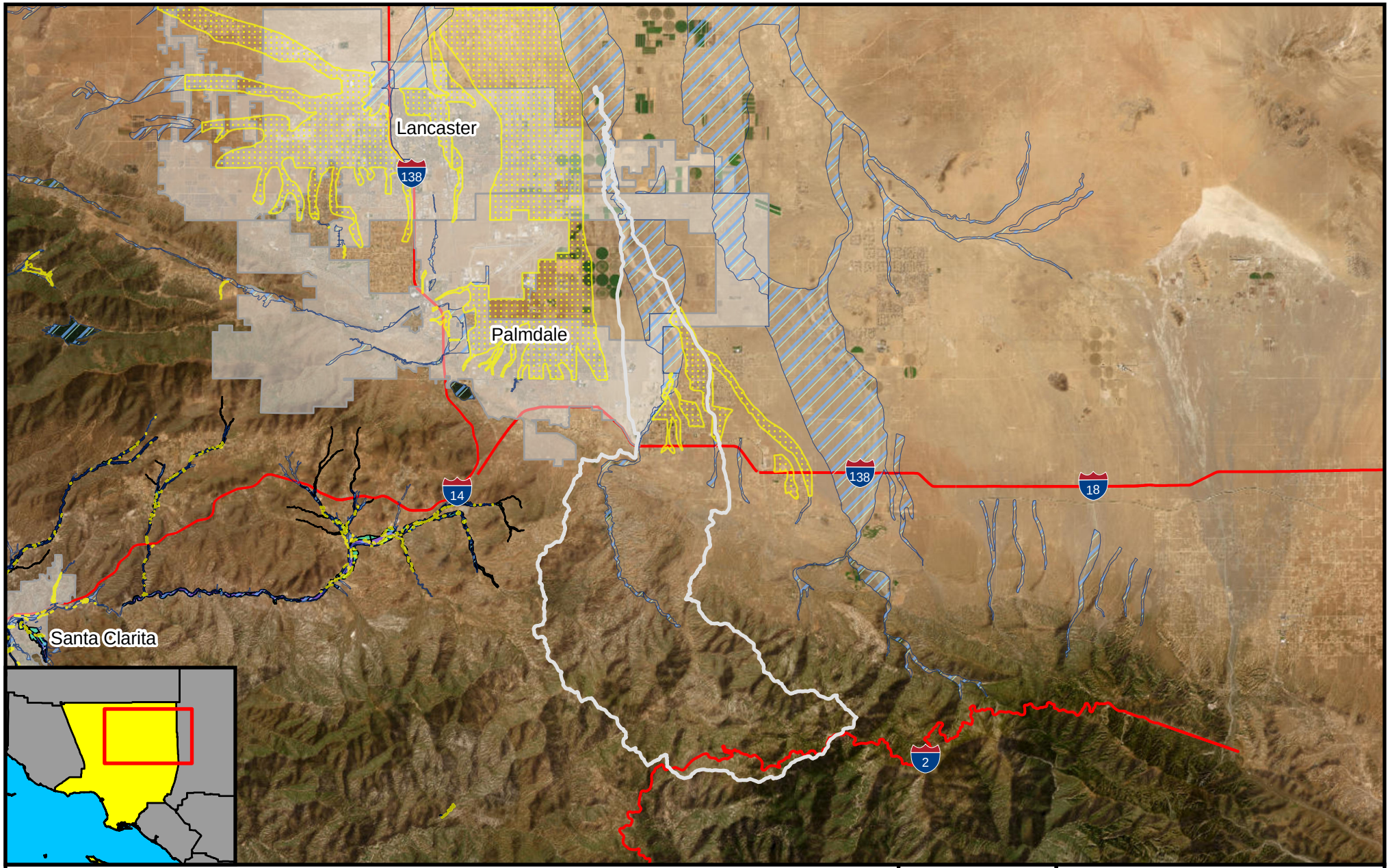
Scale in Miles

BURNS McDONNELL℠

Le Montaine Creek-Eller Slough Watershed
Los Angeles County Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

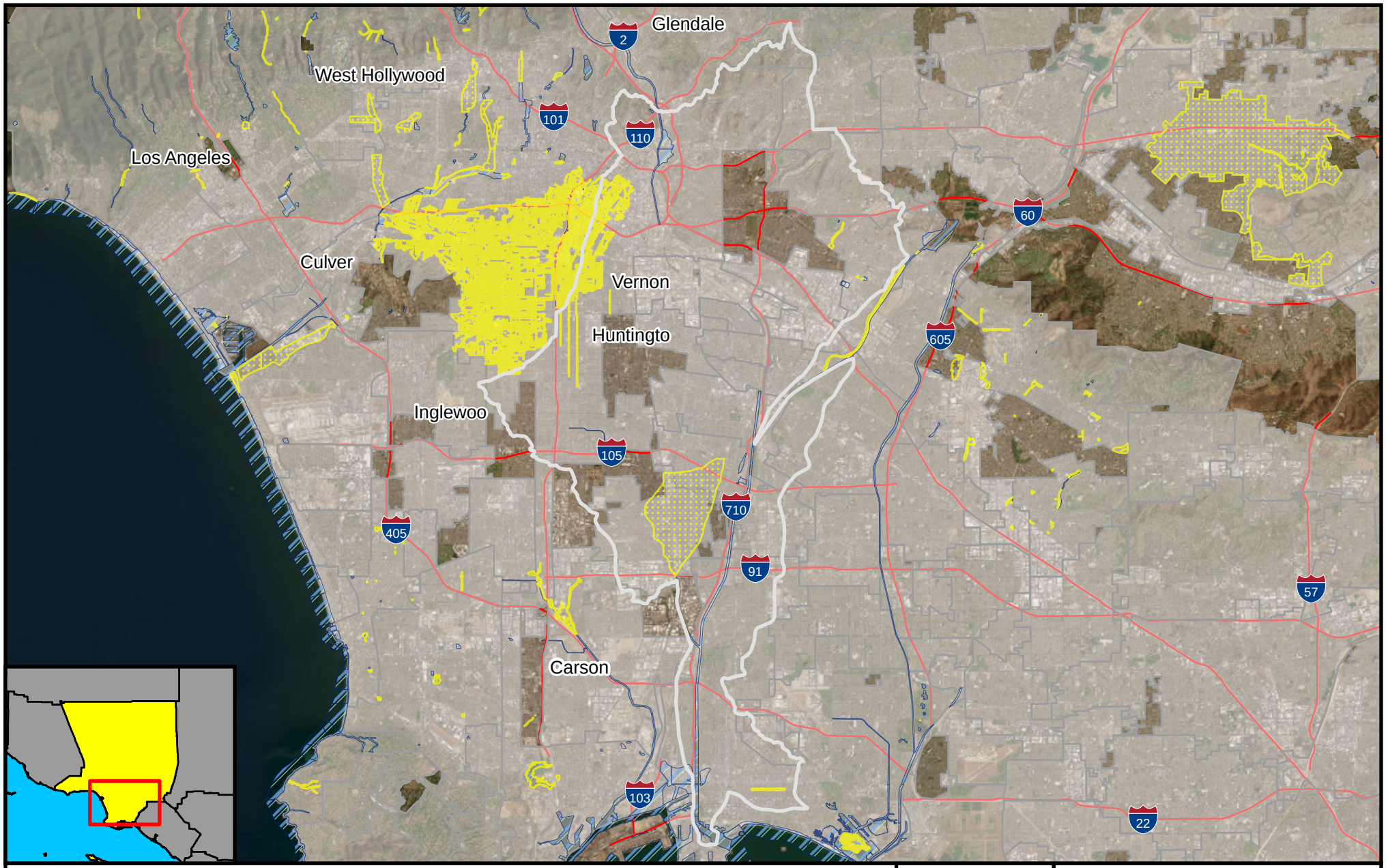
5 2.5 0 5
Scale in Miles

BURNS McDONNELL

Little Rock Wash Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

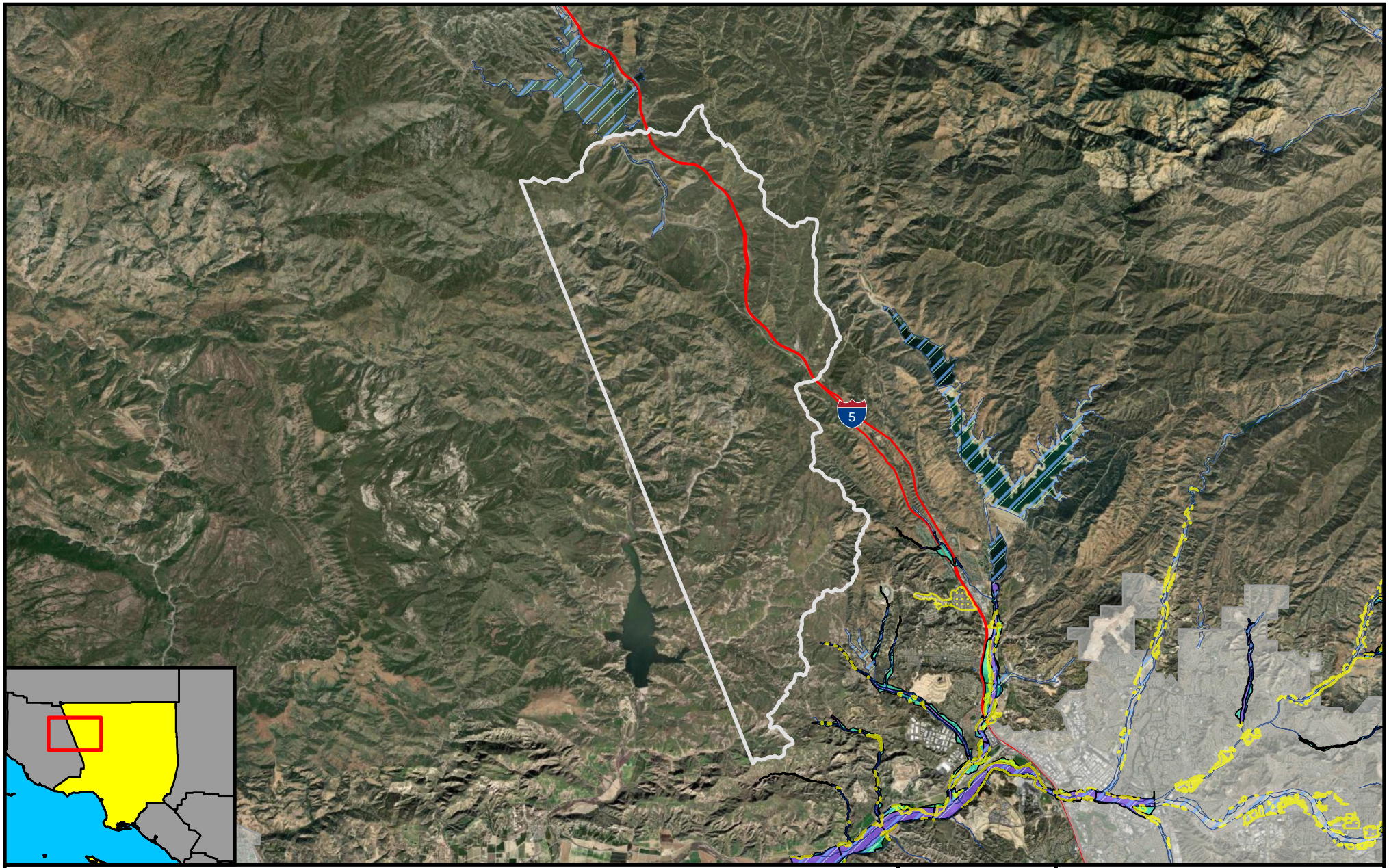
4 2 0 4
Scale in Miles

BURNS McDONNELL

Lower Los Angeles River Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

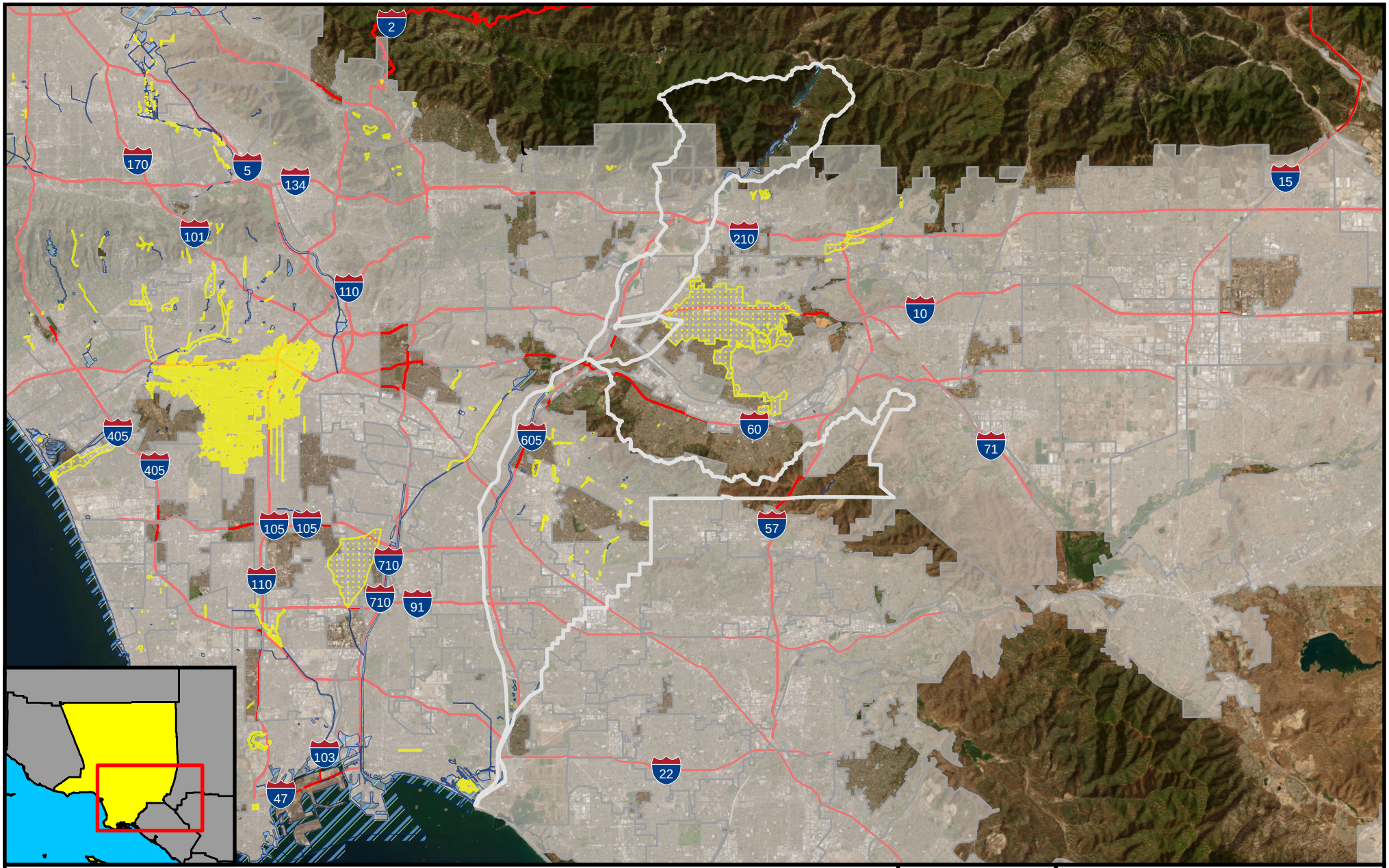
3 1.5 0 3
Scale in Miles

BURNS McDONNELL℠

Lower Piru Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

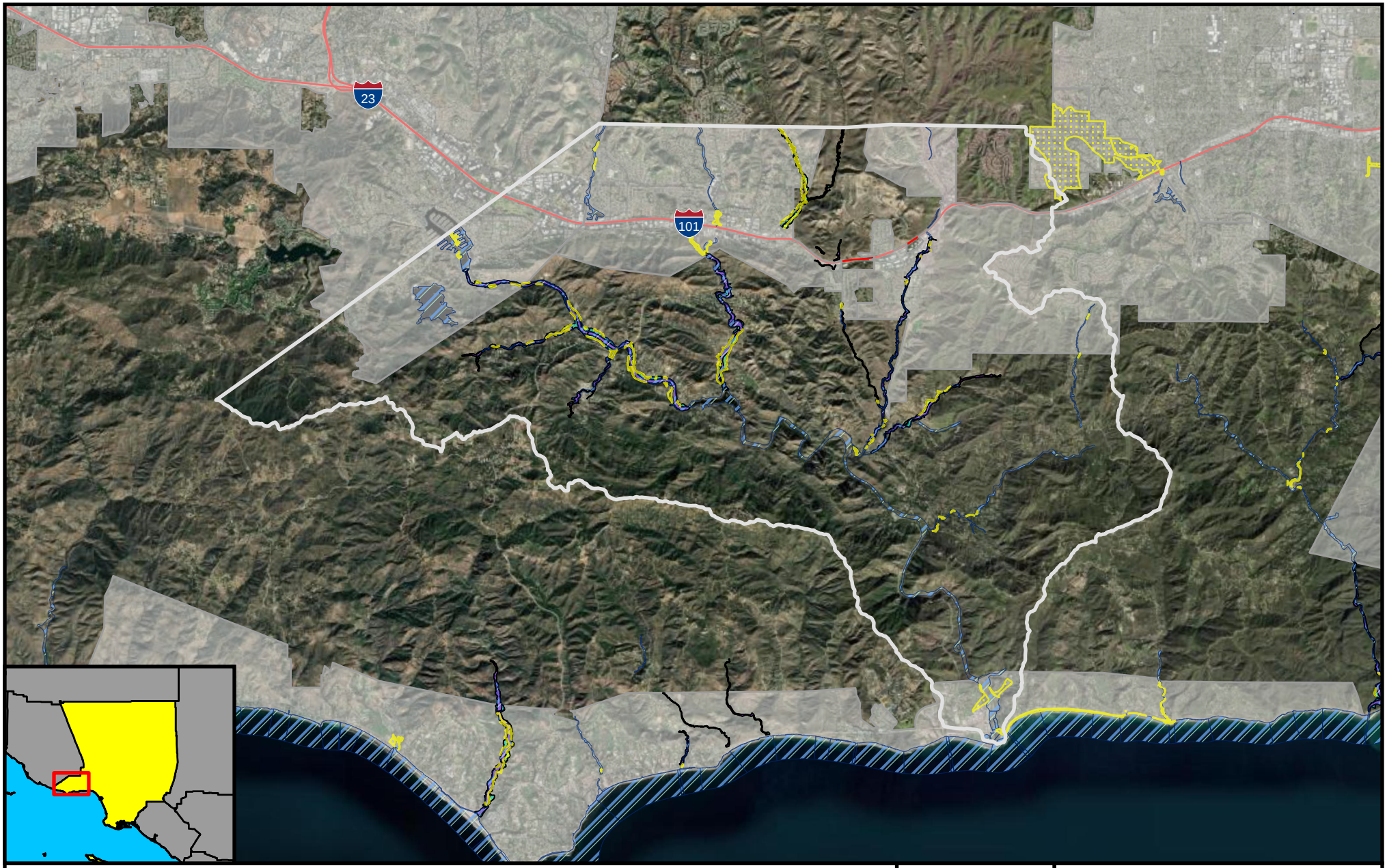
6 3 0 6
Scale in Miles

BURNS McDONNELL℠

Lower San Gabriel River Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

2 1 0 2

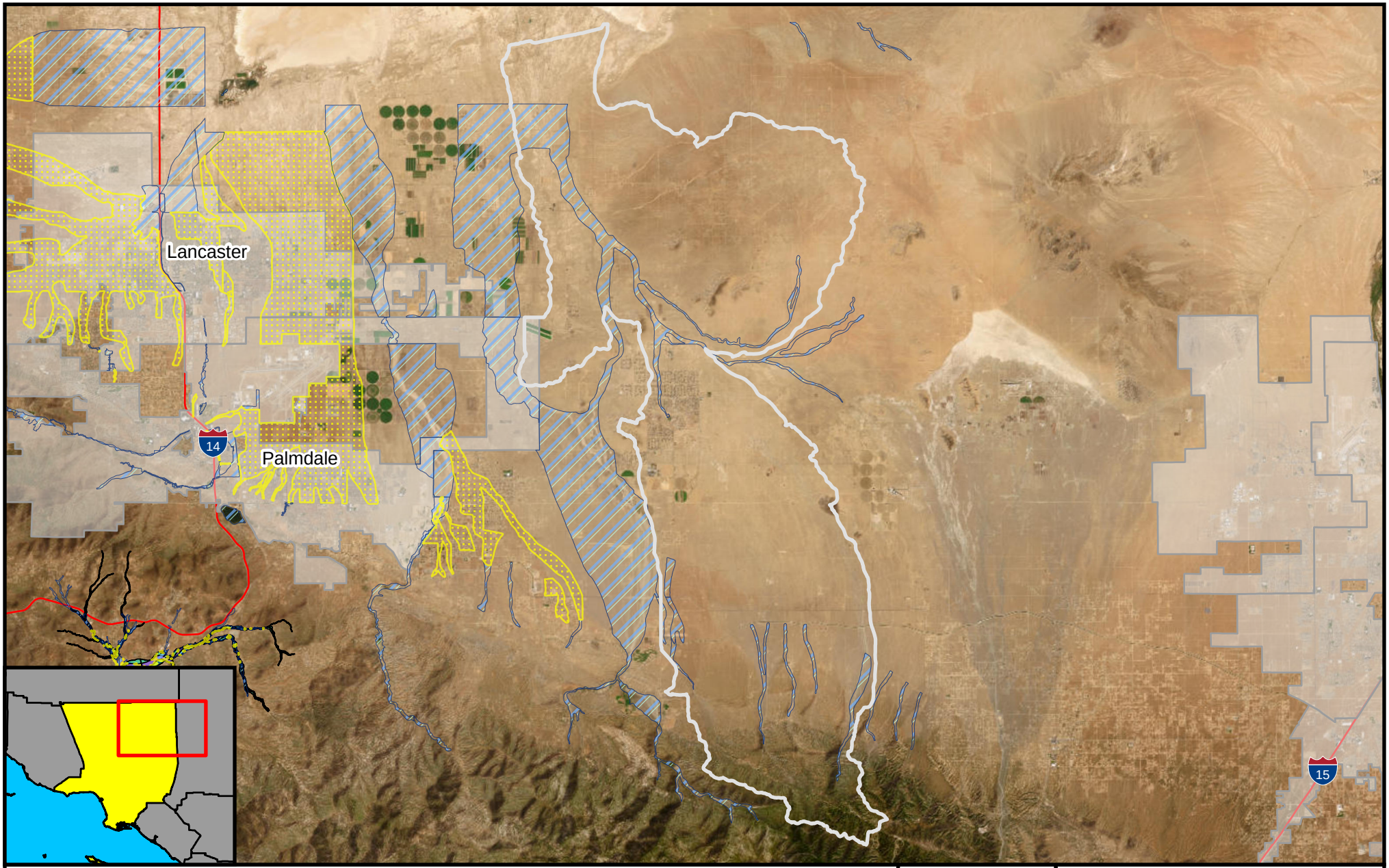
Scale in Miles

BURNS McDONNELL℠

Malibu Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

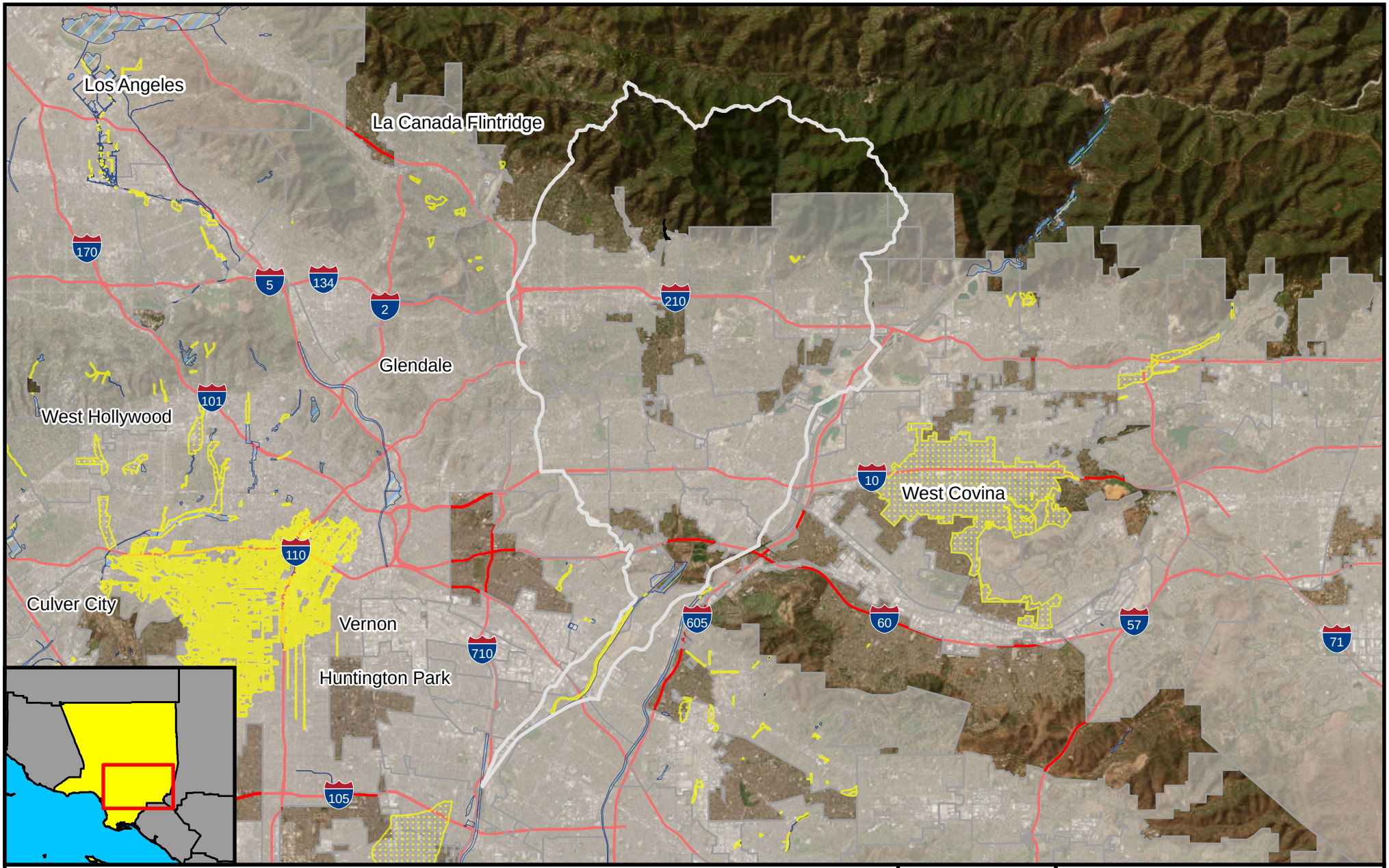
5 2.5 0 5
Scale in Miles

BURNS McDONNELL

Mescal Creek-Rocky Buttes Watershed
Los Angeles County Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

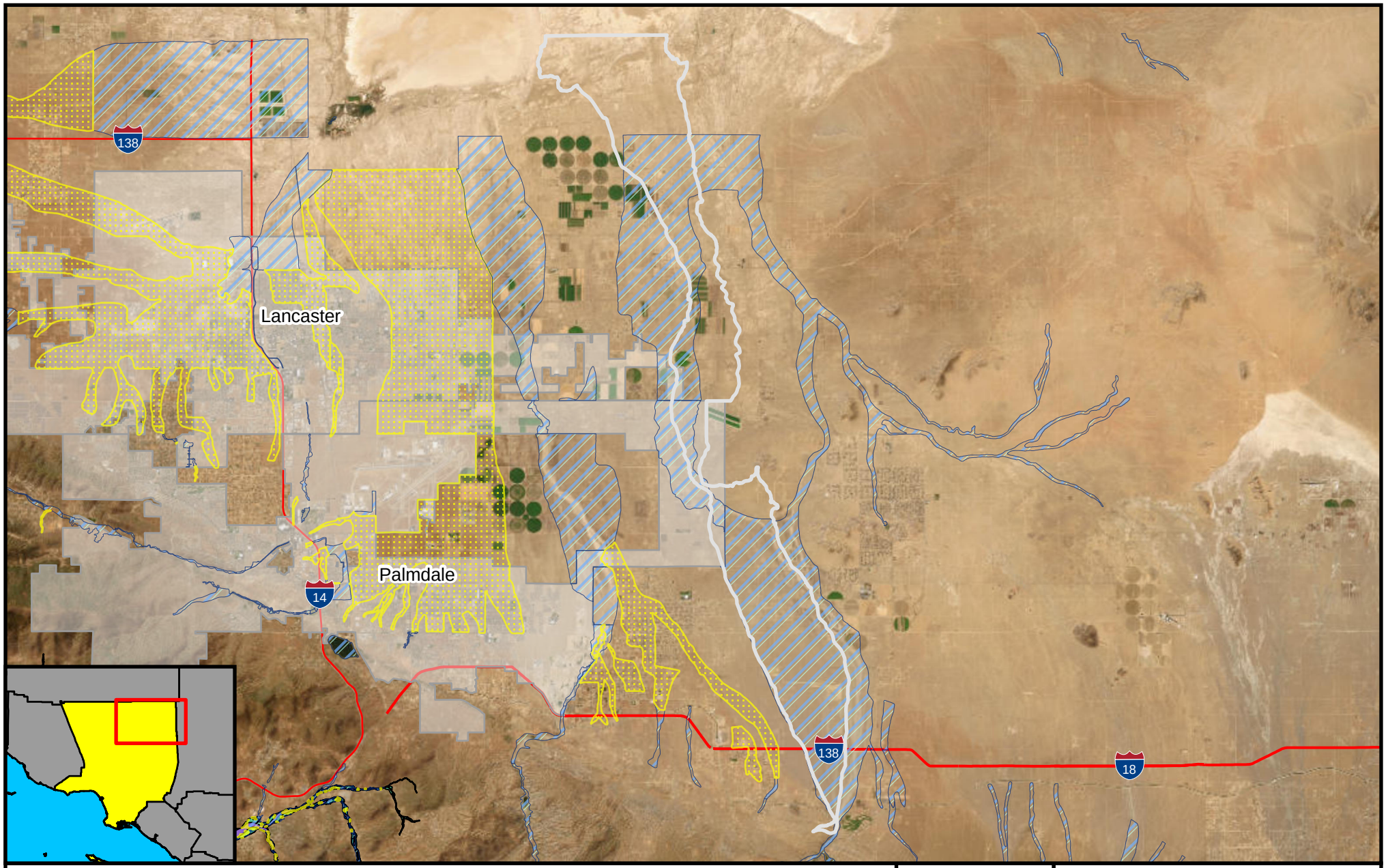
Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

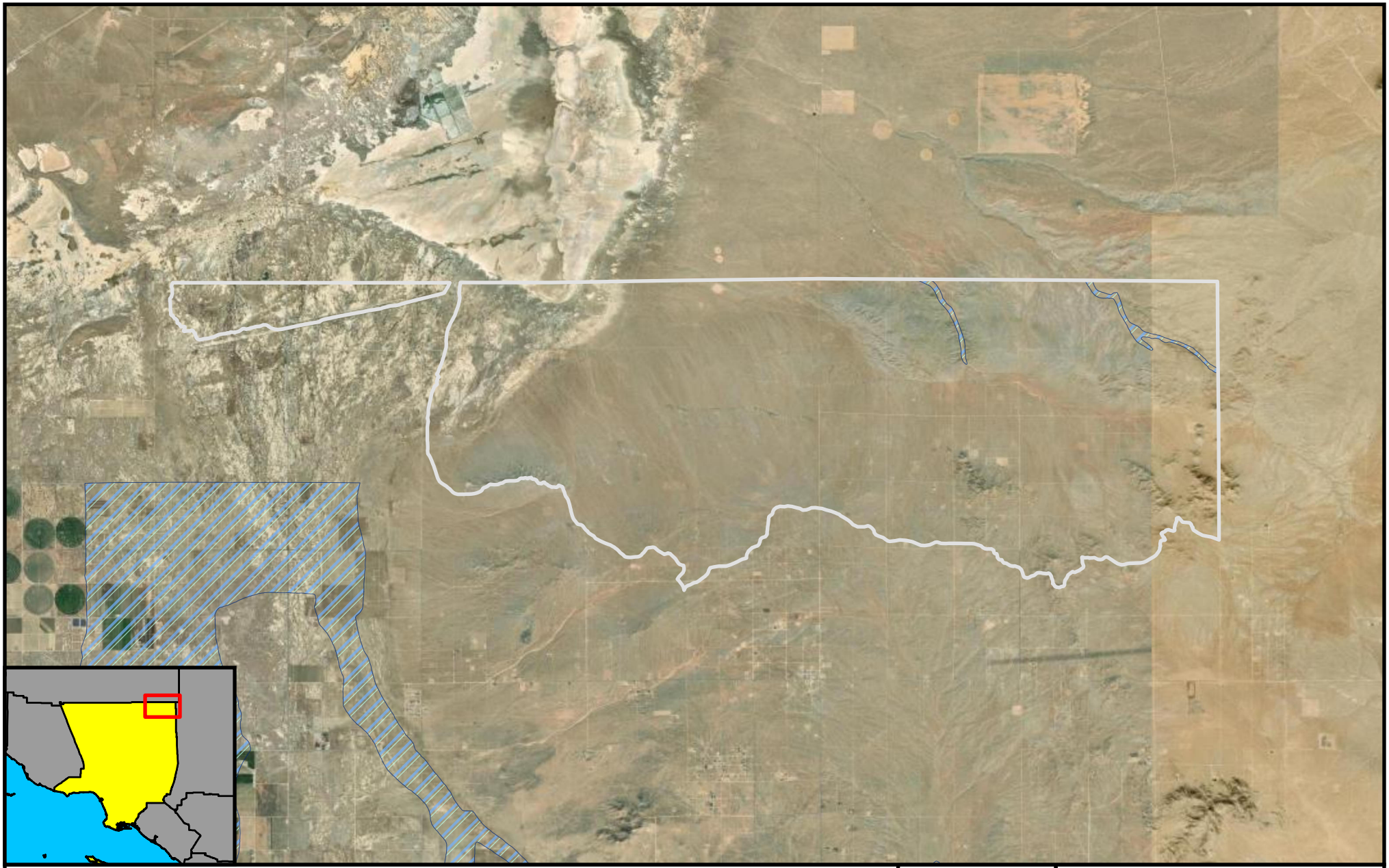
4 2 0 4
Scale in Miles

BURNS McDONNELL℠

Rock Creek-Buckhorn Lake Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Flood Zone

1% Annual Chance Flood

NORTH

2 1 0 2

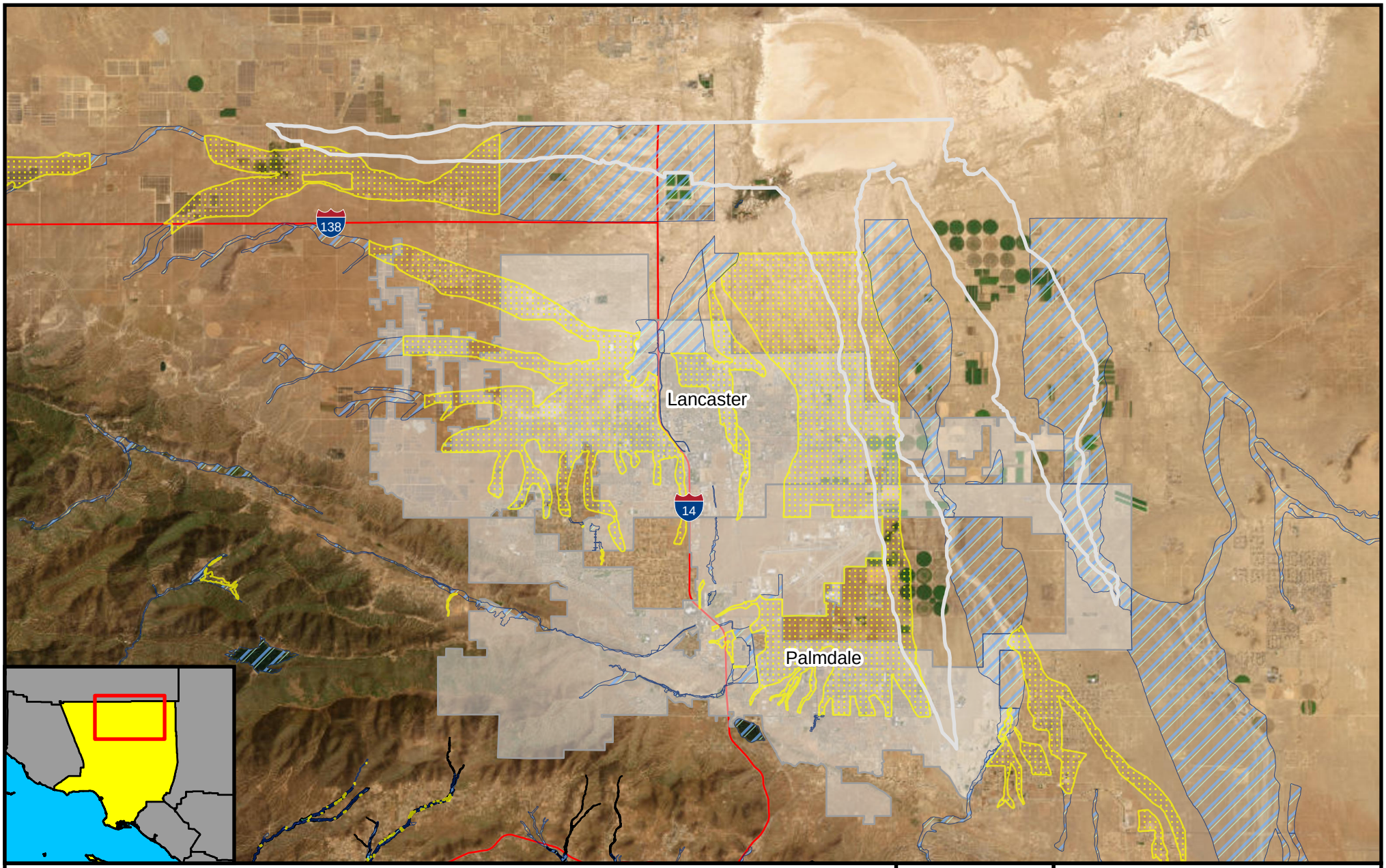
Scale in Miles

BURNS McDONNELL℠

Rogers Lake Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

4 2 0 4

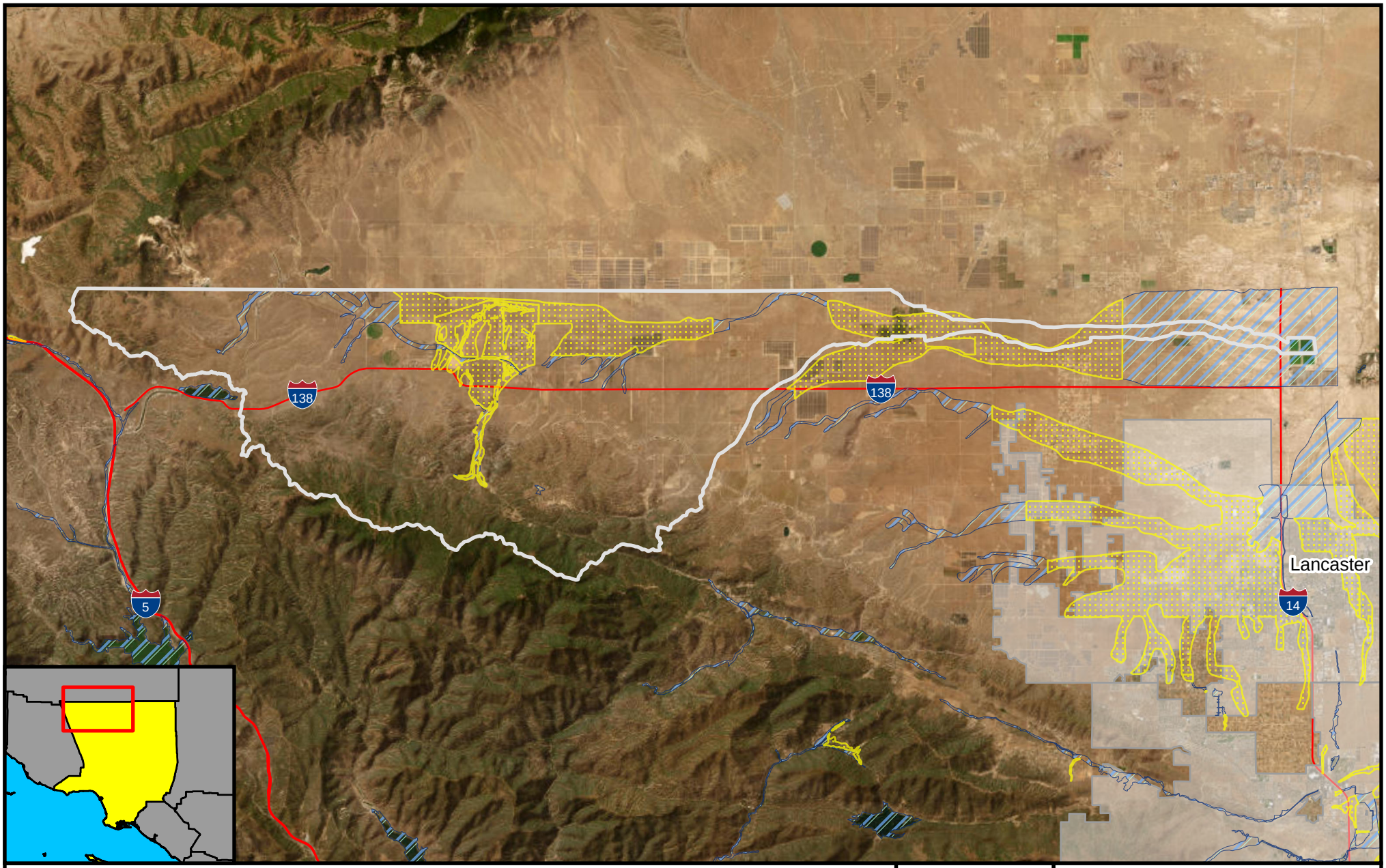
Scale in Miles

BURNS McDONNELL℠

Rosamond Lake Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Incorporated Cities

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

4 2 0 4

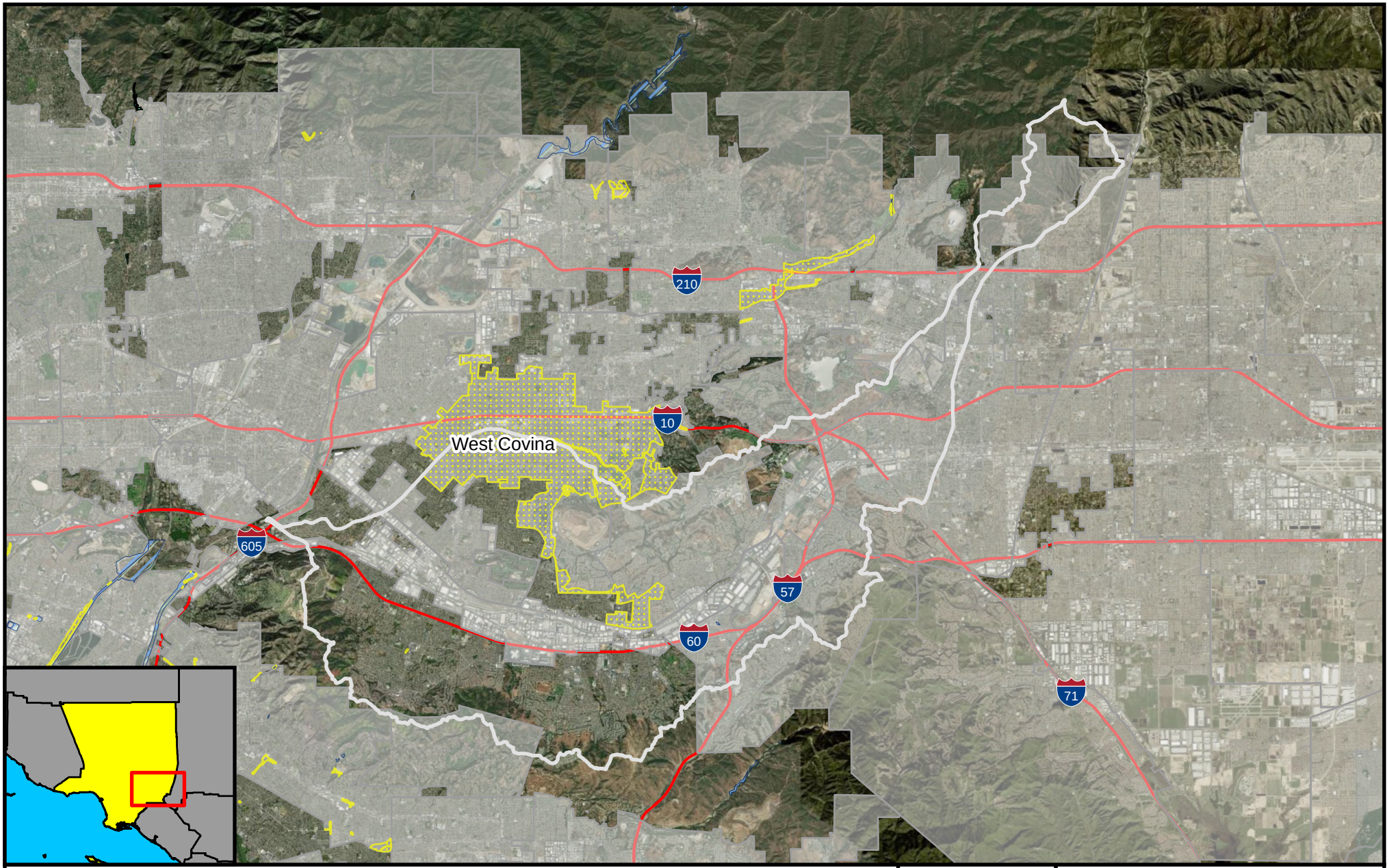
Scale in Miles

BURNS McDONNELL℠

Sacatara Creek-Kings Canyon Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

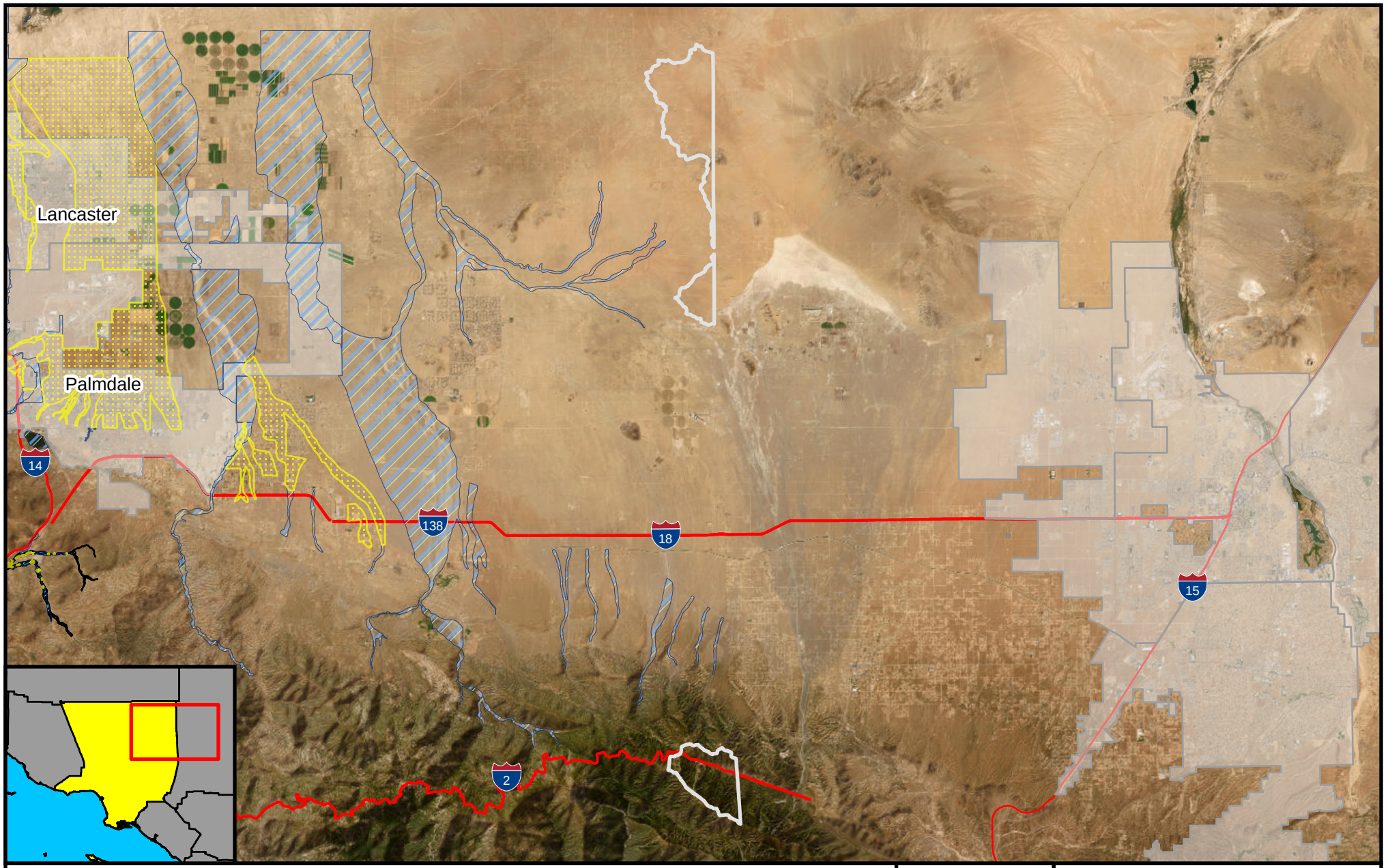
3 1.5 0 3
Scale in Miles

BURNS McDONNELL

San Jose Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

5 2.5 0 5

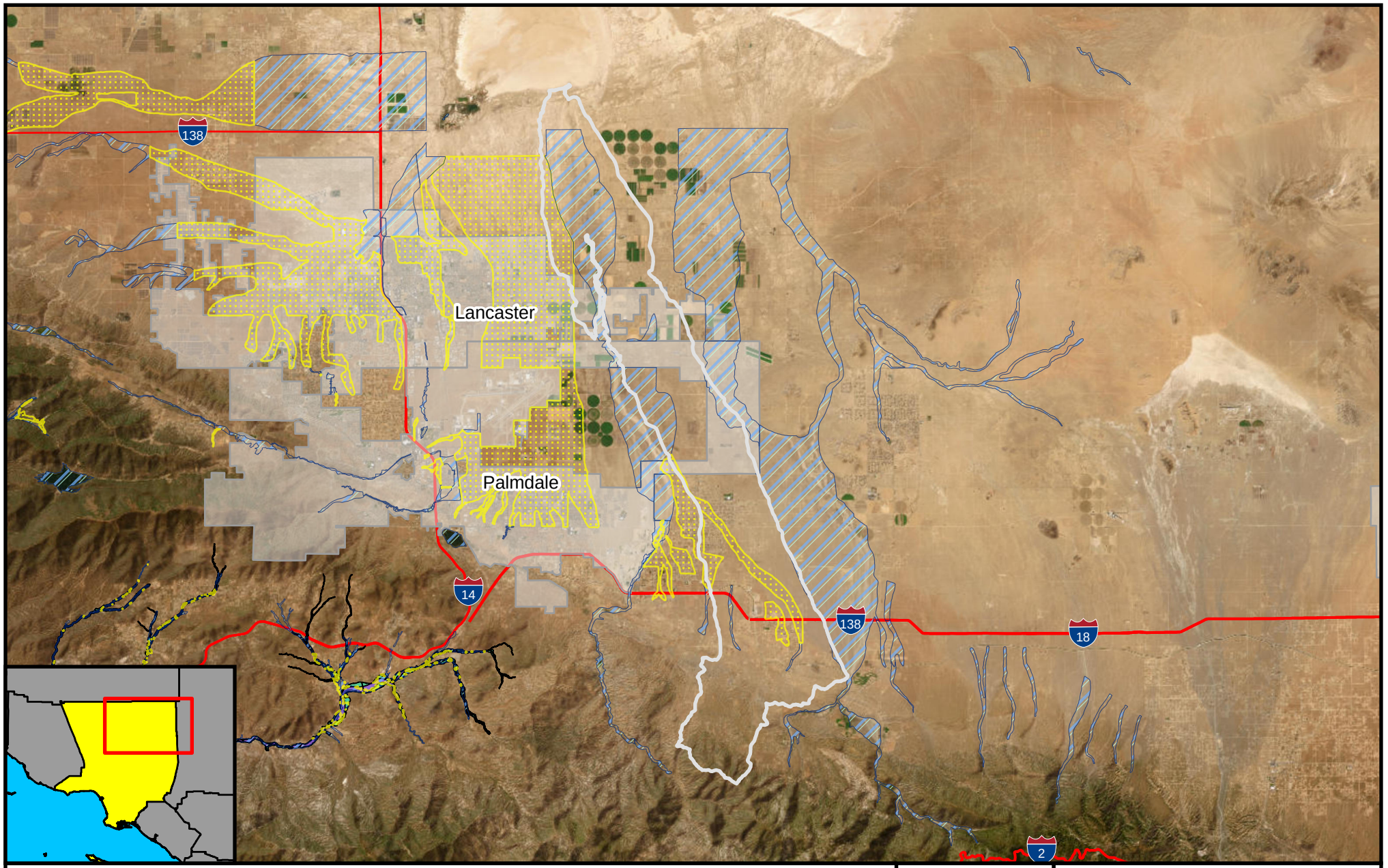
Scale in Miles

BURNS McDONNELL℠

Sheep Creek-El Mirage Lake Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

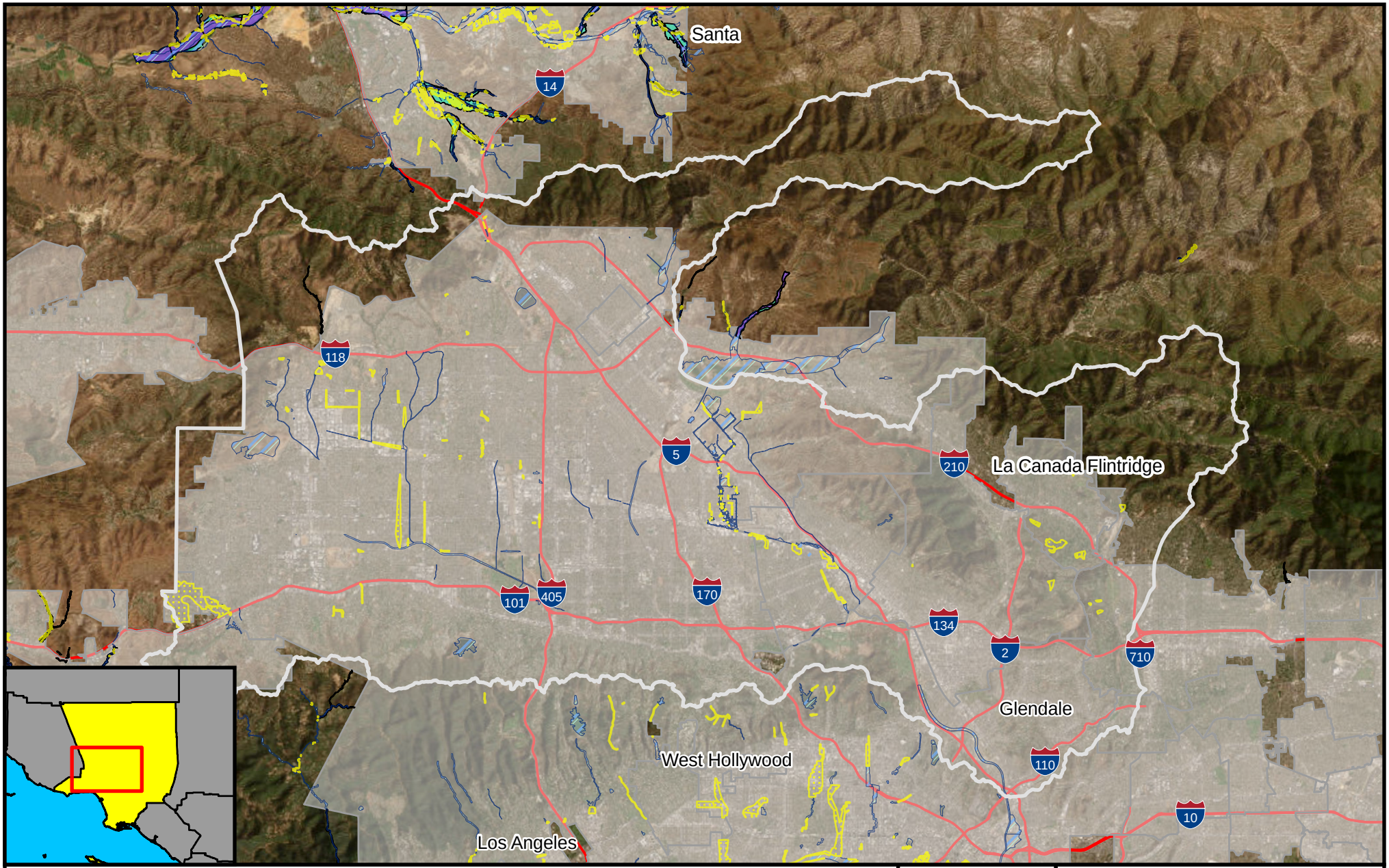
5 2.5 0 5
Scale in Miles

BURNS McDONNELL℠

Town of Pearblossom Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

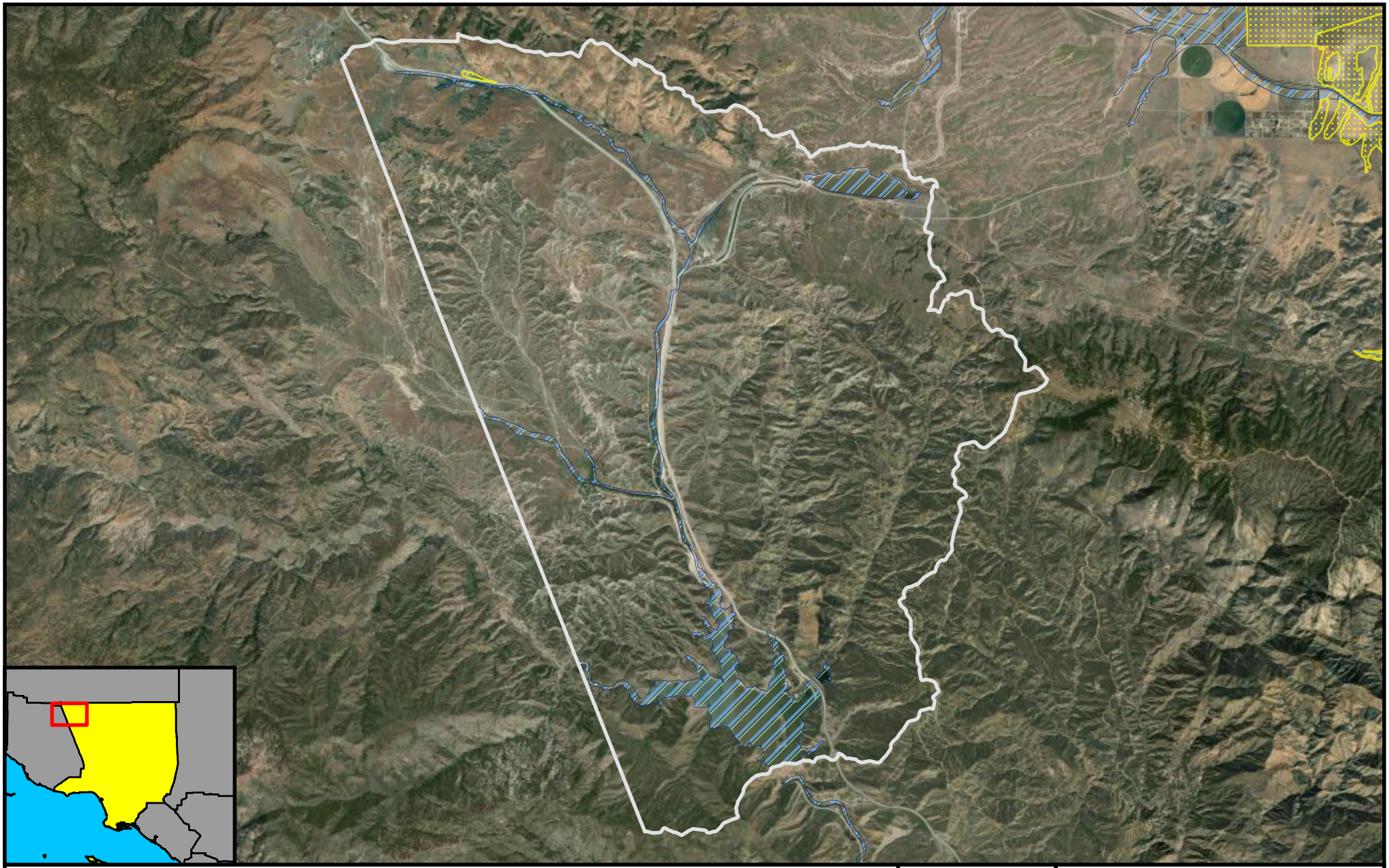
4 2 0 4
Scale in Miles

BURNS McDONNELL

Upper Los Angeles River Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

2 1 0 2

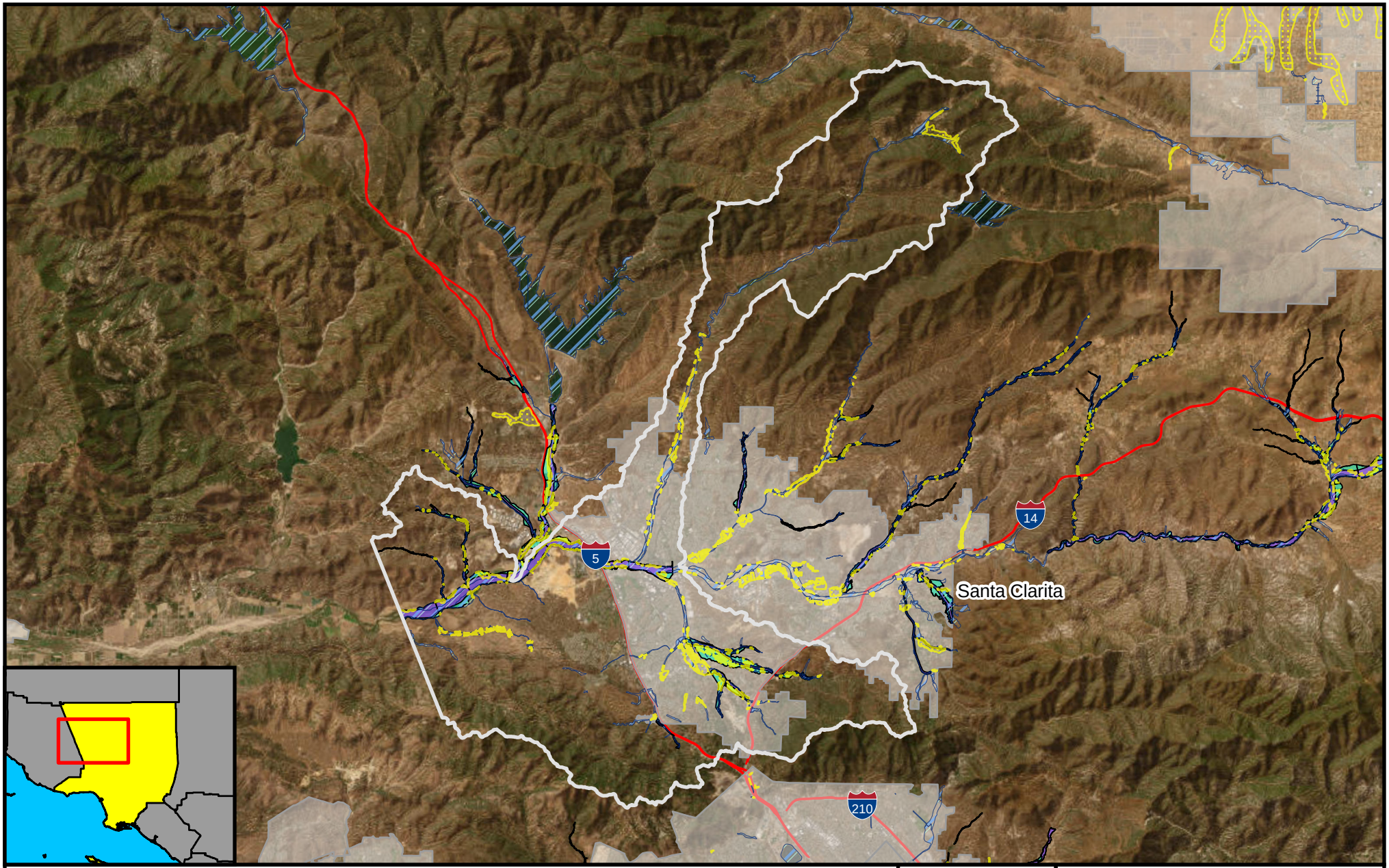
Scale in Miles

BURNS McDONNELL℠

Upper Piru Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary
Incorporated Cities
DPW Floodway
DPW Floodplain

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

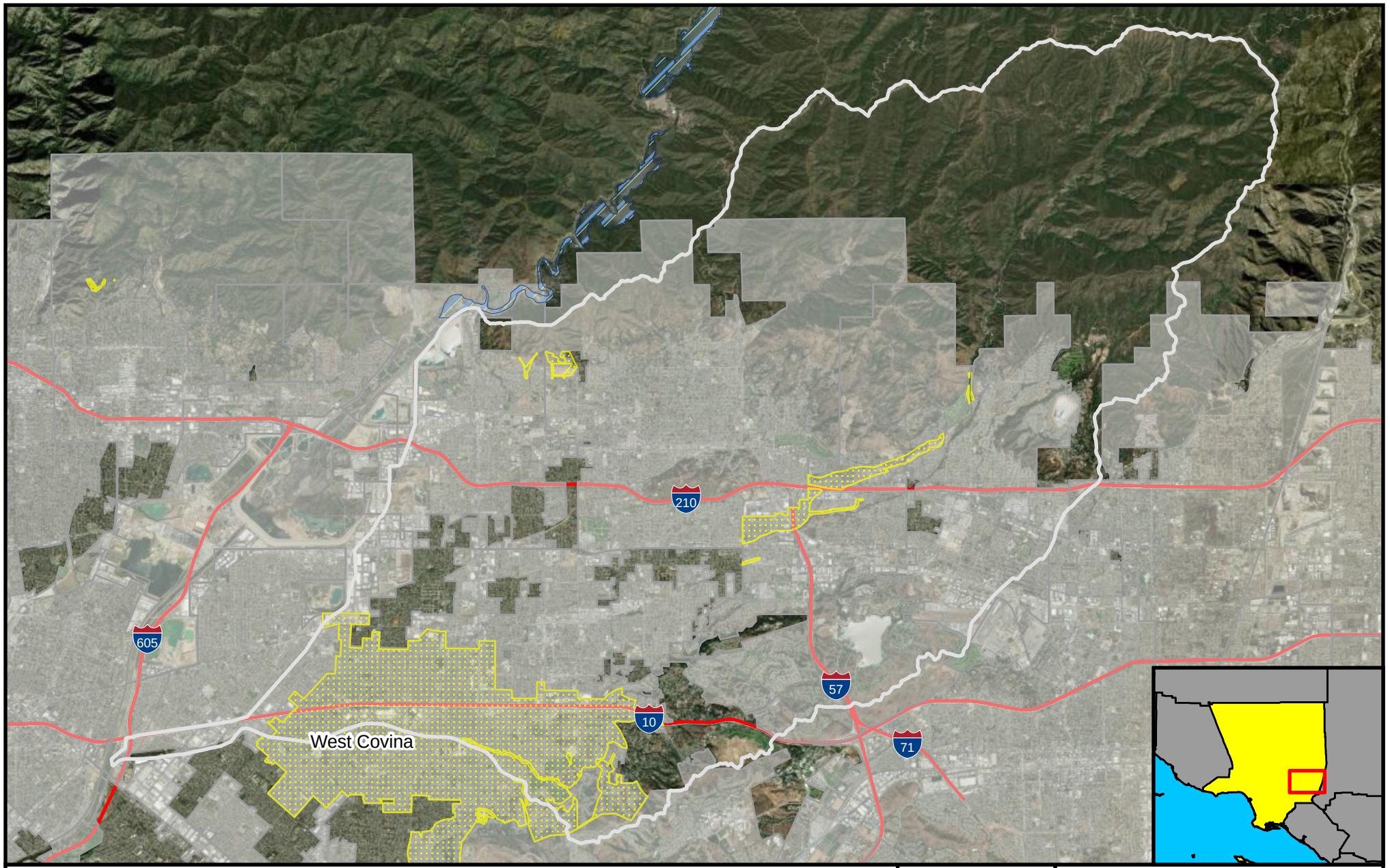
4 2 0 4
Scale in Miles

BURNS McDONNELL℠

Upper Santa Clara River Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/22/2024



Watershed Boundary

Incorporated Cities

Flood Zone

1% Annual Chance Flood

0.2% Annual Chance Flood

NORTH

2 1 0 2

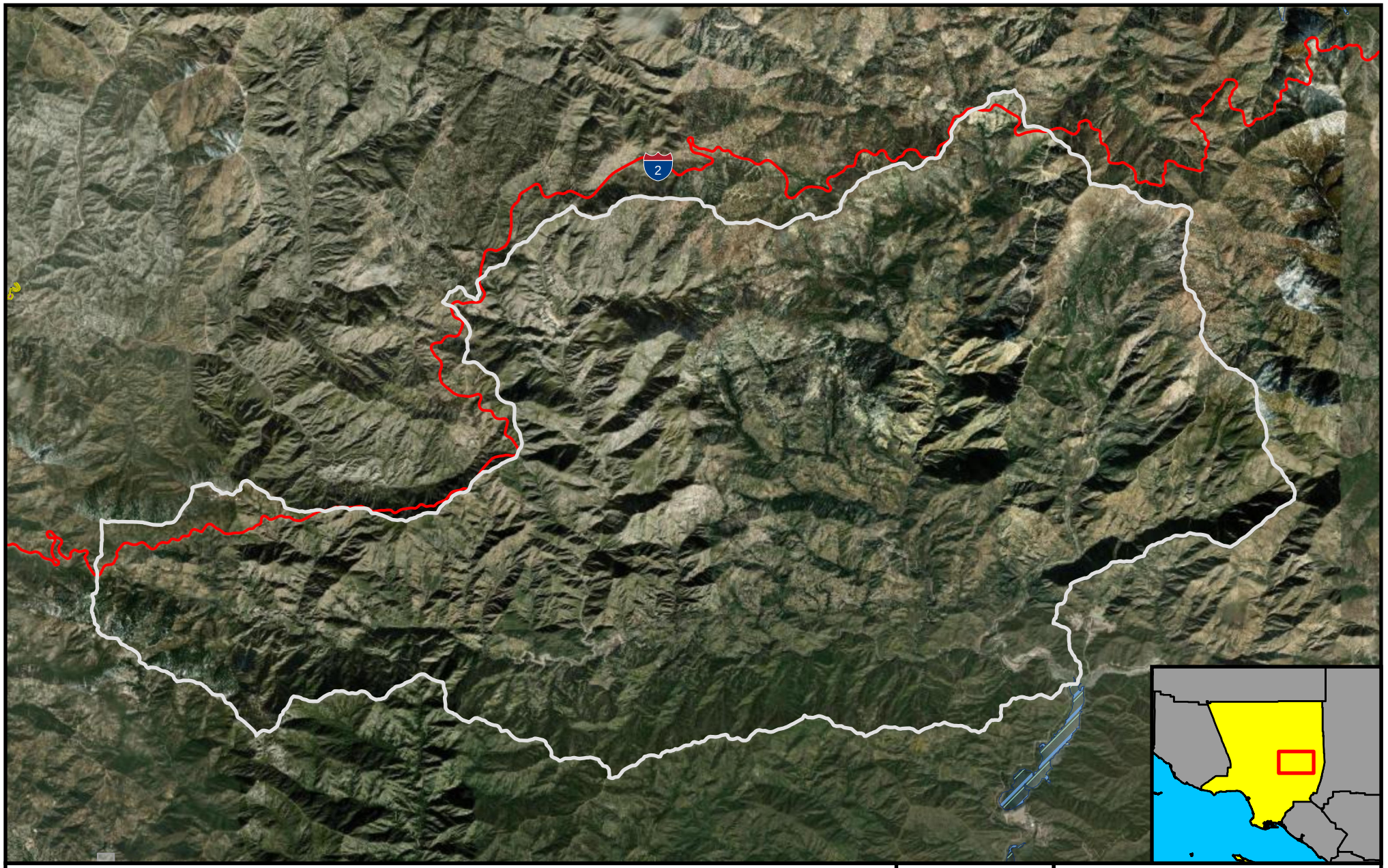
Scale in Miles

BURNS McDONNELL

Walnut Creek Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas
and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024



Watershed Boundary
Incorporated Cities
DPW Floodway

Flood Zone
1% Annual Chance Flood
0.2% Annual Chance Flood

NORTH

2 1 0 2
Scale in Miles

BURNS McDONNELL℠

West Fork San Gabriel River Watershed
Los Angeles County
Floodplain Management Plan
FEMA DFIRM Flood Hazard Areas and County Regulated Floodplains

Source: ESRI, FEMA, and Burns & McDonnell.

Issued: 08/23/2024

APPENDIX G – DATA TABLES

Output Results from HAZUS Model for 2025 FMP Update

EXPOSED POPULATION

Exposed Population

10 Year Flood Zone

Wateshed	Total Population	Population under 18 age	Population between 18-64 age	Population above 64 age	Total household income under 30k
Alamitos Bay-San Pedro Bay	3520	653	2060	798	208
Amargosa Creek	1491	306	759	431	167
Big Rock Creek-Big Rock Wash	1494	432	875	184	121
Big Tujunga Creek	112	13	77	22	3
Bouquet Canyon	163	21	113	28	8
Castaic Creek	6213	163	5939	106	21
Chino Creek	284	85	165	33	21
Cottonwood Creek-Tylerhorse Canyon	30	5	20	2	1
Dominguez Channel	10925	2260	6893	1778	715
Garapito Creek-Frontal Santa Monica Bay	1292	245	764	283	31
Headwaters Santa Clara River	4277	847	2810	610	243
Lake Palmdale-Piute Ponds	178	54	94	31	11
Le Montaine Creek-Eller Slough	52	4	32	13	3
Little Rock Wash	973	206	623	143	85
Lower Los Angeles River	38628	11578	24195	2840	2813
Lower Piru Creek	3	1	2	0	0
Lower San Gabriel River	43891	9148	28311	6442	1963
Malibu Creek	1750	464	1026	257	59
Mescal Creek-Rocky Buttes	4864	1594	2691	569	408
Rio Hondo	3563	683	2203	675	183
Rock Creek-Buckhorn Lake	257	87	140	26	14
Rogers Lake	2	0	2	0	0
Rosamond Lake	276	86	150	33	19
Sacatara Creek-Kings Canyon	78	14	50	12	0
San Jose Creek	18194	3883	11691	2612	722
Town of Pearblossom	3042	838	1874	324	191
Upper Los Angeles River	32	4	25	3	2
Upper Piru Creek	27	6	18	2	2
Upper San Gabriel River	12	1	10	1	0
Upper Santa Clara River	1241	443	717	82	11
Walnut Creek	19994	4397	12917	2685	706
West Fork San Gabriel River	9	1	7	1	0

Exposed Population

50 Year Flood Zone

Wateshed	Total Population	Population under 18 age	Population between 18-64 age	Population above 64 age	Total household income under 30k
Alamitos Bay-San Pedro Bay	8229	1580	4816	1822	436
Amargosa Creek	3867	871	2206	775	300
Big Rock Creek-Big Rock Wash	1637	476	956	204	136
Big Tujunga Creek	229	24	154	49	7
Bouquet Canyon	163	21	113	28	8
Castaic Creek	11253	1396	9142	703	154
Chino Creek	287	85	168	33	21
Cottonwood Creek-Tylerhorse Canyon	52	9	35	5	3
Dominguez Channel	16741	3826	10794	2132	1163
Garapito Creek-Frontal Santa Monica Bay	1295	245	766	283	31
Headwaters Santa Clara River	4666	931	3068	657	267
Lake Palmdale-Piute Ponds	246	63	132	46	16
Le Montaine Creek-Eller Slough	63	4	38	15	3
Little Rock Wash	3311	795	2099	417	314
Lower Los Angeles River	39994	12140	24909	2930	2923
Lower Piru Creek	3	1	2	0	0
Lower San Gabriel River	67612	14286	43622	9709	2796
Malibu Creek	1783	475	1045	260	59
Mescal Creek-Rocky Buttes	6909	2249	3834	813	564
Rio Hondo	9702	1988	5824	1890	580
Rock Creek-Buckhorn Lake	282	96	154	28	14
Rogers Lake	2	0	2	0	0
Rosamond Lake	601	135	356	92	31
Sacatara Creek-Kings Canyon	362	58	227	64	15
San Jose Creek	28886	6362	18429	4089	1154
Town of Pearblossom	4808	1323	2967	508	286
Upper Los Angeles River	141	26	97	18	6
Upper Piru Creek	37	8	25	4	2
Upper San Gabriel River	57	5	45	7	6
Upper Santa Clara River	1352	491	773	86	11
Walnut Creek	26563	5859	17213	3498	881
West Fork San Gabriel River	9	1	7	1	0

Exposed Population

100 Year Flood Zone

Wateshed	Total Population	Population under 18 age	Population between 18-64 age	Population above 64 age	Total household income under 30k
Alamitos Bay-San Pedro Bay	8384	1594	4909	1871	450
Amargosa Creek	4128	943	2362	803	315
Big Rock Creek-Big Rock Wash	1967	575	1151	236	169
Big Tujunga Creek	229	24	154	49	7
Bouquet Canyon	163	21	113	28	8
Castaic Creek	11505	1444	9311	738	164
Chino Creek	287	85	168	33	21
Cottonwood Creek-Tylerhorse Canyon	57	10	39	5	4
Dominguez Channel	20071	4622	12959	2500	1472
Garapito Creek-Frontal Santa Monica Bay	1295	245	766	283	31
Headwaters Santa Clara River	5198	1007	3433	745	291
Lake Palmdale-Piute Ponds	246	63	132	46	16
Le Montaine Creek-Eller Slough	72	5	43	17	3
Little Rock Wash	3623	876	2295	454	336
Lower Los Angeles River	39994	12140	24909	2930	2923
Lower Piru Creek	3	1	2	0	0
Lower San Gabriel River	70684	14960	45636	10087	2951
Malibu Creek	2229	625	1259	341	68
Mescal Creek-Rocky Buttes	7743	2556	4261	909	632
Rio Hondo	11308	2339	6810	2157	642
Rock Creek-Buckhorn Lake	303	103	166	30	14
Rogers Lake	2	0	2	0	0
Rosamond Lake	631	146	372	94	34
Sacatara Creek-Kings Canyon	366	58	229	64	15
San Jose Creek	31833	7047	20353	4426	1224
Town of Pearblossom	5149	1428	3172	540	305
Upper Los Angeles River	141	26	97	18	6
Upper Piru Creek	37	8	25	4	2
Upper San Gabriel River	57	5	45	7	6
Upper Santa Clara River	1409	505	809	90	14
Walnut Creek	30136	6592	19639	3912	997
West Fork San Gabriel River	9	1	7	1	0

Exposed Population

500 Year Flood Zone

Wateshed	Total Population	Population under 18 age	Population between 18-64 age	Population above 64 age	Total household income under 30k
Alamitos Bay-San Pedro Bay	9444	1749	5429	2257	550
Amargosa Creek	4451	1023	2535	877	332
Big Rock Creek-Big Rock Wash	1978	577	1157	239	171
Big Tujunga Creek	233	24	157	49	7
Bouquet Canyon	902	153	617	129	22
Castaic Creek	15291	2649	11629	994	315
Chino Creek	468	126	270	73	23
Cottonwood Creek-Tylerhorse Canyon	57	10	39	5	4
Dominguez Channel	24114	5130	15608	3385	1635
Garapito Creek-Frontal Santa Monica Bay	1313	249	777	286	31
Headwaters Santa Clara River	5349	1031	3535	771	299
Lake Palmdale-Piute Ponds	246	63	132	46	16
Le Montaine Creek-Eller Slough	83	6	49	21	3
Little Rock Wash	4237	1026	2677	535	373
Lower Los Angeles River	41994	12798	26104	3075	3061
Lower Piru Creek	3	1	2	0	0
Lower San Gabriel River	76387	16255	49245	10894	3209
Malibu Creek	2273	640	1280	348	69
Mescal Creek-Rocky Buttes	9585	3102	5340	1123	757
Rio Hondo	21520	4536	13000	3986	1123
Rock Creek-Buckhorn Lake	310	105	170	30	14
Rogers Lake	2	0	2	0	0
Rosamond Lake	663	158	388	98	36
Sacatara Creek-Kings Canyon	642	105	402	111	28
San Jose Creek	40151	8762	25613	5772	1539
Town of Pearblossom	5687	1583	3498	598	334
Upper Los Angeles River	200	38	135	27	8
Upper Piru Creek	43	9	29	5	2
Upper San Gabriel River	147	13	116	17	6
Upper Santa Clara River	3945	1203	2515	221	67
Walnut Creek	35457	7780	23313	4374	1206
West Fork San Gabriel River	9	1	7	1	0

Output Results from HAZUS Model for 2025 FMP Update

EXPOSED STRUCTURES

Exposed Structures

10 Year Flood Zone

Name	Commercial	Industrial	Public	Residential	Grand Total	Insured
Alamitos Bay-San Pedro Bay	45	22	1	454	522	4
Amargosa Creek	11	9	0	142	162	3
Big Rock Creek-Big Rock Wash	5	0	0	121	126	0
Big Tujunga Creek	8	0	0	2	10	0
Bouquet Canyon	0	0	0	16	16	2
Castaic Creek	8	0	2	22	32	6
Chino Creek	0	0	0	85	85	1
Cottonwood Creek-Tylerhorse Canyon	0	0	0	5	5	0
Dominguez Channel	95	26	10	2121	2252	0
Garapito Creek-Frontal Santa Monica Bay	7	1	0	4	12	2
Headwaters Santa Clara River	85	16	7	208	316	32
Lake Palmdale-Piute Ponds	0	0	0	3	3	0
Le Montaine Creek-Eller Slough	3	0	0	10	13	0
Little Rock Wash	23	1	1	124	149	0
Lower Los Angeles River	335	139	51	5977	6502	8
Lower San Gabriel River	135	63	21	6476	6695	1
Malibu Creek	15	0	0	50	65	5
Mescal Creek-Rocky Buttes	11	1	2	437	451	2
Rio Hondo	17	12	2	329	360	1
Rock Creek-Buckhorn Lake	1	0	0	16	17	2
Rosamond Lake	1	1	1	34	37	0
Sacatara Creek-Kings Canyon	1	0	0	14	15	0
San Jose Creek	125	87	14	1943	2169	1
Town of Pearblossom	23	6	3	339	371	2
Upper Los Angeles River	62	45	0	5	112	0
Upper Santa Clara River	0	0	0	8	8	0
Walnut Creek	54	11	6	1801	1872	0

Exposed Structures

50 Year Flood Zone

Name	Commercial	Industrial	Public	Residential	Grand Total	Insured
Alamitos Bay-San Pedro Bay	116	88	1	1598	1803	6
Amargosa Creek	37	35	2	802	876	5
Big Rock Creek-Big Rock Wash	6	0	0	153	159	0
Big Tujunga Creek	17	0	1	32	50	0
Bouquet Canyon	0	0	1	16	17	2
Castaic Creek	53	23	8	335	419	13
Chino Creek	0	0	0	90	90	1
Cottonwood Creek-Tylerhorse Canyon	1	0	0	11	12	0
Dominguez Channel	174	71	15	2688	2948	0
Garapito Creek-Frontal Santa Monica Bay	12	1	0	9	22	2
Headwaters Santa Clara River	105	23	8	301	437	37
Lake Palmdale-Piute Ponds	4	2	0	28	34	0
Le Montaine Creek-Eller Slough	4	3	0	30	37	0
Little Rock Wash	27	3	2	413	445	0
Lower Los Angeles River	355	142	60	6576	7133	8
Lower San Gabriel River	337	137	61	11940	12475	35
Malibu Creek	25	0	0	109	134	8
Mescal Creek-Rocky Buttes	51	4	5	1150	1210	10
Rio Hondo	48	26	7	1887	1968	1
Rock Creek-Buckhorn Lake	1	1	0	36	38	2
Rosamond Lake	6	2	1	133	142	4
Sacatara Creek-Kings Canyon	4	0	1	66	71	3
San Jose Creek	293	175	30	3876	4374	1
Town of Pearblossom	27	13	14	758	812	5
Upper Los Angeles River	64	63	0	7	134	0
Upper Piru Creek	0	0	0	2	2	0
Upper Santa Clara River	33	8	2	22	65	0
Walnut Creek	111	19	13	3879	4022	0

Exposed Structures

100 Year Flood Zone

Name	Commercial	Industrial	Public	Residential	Grand Total	Insured
Alamitos Bay-San Pedro Bay	118	91	1	2004	2214	6
Amargosa Creek	37	37	2	921	997	6
Big Rock Creek-Big Rock Wash	8	0	0	212	220	0
Big Tujunga Creek	20	2	2	35	59	0
Bouquet Canyon	0	0	1	16	17	2
Castaic Creek	71	32	9	507	619	16
Chino Creek	0	0	0	94	94	1
Cottonwood Creek-Tylerhorse Canyon	1	0	0	11	12	0
Dominguez Channel	191	77	20	3033	3321	0
Garapito Creek-Frontal Santa Monica Bay	12	1	0	11	24	5
Headwaters Santa Clara River	120	29	10	403	562	40
Lake Palmdale-Piute Ponds	6	3	1	32	42	0
Le Montaine Creek-Eller Slough	4	4	0	37	45	0
Little Rock Wash	28	4	3	470	505	0
Lower Los Angeles River	364	147	60	6615	7186	8
Lower San Gabriel River	373	150	67	13034	13624	35
Malibu Creek	32	1	0	129	162	10
Mescal Creek-Rocky Buttes	69	9	6	1416	1500	10
Rio Hondo	61	28	7	2203	2299	2
Rock Creek-Buckhorn Lake	1	1	0	37	39	2
Rosamond Lake	6	2	1	160	169	4
Sacatara Creek-Kings Canyon	6	0	1	81	88	3
San Jose Creek	299	182	34	4269	4784	1
Town of Pearblossom	30	13	16	820	879	5
Upper Los Angeles River	65	66	0	7	138	0
Upper Piru Creek	0	0	0	2	2	0
Upper Santa Clara River	38	8	3	32	81	0
Walnut Creek	134	23	14	4793	4964	0

Exposed Structures

500 Year Flood Zone

Name	Commercial	Industrial	Public	Residential	Grand Total	Insured
Alamitos Bay-San Pedro Bay	124	101	2	2366	2593	6
Amargosa Creek	54	44	3	1127	1228	6
Ballona Creek	0	0	0	0	0	0
Big Rock Creek-Big Rock Wash	10	0	0	227	237	0
Big Sycamore Canyon-Frontal Santa Monica Bay	0	0	0	0	0	0
Big Tujunga Creek	22	2	2	40	66	0
Bolsa Chica Channel-Frontal Hunington Harbour	0	0	0	0	0	0
Bouquet Canyon	11	0	3	74	88	6
Calleguas Creek	0	0	0	0	0	0
Castaic Creek	124	44	16	1020	1204	26
Chino Creek	2	0	1	126	129	1
Cottonwood Creek-Tylerhorse Canyon	1	0	0	11	12	0
Dominguez Channel	226	93	22	3386	3727	0
Frontal Santa Monica Bay-San Pedro Bay	0	0	0	0	0	0
Garapito Creek-Frontal Santa Monica Bay	14	2	0	14	30	5
Grapevine Creek	0	0	0	0	0	0
Headwaters Santa Clara River	143	38	10	540	731	45
Lake Palmdale-Piute Ponds	6	5	1	36	48	0
Le Montaine Creek-Eller Slough	6	6	0	44	56	0
Little Rock Wash	34	4	3	731	772	0
Lower Los Angeles River	396	163	62	6863	7484	8
Lower Piru Creek	0	0	0	0	0	0
Lower San Gabriel River	427	169	75	15085	15756	36
Malibu Creek	41	1	2	190	234	14
Mescal Creek-Rocky Buttes	77	12	11	1882	1982	11
Rio Hondo	140	38	15	3921	4114	9
Rock Creek-Buckhorn Lake	1	1	0	47	49	2
Rogers Lake	0	0	0	0	0	0
Rosamond Lake	6	2	1	165	174	4
Sacatara Creek-Kings Canyon	9	2	1	199	211	3
San Jose Creek	374	195	47	5362	5978	2
Sheep Creek-El Mirage Lake	0	0	0	0	0	0
Town of Pearblossom	32	13	16	973	1034	5
Upper Los Angeles River	65	82	0	8	155	0
Upper Piru Creek	0	1	0	4	5	0
Upper San Gabriel River	5	2	1	13	21	0
Upper Santa Clara River	40	8	3	65	116	0
Walnut Creek	162	29	21	6529	6741	0
West Fork San Gabriel River	0	0	0	0	0	0

Output Results from HAZUS Model for 2025 FMP Update

VALUE OF STRUCTURES

Value of
Structures
10 Year Flood Zone

Watershed Name	Percent Replacement	Replacement Cost	Total Exposure Cost
Alamitos Bay-San Pedro Bay	1.32	29807	2263661
Amargosa Creek	0.23	1848	792513
Big Rock Creek-Big Rock Wash	0.34	1409	420178
Big Sycamore Canyon-Frontal Santa Monica Bay	0.35	953	274888
Big Tujunga Creek	0.53	508	95703
Bouquet Canyon	0.36	451	126867
Castaic Creek	0.06	909	1459401
Chino Creek	3.13	1525	48735
Cottonwood Creek-Tylerhorse Canyon	0.58	44	7568
Dominguez Channel	1.43	66466	4648116
Garapito Creek-Frontal Santa Monica Bay	0.31	1330	429186
Headwaters Santa Clara River	0.51	10539	2054489
Lake Palmdale-Piute Ponds	0.03	51	187609
Le Montaine Creek-Eller Slough	0.03	141	435883
Little Rock Wash	1.73	4541	261936
Lower Los Angeles River	1.99	163916	8221089
Lower San Gabriel River	2.22	146751	6603253
Malibu Creek	0.46	6472	1406812
Mescal Creek-Rocky Buttes	0.43	3518	815701
Rio Hondo	2.41	12874	533250
Rock Creek-Buckhorn Lake	0.40	266	66428
Rosamond Lake	0.98	882	90172
Sacatara Creek-Kings Canyon	0.11	236	205845
San Jose Creek	1.05	41514	3937300
Town of Pearblossom	0.94	4963	527887
Upper Los Angeles River	0.03	896	3357663
Upper Piru Creek	0.16	146	90775
Upper San Gabriel River	0.10	65	66471
Upper Santa Clara River	0.05	530	1139412
Walnut Creek	1.23	32045	2604707
West Fork San Gabriel River	0.23	25	10764

*Costs are in thousands of dollars

Value of
Structures
50 Year Flood Zone

Watershed Name	Percent Replacement	Replacement Cost	Total Exposure Cost
Alamitos Bay-San Pedro Bay	4.00	129879	3246996
Amargosa Creek	1.73	26868	1549086
Big Rock Creek-Big Rock Wash	0.93	3960	425870
Big Sycamore Canyon-Frontal Santa Monica Bay	1.28	3507	274888
Big Tujunga Creek	3.35	6385	190426
Bouquet Canyon	0.58	736	126867
Castaic Creek	0.95	29025	3056762
Chino Creek	8.62	4203	48735
Cottonwood Creek-Tylerhorse Canyon	2.90	506	17431
Dominguez Channel	3.07	177606	5784597
Garapito Creek-Frontal Santa Monica Bay	0.54	2508	463705
Headwaters Santa Clara River	1.33	29371	2216252
Lake Palmdale-Piute Ponds	0.86	2605	302699
Le Montaine Creek-Eller Slough	0.33	1474	452636
Little Rock Wash	2.95	17825	603572
Lower Los Angeles River	5.26	458646	8711611
Lower San Gabriel River	5.21	561707	10775908
Malibu Creek	1.42	22123	1554906
Mescal Creek-Rocky Buttes	1.93	20822	1079719
Rio Hondo	4.78	70339	1471774
Rock Creek-Buckhorn Lake	1.82	1270	69927
Rosamond Lake	2.74	4529	165328
Sacatara Creek-Kings Canyon	1.04	3424	329368
San Jose Creek	2.86	155397	5442132
Town of Pearblossom	2.60	19708	759256
Upper Los Angeles River	0.05	1707	3441726
Upper Piru Creek	0.52	497	94862
Upper San Gabriel River	0.11	88	77097
Upper Santa Clara River	0.44	7451	1693871
Walnut Creek	4.12	134453	3266803
West Fork San Gabriel River	0.38	41	10764

*Costs are in thousands of dollars

Value of
Structures
100 Year Flood Zone

Watershed Name	Percent Replacement	Replacement Cost	Total Exposure Cost
Alamitos Bay-San Pedro Bay	4.34	175232	4039008
Amargosa Creek	2.80	45413	1619330
Big Rock Creek-Big Rock Wash	1.46	6739	460911
Big Sycamore Canyon-Frontal Santa Monica Bay	1.81	4976	274888
Big Tujunga Creek	4.19	7987	190426
Bouquet Canyon	0.65	962	148217
Castaic Creek	1.90	60271	3178192
Chino Creek	11.07	5555	50185
Cottonwood Creek-Tylerhorse Canyon	4.66	812	17431
Dominguez Channel	3.27	233111	7121032
Garapito Creek-Frontal Santa Monica Bay	0.65	3026	463705
Headwaters Santa Clara River	1.69	43380	2570315
Lake Palmdale-Piute Ponds	2.85	8658	304209
Le Montaine Creek-Eller Slough	0.52	2337	453515
Little Rock Wash	3.35	23099	690314
Lower Los Angeles River	6.60	575597	8719057
Lower San Gabriel River	6.58	787123	11966425
Malibu Creek	1.82	31969	1760714
Mescal Creek-Rocky Buttes	2.95	34927	1183479
Rio Hondo	5.00	93490	1869297
Rock Creek-Buckhorn Lake	2.53	1848	73066
Rosamond Lake	3.64	6560	180175
Sacatara Creek-Kings Canyon	2.90	9594	330406
San Jose Creek	3.75	210929	5626108
Town of Pearblossom	3.40	27234	801051
Upper Los Angeles River	0.06	2097	3441726
Upper Piru Creek	0.72	682	94862
Upper San Gabriel River	0.13	97	77097
Upper Santa Clara River	1.02	17809	1749041
Walnut Creek	5.09	190768	3748755
West Fork San Gabriel River	0.46	49	10764

*Costs are in thousands of dollars

Value of
Structures
500 Year Flood Zone

Watershed Name	Percent Replacement	Replacement Cost	Total Exposure Cost
Alamitos Bay-San Pedro Bay	7.77	329745	4241997
Amargosa Creek	8.82	154273	1749668
Big Rock Creek-Big Rock Wash	3.01	15156	502763
Big Sycamore Canyon-Frontal Santa Monica Bay	3.83	10515	274888
Big Tujunga Creek	5.21	12651	242803
Bouquet Canyon	2.06	7255	352820
Castaic Creek	4.52	249727	5527653
Chino Creek	13.03	12106	92930
Cottonwood Creek-Tylerhorse Canyon	11.84	2064	17431
Dominguez Channel	5.60	439928	7850904
Garapito Creek-Frontal Santa Monica Bay	1.06	4987	471068
Headwaters Santa Clara River	3.16	83374	2637344
Lake Palmdale-Piute Ponds	8.78	26700	304209
Le Montaine Creek-Eller Slough	1.12	5101	456507
Little Rock Wash	5.65	42244	747620
Lower Los Angeles River	10.17	928902	9133588
Lower Piru Creek	0.98	51	5200
Lower San Gabriel River	12.30	1559841	12685361
Malibu Creek	3.77	68213	1808879
Mescal Creek-Rocky Buttes	6.88	93949	1365724
Rio Hondo	6.09	228957	3760724
Rock Creek-Buckhorn Lake	6.22	4575	73497
Rosamond Lake	11.63	21213	182442
Sacatara Creek-Kings Canyon	8.59	33117	385612
San Jose Creek	6.37	443909	6965775
Town of Pearblossom	6.81	58734	861877
Upper Los Angeles River	0.11	3927	3500599
Upper Piru Creek	1.88	1851	98586
Upper San Gabriel River	22.77	20385	89514
Upper Santa Clara River	1.26	50183	3984937
Walnut Creek	8.32	359357	4317368
West Fork San Gabriel River	0.57	77	13457

*Costs are in thousands of dollars

Output Results from HAZUS Model for 2025 FMP Update

CRITICAL FACILITIES

Critical Facilities

10 Year Flood Zone

Watershed	Energy	Food, Water and Sheltering	Hazardous Materials	Safety and Security	Transportation	Grand Total
Alamitos Bay-San Pedro Bay	0	0	3	0	5	**8**
Amargosa Creek	0	0	0	0	3	**3**
Big Rock Creek-Big Rock Wash	0	0	0	0	1	**1**
Big Tujunga Creek	0	0	0	0	1	**1**
Castaic Creek	1	1	0	0	3	**5**
Chino Creek	0	0	0	0	1	**1**
Dominguez Channel	0	10	4	0	4	**18**
Headwaters Santa Clara River	0	2	0	0	7	**9**
Lake Palmdale-Piute Ponds	0	1	0	0	1	**2**
Lower Los Angeles River	0	21	20	0	20	**61**
Lower San Gabriel River	1	17	2	0	28	**48**
Malibu Creek	0	2	0	0	2	**4**
Mescal Creek-Rocky Buttes	0	3	0	0	0	**3**
Rio Hondo	0	2	1	0	4	**7**
Sacatara Creek-Kings Canyon	0	1	0	0	0	**1**
San Jose Creek	0	6	3	0	4	**13**
Town of Pearblossom	0	4	0	0	1	**5**
Upper Los Angeles River	0	0	0	1	0	**1**
Upper Piru Creek	0	0	0	0	4	**4**
Upper Santa Clara River	0	0	0	0	1	**1**
Walnut Creek	0	4	0	0	2	**6**
West Fork San Gabriel River	0	1	0	0	1	**2**
Grand Total	**2**	**75**	**33**	**1**	**93**	**204**

Critical Facilities

50 Year Flood Zone

Watershed	Energy	Food, Water and Sheltering	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Grand Total
Alamitos Bay-San Pedro Bay	0	0	7	0	1	9	**17**
Amargosa Creek	0	1	0	0	1	18	**20**
Big Rock Creek-Big Rock Wash	0	0	0	0	0	4	**4**
Big Tujunga Creek	0	0	0	0	0	2	**2**
Castaic Creek	1	5	2	0	1	13	**22**
Chino Creek	0	0	0	0	0	1	**1**
Dominguez Channel	0	15	6	0	0	5	**26**
Headwaters Santa Clara River	0	4	0	0	0	8	**12**
Lake Palmdale-Piute Ponds	0	1	0	0	0	6	**7**
Little Rock Wash	0	2	1	0	0	1	**4**
Lower Los Angeles River	0	23	21	2	1	20	**67**
Lower San Gabriel River	1	41	5	0	0	43	**90**
Malibu Creek	0	4	0	0	0	3	**7**
Mescal Creek-Rocky Buttes	0	8	0	1	0	2	**11**
Rio Hondo	0	4	1	0	0	6	**11**
Rosamond Lake	0	0	0	0	0	2	**2**
Sacatara Creek-Kings Canyon	0	1	0	0	0	4	**5**
San Jose Creek	0	15	4	0	0	8	**27**
Town of Pearblossom	0	4	0	0	0	1	**5**
Upper Los Angeles River	0	1	0	0	1	0	**2**
Upper Piru Creek	0	0	0	0	0	9	**9**
Upper Santa Clara River	0	1	0	0	2	6	**9**
Walnut Creek	0	8	0	0	0	3	**11**
West Fork San Gabriel River	0	1	0	0	0	1	**2**
Grand Total	**2**	**139**	**47**	**3**	**7**	**175**	**373**

Critical Facilities

100 Year Flood Zone

Watershed	Energy	Food, Water and Sheltering	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Grand Total
Alamitos Bay-San Pedro Bay	0	0	7	0	1	9	**17**
Amargosa Creek	0	1	0	0	1	18	**20**
Big Rock Creek-Big Rock Wash	0	0	0	0	0	4	**4**
Big Tujunga Creek	0	0	0	0	0	2	**2**
Castaic Creek	1	5	2	0	1	13	**22**
Chino Creek	0	0	0	0	0	1	**1**
Dominguez Channel	0	15	6	0	0	5	**26**
Headwaters Santa Clara River	0	4	0	0	0	8	**12**
Lake Palmdale-Piute Ponds	0	1	0	0	0	6	**7**
Little Rock Wash	0	2	1	0	0	1	**4**
Lower Los Angeles River	0	23	21	2	1	20	**67**
Lower San Gabriel River	1	41	5	0	0	43	**90**
Malibu Creek	0	4	0	0	0	3	**7**
Mescal Creek-Rocky Buttes	0	8	0	1	0	2	**11**
Rio Hondo	0	4	1	0	0	6	**11**
Rosamond Lake	0	0	0	0	0	2	**2**
Sacatara Creek-Kings Canyon	0	1	0	0	0	4	**5**
San Jose Creek	0	15	4	0	0	8	**27**
Town of Pearblossom	0	4	0	0	0	1	**5**
Upper Piru Creek	0	0	0	0	0	9	**9**
Upper Santa Clara River	0	1	0	0	2	6	**9**
Walnut Creek	0	8	0	0	0	3	**11**
West Fork San Gabriel River	0	1	0	0	0	1	**2**
Grand Total	**2**	**139**	**47**	**3**	**7**	**175**	**373**

Critical Facilities

500 Year Flood Zone

Watershed	Communications	Energy	Food, Water and Sheltering	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Grand Total
Alamitos Bay-San Pedro Bay	0	0	0	7	0	1	12	**20**
Amargosa Creek	1	0	2	0	0	1	24	**28**
Big Rock Creek-Big Rock Wash	0	0	1	0	0	0	4	**5**
Big Tujunga Creek	0	0	1	0	0	0	4	**5**
Bouquet Canyon	0	0	0	0	0	0	1	**1**
Castaic Creek	0	1	8	2	0	2	19	**32**
Chino Creek	0	0	0	0	0	0	1	**1**
Dominguez Channel	0	0	17	11	0	2	17	**47**
Garapito Creek-Frontal Santa Monica Bay	0	0	2	0	0	0	0	**2**
Headwaters Santa Clara River	1	0	9	2	0	0	13	**25**
Lake Palmdale-Piute Ponds	0	0	1	0	0	0	6	**7**
Little Rock Wash	0	0	4	1	0	0	1	**6**
Lower Los Angeles River	0	0	27	21	3	1	24	**76**
Lower San Gabriel River	0	1	48	6	0	0	53	**108**
Malibu Creek	0	0	4	0	0	0	8	**12**
Mescal Creek-Rocky Buttes	0	0	11	0	1	1	3	**16**
Rio Hondo	0	0	6	1	0	1	10	**18**
Rosamond Lake	0	0	0	0	0	0	3	**3**
Sacatara Creek-Kings Canyon	0	0	1	0	0	0	5	**6**
San Jose Creek	0	0	20	5	0	0	8	**33**
Town of Pearblossom	0	0	5	0	0	0	1	**6**
Upper Los Angeles River	0	0	1	0	0	1	1	**3**
Upper Piru Creek	0	0	0	0	0	0	13	**13**
Upper San Gabriel River	0	0	0	0	0	0	2	**2**
Upper Santa Clara River	0	2	1	0	0	2	6	**11**
Walnut Creek	0	0	14	0	0	0	6	**20**
West Fork San Gabriel River	0	0	1	0	0	0	1	**2**
Grand Total	**2**	**4**	**184**	**56**	**4**	**12**	**246**	**508**

APPENDIX H – EXAMPLE PROGRESS REPORT

COUNTY OF LOS ANGELES FLOODPLAIN MANAGEMENT PLAN (FMP) AND PROGRAM FOR PUBLIC INFORMATION ANNUAL PROGRESS REPORT

OVERVIEW

Reporting Period

(Insert reporting period)

Background

Los Angeles County developed a floodplain management plan to reduce risk from flooding by identifying resources, information, and strategies for risk reduction. To prepare the plan, Los Angeles County organized resources, assessed risks from flooding, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from floods. The plan can be viewed online at:

https://dpw.lacounty.gov/wmd/NFIP/FMP2025/

During the floodplain management plan development, Los Angeles County also developed a program for public information to identify, prepare, implement, and monitor a range of flood-related public information activities that meet specific, local needs. The PPI framework is described in Chapter 14 of the floodplain management plan.

Purpose

The purpose of this report is to provide an annual update on the implementation of the action plan identified in the Los Angeles County Comprehensive Floodplain Management Plan and on the implementation and evaluation of the outreach projects identified in the program for public information. The objective is to ensure that there is a continuing and responsive planning process that will keep the floodplain management plan and related outreach efforts dynamic and responsive to the needs and capabilities of Los Angeles County and stakeholders. This report discusses the following:

- Flood events that have occurred within the last year
- Changes in risk exposure within the planning area (unincorporated Los Angeles County)
- Mitigation success stories
- Changes in capabilities that could impact plan implementation
- Floodplain management plan implementation status
    - Review of the action plan
    - Recommendations for changes/enhancement
- Program for Public Information implementation and evaluation status
    - Review of the outreach projects
    - Review on progress toward desired outcomes
    - Recommendations for changes/enhancement

Flood Events within the Planning Area

During the reporting period, there were __ flood events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- _____
- _____
- _____
- _____
- _____

Changes in Risk Exposure in the Planning Area

(Insert brief overview of any flood event in the planning area that changed the probability of occurrence of flooding as presented in the floodplain management plan)

Mitigation Success Stories

(Insert brief overview of mitigation accomplishments during the reporting period, including notably successful public outreach efforts)

Changes That May Impact the Implementation of the Plan

(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan or on public outreach efforts. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)

FLOODPLAIN MANAGEMENT PLAN PROGRESS

Summary Overview of the Plan's Progress

The performance period for the floodplain management plan became effective on ____, 2025, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before _____, 2030. As of this reporting period, the performance period for this plan is considered to be __% complete. The floodplain management plan has targeted 38 flood hazard mitigation actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __ actions (__%) reported ongoing action toward completion.
- __ out of __ actions (__%) were reported as being complete.
- __ out of __ actions (___%) reported no action taken.

The Floodplain Management Plan Floodplain Management Plan Committee

The floodplain management plan Floodplain Management Committee, made up of stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 202_. It was determined through the plan's development process that a Floodplain Management Committee would remain in service to oversee maintenance of the plan. At a minimum, the Floodplain Management Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the Floodplain Management Committee membership is as indicated in Table 1.

Figure 1. Floodplain Management Committee Members

Name	Title	Jurisdiction/Agency

Review of the Action Plan

Table 2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the floodplain management plan for more detailed descriptions of each action and the prioritization process. Address the following in the "status" column of the following table:

- Was any element of the action carried out during the reporting period?
- If no action was completed, why?
- Is the timeline for implementation for the action still appropriate?
- If the action was completed, does it need to be changed or removed from the action plan?

Figure 2. Action Plan Matrix

Action #	Action Description	Action Taken? (yes/no)	Timeline	Priority	Status	Status (X,O,✓)

Completion status legend:
✓= Project Completed
O = Action ongoing toward completion
X = No progress at this time

Recommendations for Changes or Enhancements

Based on the review of this report by the floodplain management plan Floodplain Management Plan Committee, the following recommendations will be noted for future updates or revisions to the plan

- _____
- _____
- _____
- _____
- _____
- _____

PROGRAM FOR PUBLIC INFORMATION IMPLEMENTATION

Summary Overview and Implementation

The annual performance period for the program for public information is from September 1 to September 30 of each year. In the 20___ reporting period, ___ (__ percent) of the ___ identified outreach projects were implemented. Of the projects that were implemented ___ (__ percent) have resulted in progress toward desired outcomes.

The Program for Public Information Committee

The Program for Public Information Committee, made up of stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 202_. It is expected that turnover will occur in Program for Public Information Committee membership from year to year. For this reporting period, the Committee membership is as indicated in Table 3.

Figure 3. Program for Public Information Committee

Name #	Title	Jurisdiction/Agency

Review of the Outreach Projects

Table 4 reviews the identified outreach projects, reporting on the following items:

- The target audiences, the messages, and the desired outcomes.
- The projects in the PPI used to convey the messages.
- Which projects were implemented.
- Why some projects were not implemented.
- What progress was made toward the desired outcomes.
- What should be changed.

Recommendations for Changes or Enhancements

Based on the review of this report by the Program for Public Information Committee, the following changes will be incorporated during the next performance period:

- _____
- _____
- _____
- _____

Figure 4. Program For Public Information Committee

Message	Target Audiences	Desired Outcomes	Progress Toward Outcomes	Projects	Assignment	Schedule	Stakeholder	Implemented (Yes or why not?)
Topic 1								
Topic 2								
Topic 3								
Topic 4								
Topic 5								
Topic 6								
Topic 7								
Recommended Changes:								

PUBLIC REVIEW NOTICE

The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the Los Angeles County Board of Supervisors and to local media outlets and the report is posted on the floodplain management plan website. Any questions or comments regarding the contents of this report should be directed to:

FMP Hotline

(626) 458-4321

floodanalysis@dpw.lacounty.gov

APPENDIX I – REPETITIVE LOSS AREA ANALYSIS

LOS ANGELES COUNTY

REPETITIVE LOSS AREA ANALYSIS

COMPANION REPORT TO THE COMPREHENSIVE FLOODPLAIN MANAGEMENT PLAN

FINAL

September 3, 2025

BURNS McDONNELL

CONTENTS

Part 1 – Planning Process and Project Background 1-1

1 Introduction 1-1

1.1 Repetitive Loss Properties and the Community Rating System 1-1

1.2 Los Angeles County Repetitive Loss Area Analysis 1-1

1.3 Numbering and Nomenclature 1-4

2 Repetitive Loss Area Analysis Methodology 2-1

2.1 Basic Requirements 2-1

2.2 Reverse Damage Function Methodology 2-1

2.2.1 Rationale for Alternative Approach 2-1

2.2.2 Description of Selected Approach 2-2

2.3 Secondary Identification 2-4

2.4 Property Condition Assessment 2-4

2.5 Foundation Type 2-5

3 Repetitive Loss Areas Outreach 3-1

3.1 CRS Outreach Requirements for RLAA 3-1

3.2 Countywide Floodplain Management Planning Effort 3-1

3.2.1 Contact with Agencies and Organizations 3-1

3.2.2 Strategy 3-2

3.2.3 Public Involvement Results 3-9

3.3 Repetitive Loss Area Specific Outreach 3-11

4 Relevant Programs and Regulations 4-1

4.1 Federal and State 4-1

4.2 Local 4-5

4.2.1 General Plan 4-5

4.2.2 Community Plans 4-9

4.2.3 Watershed Management Program 4-9

4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan 4-10

4.2.5 Los Angeles County Flood Control District 4-11

4.2.6 Antelope Valley Comprehensive Plan and Amendments 4-11

4.2.7 Antelope Valley Integrated Regional Water Management Plan and Salt and Nutrient Management Plan 4-12

4.2.8 Upper Santa Clara River Watershed Integrated Regional Water Management Plan 4-12

4.2.9 Sediment Management Strategic Plan....4-12
4.2.10 Local Coastal Programs....4-13
4.2.11 Los Angeles County Low Impact Development Ordinance....4-13
4.2.12 County of Los Angeles Operational Area Emergency Operations Plan....4-14
4.2.13 Topanga Creek Watershed Management Plan....4-14
4.2.14 Rio Hondo Watershed Management Plan....4-14
4.2.15 Gateway Watershed Management Program....4-14
4.2.16 Los Angeles River Master Plan and Corridor Highlights....4-14
4.2.17 Los Angeles County Annual Hydrologic Reports....4-15
4.2.18 Los Angeles County Drainage Area....4-15
4.2.19 Trash Best Management Practices....4-18
4.2.20 Los Angeles County Response to Americans with Disabilities Act....4-18
4.3 Capability Assessment....4-19
4.4 FEMA Special Flood Hazard Areas....4-24
5 Mitigated Repetitive Loss Properties....5-1
5.1 Repetitive Loss List Correction....5-1
5.2 Mitigated Repetitive Loss Properties....5-3
6 Mitigation Alternatives Considered....6-1
6.1 Preventive....6-1
6.2 Property Protection....6-1
6.2.1 Aquisition....6-2
6.2.2 Home Elevation....6-2
6.2.3 Dry Flood-Proofing....6-3
6.2.4 Wet Flood-Proofing....6-4
6.2.5 Direct Drainage Away from the Building....6-6
6.2.6 Drainage Maintenance....6-6
6.2.7 Sewer Improvements....6-7
6.2.8 Permanent Temporary Barriers....6-8
6.3 Natural Resouce Protection....6-12
6.4 Emergency Services....6-12
6.5 Structural Projects....6-12
6.6 Public Information....6-12
Part 2 – Analysis of Individual Repetitive Loss Areas....6-1
7 Agua Dulce A Repetitive Loss Area....7-1
7.1 Problem Statement....7-1

7.2 Identified Repetitive Loss Property....7-1
7.3 Properties Included in Repetitive Loss Area....7-1
8 Agua Dulce B Repetitive Loss Area....8-1
8.1 Problem Statement....8-1
8.2 Identified Repetitive Loss Property....8-1
8.3 Properties Included in Repetitive Loss Area....8-1
9 Altadena A Repetitive Loss Area....9-1
9.1 Problem Statement....9-1
9.2 Identified Repetitive Loss Property....9-1
9.3 Properties Included in Repetitive Loss Area....9-1
10 Altadena B Repetitive Loss Area....10-1
10.1 Problem Statement....10-1
10.2 Identified Repetitive Loss Property....10-1
10.3 Properties Included in Repetitive Loss Area....10-1
11 Calabasas A Repetitive Loss Area....11-1
11.1 Problem Statement....11-1
11.2 Identified Repetitive Loss Property....11-1
11.3 Properties Included in Repetitive Loss Area....11-1
12 Calabasas B Repetitive Loss Area....12-1
12.1 Problem Statement....12-1
12.2 Identified Repetitive Loss Property....12-1
12.3 Properties Included in Repetitive Loss Area....12-1
13 Cold Creek A Repetitive Loss Area....13-1
13.1 Problem Statement....13-1
13.2 Identified Repetitive Loss Property....13-1
13.3 Properties Included in Repetitive Loss Area....13-1
14 Cold Creek B Repetitive Loss Area....14-1
14.1 Problem Statement....14-1
14.2 Identified Repetitive Loss Property....14-1
14.3 Properties Included in Repetitive Loss Area....14-1
15 Del Sur Repetitive Loss Area....15-1
15.1 Problem Statement....15-1
15.2 Identified Repetitive Loss Property....15-1
15.3 Properties Included in Repetitive Loss Area....15-1
16 Lake Hughes Repetitive Loss Area....16-1
16.1 Problem Statement....16-1
16.2 Identified Repetitive Loss Property....16-1

16.3 Properties Included in Repetitive Loss Area 16-1
17 Lower Topanga Canyon Repetitive Loss Area 17-1
17.1 Problem Statement 17-1
17.2 Identified Repetitive Loss Property 17-1
17.3 Properties Included in Repetitive Loss Area 17-2
18 Malibou Lake A Repetitive Loss Area 18-1
18.1 Problem Statement 18-1
18.2 Identified Repetitive Loss Property 18-1
18.3 Properties Included in Repetitive Loss Area 18-2
19 Malibou Lake B Repetitive Loss Area 19-1
19.1 Problem Statement 19-1
19.2 Identified Repetitive Loss Property 19-1
19.3 Properties Included in Repetitive Loss Area 19-1
20 Malibu Repetitive Loss Area 20-1
20.1 Problem Statement 20-1
20.2 Identified Repetitive Loss Property 20-1
20.3 Properties Included in Repetitive Loss Area 20-1
21 Quartz Hill A Repetitive Loss Area 21-1
21.1 Problem Statement 21-1
21.2 Identified Repetitive Loss Property 21-1
21.3 Properties Included in Repetitive Loss Area 21-1
22 Quartz Hill B Repetitive Loss Area 22-1
22.1 Problem Statement 22-1
22.2 Identified Repetitive Loss Property 22-1
22.3 Properties Included in Repetitive Loss Area 22-1
23 Quartz Hill C Repetitive Loss Area 23-1
23.1 Problem Statement 23-1
23.2 Identified Repetitive Loss Property 23-1
23.3 Properties Included in Repetitive Loss Area 23-1
24 Roosevelt Repetitive Loss Area 24-1
24.1 Problem Statement 24-1
24.2 Identified Repetitive Loss Property 24-1
24.3 Properties Included in Repetitive Loss Area 24-1
25 Rowland Heights Repetitive Loss Area 25-1
25.1 Problem Statement 25-1
25.2 Identified Repetitive Loss Property 25-1
25.3 Properties Included in Repetitive Loss Area 25-1

26 Topanga Canyon A Repetitive Loss Area 26-1
26.1 Problem Statement 26-1
26.2 Identified Repetitive Loss Property 26-1
26.3 Properties Included in Repetitive Loss Area 26-1
27 Topanga Canyon B Repetitive Loss Area 27-1
27.1 Problem Statement 27-1
27.2 Identified Repetitive Loss Property 27-1
27.3 Properties Included in Repetitive Loss Area 27-1
28 Topanga Canyon C Repetitive Loss Area 28-1
28.1 Problem Statement 28-1
28.2 Identified Repetitive Loss Property 28-1
28.3 Properties Included in Repetitive Loss Area 28-1
29 Topanga Canyon D Repetitive Loss Area 29-1
29.1 Problem Statement 29-1
29.2 Identified Repetitive Loss Property 29-1
29.3 Properties Included in Repetitive Loss Area 29-1
30 Topanga Canyon E Repetitive Loss Area 30-1
30.1 Problem Statement 30-1
30.2 Identified Repetitive Loss Property 30-1
30.3 Properties Included in Repetitive Loss Area 30-1
31 Topanga Canyon F Repetitive Loss Area 31-1
31.1 Problem Statement 31-1
31.2 Identified Repetitive Loss Property 31-1
31.3 Properties Included in Repetitive Loss Area 31-1
32 Triunfo Canyon A Repetitive Loss Area 32-1
32.1 Problem Statement 32-1
32.2 Identified Repetitive Loss Property 32-1
32.3 Properties Included in Repetitive Loss Area 32-1
33 Triunfo Canyon B Repetitive Loss Area 33-1
33.1 Problem Statement 33-1
33.2 Identified Repetitive Loss Property 33-1
33.3 Properties Included in Repetitive Loss Area 33-1
34 Upper Topanga Canyon Repetitive Loss Area 34-1
34.1 Problem Statement 34-1
34.2 Identified Repetitive Loss Property 34-1
34.3 Properties Included in Repetitive Loss Area 34-2
35 Summary of Repetitive Loss Area Analysis 35-1

Part 3 – Repetitive Loss Area Action Plan 35-1
36 Repetitive Loss Area Action Plan 36-1
36.1 Mitigation Actions 36-1
36.2 Benefit/Cost Analysis 36-11
36.3 Action Plan Prioritization 36-12
36.4 Annual Evaluation Report 36-18
37 Plan Adoption 37-19

References 1

APPENDIX A – GENERIC DEPTH DAMAGE RELATIONSHIPS FOR RESIDENTIAL STRUCTURES
APPENDIX B – FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

FIGURES

Figure 2-1: Foundation Types 2-5
Figure 3-1: Sample Page from Floodplain Management Plan Website 3-3
Figure 3-2: Sample Page from Survey 3-4
Figure 3-3: Post Card Mailing Advertising the Survey 3-5
Figure 3-4: Flyer Announcing Phase 1 Public Meeting for the Floodplain Management Plan 3-7
Figure 3-5: Printouts at Phase 1 Public Meeting 3-8
Figure 3-6: FMP Presentation at Malibou Lake Public Meeting Phase 1 July 18th 2024 3-8
Figure 3-7: Repetitive Loss Area Target Mailing #1 3-12
Figure 3-8: Repetitive Loss Area Target Mailing #2 3-13
Figure 4-1: Los Angeles County Significant Ecological Areas and Coastal Resouce Areas 4-8
Figure 4-2: Alondra Park Multi-Benefit Stormwater Capture Project 4-10
Figure 4-3: Los Angeles County Flood Control District 4-17
Figure 5-1: Example AW-501 5-2
Figure 6-1: Dry Flood-Proofing Example 6-3
Figure 6-2: Window Well Example 6-4
Figure 6-3: Wet Flood-Proofing Example 6-5
Figure 6-4: Example of a Residential Yard Swale 6-6
Figure 6-5: Public Works employee clearing storm drains during rainy season 6-7
Figure 6-6: Sewer Backflow Valve Installation Example 6-8
Figure 6-7: Sandbags as a Temporary Barrier 6-9

Figure 6-8: Unprotected Homes 6-10
Figure 6-9: Homes Protected from Major Damage 6-11
Figure 7-1: Agua Dulce A Repetitive Loss Area 7-3
Figure 8-1: Agua Dulce B Repetitive Loss Area 8-3
Figure 12-1: Calabasas B Repetitive Loss Area 12-4
Figure 13-1: Cold Creek A Repetitive Loss Area 13-3
Figure 14-1: Cold Creek B Repetitive Loss Area 14-3
Figure 15-1: Del Sur Repetitive Loss Area 15-3
Figure 16-1: Lake Hughes Repetitive Loss Area 16-3
Figure 17-1: Lower Topanga Canyon Repetitive Loss Area 17-3
Figure 18-1: Malibou Lake A Repetitive Loss Area 18-10
Figure 19-1: Malibou Lake B Repetitive Loss Area 19-3
Figure 20-1: Malibu Repetitive Loss Area 20-3
Figure 22-1: Quartz Hill B Repetitive Loss Area 22-4
Figure 23-1: Quartz Hill C Repetitive Loss Area 23-4
Figure 24-1: Roosevelt Repetitive Loss Area 24-3
Figure 27-1: Topanga Canyon B Repetitive Loss Area 27-3
Figure 29-1: Topanga Canyon D Repetitive Loss Area 29-3
Figure 30-1: Topanga Canyon E Repetitive Loss Area 30-3
Figure 31-1: Topanga Canyon F Repetitive Loss Area 31-3
Figure 34-1: Upper Topanga Canyon Repetitive Loss Area 34-9

TABLES

Table 1-1: Naming and Numbering of Los Angeles County Repetitive Loss Properties and Areas 1-2
Table 3-1: Floodplain Management Plan Public Meetings 3-6
Table 3-2: Summary of Public Meetings 3-11
Table 4-1: Summary of Relevant Federal Agencies, Programs and Regulations 4-1
Table 4-2: Summary of Relevant State Agencies, Programs and Regulations 4-3
Table 4-3: Significant Ecological Areas and Coastal Resource Areas 4-6
Table 4-4: Los Angeles County Legal and Regulatory Capability 4-19
Table 4-5: Administrative and Technical Capability 4-22
Table 4-6: Fiscal Capability 4-22
Table 4-7: Community Classifications 4-23

Table 4-8: National Flood Insurance Program Compliance 4-23
Table 7-1: Repetitive Loss Properties in Agua Dulce A Repetitive Loss Area 7-1
Table 7-2: All Properties in Agua Dulce A Repetitive Loss Area 7-2
Table 8-1: Repetitive Loss Properties in Agua Dulce B Repetitive Loss Area 8-1
Table 8-2: All Properties in Agua Dulce B Repetitive Loss Area 8-2
Table 9-1: Repetitive Loss Properties in Altadena A Repetitive Loss Area 9-1
Table 9-2: All Properties in Altadena A Repetitive Loss Area 9-2
Table 10-1: Repetitive Loss Properties in Altadena B Repetitive Loss Area 10-1
Table 10-2: All Properties in Altadena B Repetitive Loss Area 10-2
Table 11-1: Repetitive Loss Properties in Calabasas A Repetitive Loss Area 11-1
Table 11-2: All Properties in Calabasas A Repetitive Loss Area 11-2
Table 12-1: Repetitive Loss Properties in Calabasas B Repetitive Loss Area 12-1
Table 12-2: All Properties in Calabasas B Repetitive Loss Area 12-2
Table 13-1: Repetitive Loss Properties in Cold Creek A Repetitive Loss Area 13-1
Table 13-2: All Properties in Cold Creek A Repetitive Loss Area 13-2
Table 14-1: Repetitive Loss Properties in Cold Creek B Repetitive Loss Area 14-1
Table 14-2: All Properties in Cold Creek B Repetitive Loss Area 14-2
Table 15-1: Repetitive Loss Properties in Del Sur Repetitive Loss Area 15-1
Table 15-2: All Properties in Del Sur Repetitive Loss Area 15-2
Table 16-1: Repetitive Loss Properties in Lake Hughes Repetitive Loss Area 16-1
Table 16-2: Properties in Lake Hughes Repetitive Loss Area 16-2
Table 17-1: Repetitive Loss Properties in Lower Topanga Canyon Repetitive Loss Area 17-2
Table 18-1: Repetitive Loss Properties in Malibou Lake A Repetitive Loss Area 18-2
Table 18-2: All Properties in Malibou Lake A Repetitive Loss Area 18-3
Table 19-1: Repetitive Loss Properties in Malibou Lake B Repetitive Loss Area 19-1
Table 19-2: All Properties in Malibou Lake B Repetitive Loss Area 19-2
Table 20-1: Repetitive Loss Properties in Malibu Repetitive Loss Area 20-1
Table 20-2: All Properties in Malibu Repetitive Loss Area 20-2
Table 21-1: Repetitive Loss Properties in Quartz Hill A Repetitive Loss Area 21-1
Table 21-2: All Properties in Quartz Hill A Repetitive Loss Area 21-2
Table 22-1: Repetitive Loss Properties in Quartz Hill B Repetitive Loss Area 22-1
Table 22-2: All Properties in Quartz Hill B Repetitive Loss Area 22-2
Table 23-1: Repetitive Loss Properties in Quartz Hill C Repetitive Loss Area 23-1
Table 23-2: All Properties in Quartz Hill C Repetitive Loss Area 23-2
Table 24-1: Repetitive Loss Properties in Roosevelt Repetitive Loss Area 24-1

Table 24-2: All Properties in Roosevelt Repetitive Loss Area 24-2
Table 25-1: Repetitive Loss Properties in Rowland Heights Repetitive Loss Area 25-1
Table 25-2: All Properties in Rowland Heights Repetitive Loss Area 25-2
Table 26-1: Repetitive Loss Properties in Topanga Canyon A Repetitive Loss Area 26-1
Table 26-2: All Properties in Topanga Canyon A Repetitive Loss Area 26-2
Table 27-1: Repetitive Loss Properties in Topanga Canyon B Repetitive Loss Area 27-1
Table 27-2: All Properties in Topanga Canyon B Repetitive Loss Area 27-2
Table 28-1: Repetitive Loss Properties in Topanga Canyon C Repetitive Loss Area 28-1
Table 28-2: All Properties in Topanga Canyon C Repetitive Loss Area 28-2
Table 29-1: Repetitive Loss Properties in Topanga Canyon D Repetitive Loss Area 29-1
Table 29-2: All Properties in Topanga Canyon D Repetitive Loss Area 29-2
Table 30-1: Repetitive Loss Properties in Topanga Canyon E Repetitive Loss Area 30-1
Table 30-2: All Properties in Topanga Canyon E Repetitive Loss Area 30-2
Table 31-1: Repetitive Loss Properties in Topanga Canyon F Repetitive Loss Area 31-1
Table 31-2: All Properties in Topanga Canyon F Repetitive Loss Area 31-2
Table 32-1: Repetitive Loss Properties in Triunfo Canyon A Repetitive Loss Area 32-1
Table 32-2: All Properties in Triunfo Canyon A Repetitive Loss Area 32-2
Table 33-1: Repetitive Loss Properties in Triunfo Canyon B Repetitive Loss Area 33-1
Table 33-2 All Properties in Triunfo Canyon B Repetitive Loss Area 33-2
Table 34-1: Repetitive Loss Properties in Upper Topanga Canyon Repetitive Loss Area 34-2
Table 34-2: All Properties in Upper Topanga Canyon Repetitive Loss Area 34-3
Table 35-1: Summary of Repetitive Loss Area Analysis 35-1
Table 36-1: Action Plan-Flood Mitigation Initiatives 36-2
Table 36-2: Prioritization of Mitigation Actions 36-13

List of Abbreviations

Abbreviation	Term/Phrase/Name
AB	Assembly Bill
ADA	Americans with Disabilities Act
BLS	Bureau of Labor Statistics
CEQA	California Environmental Quality Act
CRA	Coastal Resource Area
CRS	Community Rating System
DWR	California Department of Water Resources
EDD	Employment Development Department
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMP	Floodplain Management Plan
GIS	Geographic Information System
HUC	Hydrologic Unit Code
IRWM	Integrated Regional Water Management
LACDA	Los Angeles County Drainage Area
LACFCD	Los Angeles County Flood Control District
LCP	Local Coastal Program
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer System
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NRCS	Natural Resources Conservation Service
PPI	Program for Public Information
RLAA	Repetitive Loss Area Analysis
SB	Senate Bill
SEA	Significant Ecological Area
SFHA	Special Flood Hazard Area

SR	State Route

Part 1 – Planning Process and Project Background

1 Introduction

1.1 Repetitive Loss Properties and the Community Rating System

A repetitive loss property is defined by the Federal Emergency Management Agency (FEMA) as a property in which two or more claims of more than $1,000 have been paid by the National Flood Insurance Program (NFIP) within any 10-year period since 1978 (e.g., two claims during the periods 1978–1987, 1979–1988, etc.) (FEMA, 2021). Over $12 billion has been paid to repetitive loss properties nationwide, about one-fourth of the NFIP payments since 1978. (FEMA, 2021).

FEMA's Community Rating System (CRS) encourages communities to identify and mitigate the causes of repetitive losses. The first step is to map repetitive loss areas, which are contiguous areas that include one or more properties on FEMA's list of repetitive loss properties and the nearby properties with exposure to the same or similar flooding conditions. FEMA considers listed repetitive loss properties to indicate an overall repetitive loss problem that may affect other nearby properties. Designation of repetitive loss areas around listed repetitive loss properties allows an evaluation of actual or potential flooding problems at properties that may not have flood insurance or may have had only a single previous claim. This provides properties with the same exposure to a flood risk to be addressed equally. The CRS, which provides reduced flood insurance premiums for communities that carry out flood mitigation activities, requires the following from participating communities with 50 or more repetitive loss properties (Category C communities):

- Prepare a map of repetitive loss areas.
- Review and describe each area's repetitive loss problem.
- Prepare a list of the addresses of all properties in the repetitive loss areas with insurable buildings, which are defined to include the following (FEMA, 2017a):
  - A structure that is affixed to a permanent site and has two or more outside rigid walls and a fully secured roof
  - A manufactured home (also known as a mobile home) built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation
  - A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community's floodplain management and building ordinances or laws.
- Undertake an annual outreach project to those addresses.
- Prepare a floodplain management plan or area analysis for the repetitive loss areas (FEMA, 2017a).

1.2 Los Angeles County Repetitive Loss Area Analysis

Los Angeles County had 54 FEMA-designated repetitive loss properties in its unincorporated areas as of 2023. Forty-nine (49) of these 54 repetitive loss properties on the 2023 FEMA list were also FEMA-

designated repetitive loss properties identified in the 2020 FEMA list. These 49 repetitive loss properties are listed in Table 1-1 were analyzed and mapped into repetitive loss areas in the 2020 FMP Report. The reviewed and approved methodology used to develop the repetitive loss areas for these 49 properties is outlined in this section. The repetitive loss areas previously developed for the 49 properties are used in this report, where no changes have been made to the number and location of repetitive loss properties. The exception is the Malibou Lake A repetitive loss area, where one new repetitive loss property has been added to the 2023 list. This property is included in Table 1-1 and footnoted. Additionally, one repetitive loss property (RL #74498) was reported in the 2020 FEMA list and designated in the Upper Topanga Canyon Repetitive Loss Area. The list of repetitive loss properties provided by FEMA in 2023 did not include this property, and therefore not listed in Table 1-1. The five new repetitive loss areas and associated newly listed properties are included in Table 1-1 and footnoted. The methodology used to analyze and map the repetitive loss areas for these five new properties is presented in this section. This includes revision to the Malibou Lake A repetitive loss area.

Table 1-1: Naming and Numbering of Los Angeles County Repetitive Loss Properties and Areas

Repetitive Loss Area Name	FEMA RL #
Agua Dulce A	91339
Agua Dulce B	302668 [a]
Altadena A	56933
Altadena B	91348 [b]
Calabasas A	72498
Calabasas B	136718
Cold Creek A	71255
Cold Creek B	148768
Del Sur	138781
Lake Hughes	317907 [a]
Lower Topanga Canyon	14900 [b]
	17941 [b]
	17942 [b]
	28440 [b] /58082 [ac]
	17940 [b]
Malibou Lake A	46576
	1165
	39962
	28487
	40087
	12820
	49496
	28444
	71413 [b]
	73653

Repetitive Loss Area Name	FEMA RL #
	72406
	71417
	35727
	52974
	93872
	57971
	137792
	47197
	91232
	282562 [a]
Malibou Lake B	57972 [a]
Malibu	70079
Quartz Hill A	57385[b]
Quartz Hill B	91087
Quartz Hill C	131222
Roosevelt	137354
Rowland Heights	138651
Topanga Canyon A	28394
Topanga Canyon B	12818
Topanga Canyon C	111971
Topanga Canyon D	137970
Topanga Canyon E	138321
Topanga Canyon F	256028[a]
Triunfo Canyon A	95737
Triunfo Canyon B	137793
Upper Topanga Canyon	74656
	74334
	74553
	76269

[a] This is a new property in the 2023 FEMA dataset.

[b] These repetitive loss properties have been requested to be removed and AW-501s have been submitted to FEMA.

[c] This point has been removed from analysis as it is a duplicate of an existing point containing the same coordinates and an empty address.

FEMA prescribes the following five-step process for conducting an area analysis:

- Step 1—Advise all the property owners in the repetitive flood loss area that the analysis will be conducted and request their input on the flood hazard and recommended actions.
- Step 2—Contact agencies or organizations that may have plans that could affect the cause or impacts of the flooding.

- Step 3—Collect data on the analysis area and each building in it to determine the causes of the repetitive damage and mitigation measures that would be appropriate.
- Step 4—Review alternative mitigation approaches and determine whether any property protection measures or drainage improvements are feasible.
- Step 5—Document the findings in a report.

This Repetitive Loss Area Analysis (RLAA) documents the fulfillment of the CRS requirements for Category C communities, following the five-step area-analysis process. As required under Step 5, it provides the following information:

- A summary of the process followed (Chapters 2 and 3)
- Problem statements with maps for each area (Chapters 7 – 30)
- A table of basic information about each building in the area (Chapters 7 – 30)
- A description of alternative approaches considered to address the problem (Chapter 6)
- A set of recommended action items to address the problem (Chapters 7 – 30).

Individual properties and structures are counted and described in this document, but specific address information is withheld under the federal Privacy Act of 1974. A separate document on file with Los Angeles County for internal use only correlates the property ID numbers presented here with specific address information.

1.3 Numbering and Nomenclature

In designating federally recognized repetitive loss properties, FEMA assigns a seven-digit repetitive loss number (RL #) to each property, using a nationally defined numbering system. Based on geographic distribution, repetitive loss areas were defined for the current RLAA that include one or more repetitive loss properties. Areas were designated with a place name indicating the general location of the area. Table 1-1 summarizes area naming used in this analysis and the FEMA numbering of repetitive loss properties in each area.

2 Repetitive Loss Area Analysis Methodology

2.1 Basic Requirements

There are two key sets of requirements to be met for a repetitive loss area analysis (RLAA):

- Repetitive loss area mapping requirements contained in Section 503 of the CRS Coordinator's Manual and in the supplemental publication, *Mapping Repetitive Loss Areas* (FEMA, 2015).
- Building data collection requirements contained in Section 512.b of the CRS Coordinator's Manual (FEMA, 2017a):
    - Visit each building in the repetitive loss area and collect basic data.
    - Collect data during the site visit that is sufficient to make a preliminary determination of the cause of the repetitive flooding and of mitigation measures that would be appropriate to address the problem. This usually includes a review of drainage patterns around the building, the condition of the structure, and the condition and type of foundation.
    - The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street.
    - Floor elevations or historical flood levels are not required but can be helpful if available.
    - The date of each building's insurance claim can help identify the cause of flooding (e.g., rainfall or overbank flooding). The amount of the claim can help determine the amount of damage. Every year, each repetitive loss community is provided with a list of its historical insurance claims. This includes single-claim properties. Non-repetitive-loss communities that elect to do an RLAA may request these data from the CRS program.

More information on building data can be found in *Selecting Appropriate Mitigation Measures for Floodprone Structures* (FEMA-551).

2.2 Reverse Damage Function Methodology

2.2.1 Rationale for Alternative Approach

The Reverse Damage Function Methodology was used for the 49 repetitive loss properties that are on both the 2023 FEMA list and those analyzed in the 2020 Los Angeles County RLAA. For the additional five repetitive loss properties on the 2023 FEMA list, the Reverse Damage Function Methodology was used where applicable. The other methodologies considered and used for these additional properties are discussed in this section.

The building data collection requirements outlined in the CRS Coordinator's Manual were met using the Reverse Function Methodology. This approach was used for initial identification of repetitive loss areas for the following reasons:

- Los Angeles County used the 2023 dated repetitive loss data that it received from the Insurance Services Office (ISO) (also referred to as FEMA list) for this RLAA. As noted, 49 of the repetitive loss properties listed in the 2023 FEMA list were also listed on the 2018 FEMA list.
- A Level 2, user-defined flood model using FEMA's Hazus hazard-evaluation software (version 6.1) was constructed to support the development of the 2025 and 2020 Los Angeles County

Comprehensive Floodplain Management Plan. The model was possible due to the quality of Los Angeles County Assessor data available to the planning team. The County Assessor data provided key building attributes to model flood risk, such as date of construction, foundation type, occupancy class, square footage and permit history, The detailed model data allowed the use of the selected alternative approach.

- The repetitive loss areas developed using this methodology for the 49 repetitive loss properties in the 2020 Los Angeles County Comprehensive Floodplain Management Plan that are also in the 2023 FEMA list are used in this 2025 update with the exception of the Malibou Lakes Repetitive Loss Area A where one new repetitive loss property has been added. The methods used for this repetitive loss area and of those for the other new repetitive loss properties are summarized in Section 2.2.2.

2.2.2 Description of Selected Approach

The selected reverse damage function approach used available data and capabilities to prepare the RLAA. The alternative approach achieved the same objectives as the approach prescribed in the 2017 CRS Coordinator's Manual (Section 512b), while providing the County a better protocol for maintaining data in the future to identify properties in a defined repetitive loss area and determine the cause of repetitive flooding.

The reverse damage function approach is a quantitative process based on modeling principles rather than the qualitative process outlined in the 2017 CRS Coordinator's Manual and 2021 Addendum. It uses an existing model to apply the principles of the "depth-damage function," which is the cornerstone of risk assessment in FEMA's Hazus and Benefit-Cost Analysis programs. Both of these programs estimate damage using curves that show the percentage of asset value that will be damaged as a function of the depth of floodwaters. These depth-damage curves are well-established as a basis for estimating losses caused by flooding.

The reverse damage function methodology uses known values of damage from a flood event, based on filed claims, to estimate what the floodwater depth was for that event. The following protocol was followed:

- Each repetitive loss property from the ISO data set was mapped in GIS to look for possible groupings based on proximity. The GIS mapping was based on the LiDAR-generated digital elevation model used to prepare the Los Angeles County Comprehensive Floodplain Management Plan. This digital elevation model has a 3-foot resolution.
- The average loss for each repetitive-loss property was determined by taking the average of all claims for that property.
- Replacement cost for each structure was calculated by applying the size and construction class for each repetitive-loss property to the construction-cost-per-square-foot tables in 2024 BNi Home Builder's Costbook (Building News International, p. 2024). (note: the 2015 BNi Costbook was used for the 2020 FMP for the 40 properties also listed in the 2023 FEMA list)
- The percent damage "X" was calculated as:

  $X = Z \div Y$

where:
X is the percent damage (to be determined)
Y is the replacement cost of the structure (based on assessor information)
Z is the estimated loss (based on the flood insurance claim)

- Once the percent damage was determined, the corresponding flood depth was determined by looking at the U.S. Army Corps of Engineers 2003 Generic Depth-Damage Relationships for Residential Structures (see Appendix A). These damage functions represent projected flood depths above the top of the finished floor.
- The determined flood depth was applied to the repetitive loss structure. Using the foundation type from the Assessor's data, the depth was added to the top of the finished floor. For a structure with a slab foundation, the top of the finished floor was set at 8 inches above adjacent grade. For a structure with a crawlspace foundation, the finished floor was set at 24 inches above adjacent grade. These parameters are based on standard building practices. None of the repetitive-loss properties were shown to have basements, according to the Assessor's data.
- Once the depth was applied to the finished floor, it was extended across the digital elevation model until it ran to zero depth (high ground) and a boundary was delineated. These boundaries were projected north, south, east and west for each property. In areas with multiple repetitive-loss properties, the property with the highest depth above finished floor was used for this exercise.
- The boundary for each repetitive loss area was intersected with an ortho-photo and parcel boundary map. Each parcel with a structure within the delineated boundary was determined to be a property potentially subjected to repetitive flooding and was added to a repetitive loss area list for Los Angeles County. These additional properties are not FEMA-recognized repetitive-loss properties.
- Property condition assessments included in existing Los Angeles County Assessor's data were used for this RLAA.

Utilizing this methodology, repetitive loss areas were delineated for the 49 repetitive loss properties that were analyzed in the 2020 Updated RLAA and again listed in the 2023 FEMA list with the exception of the Malibou Lake Repetitive Loss Area A where one new repetitive loss property has been added. The development of the repetitive loss areas for Malibou Lake A and the four additional repetitive loss properties in the 2023 FEMA list used several methodologies depending on the characteristics of the area hydrology, topography, property, nearby properties, and closest repetitive loss area. The methods used include:

- Hazus Model – the Hazus model was used for defined stream segments where the model provided output that corresponded to FEMA flood maps.
- FEMA & County Flood Maps – 100-year and 500-year frequency maps were used for properties located within floodways near tributaries that are mapped.
- Reverse Function Analysis – this methodology was used to both check the results of the output of the other methodologies and where no Hazus Model or flood mapping provided data that could be used to develop the repetitive loss area.

Maps and descriptions of the causes of flooding for each area can be found in Chapters 7 to 34. The methodology used and assumptions are also listed in these Chapters for each area as a basis for future adjustments in these areas as properties are removed or added.

The final step was to determine the cause of flooding, giving consideration to the findings from the initial identification.

2.3 Secondary Identification

Once the initial identification of the repetitive loss areas was completed using the reverse-damage-function methodology, the planning team performed a secondary review of each repetitive loss area based on three questions about each area:

- Is there really a repetitive loss problem in this area, based on local knowledge?
- Does the list of properties make sense based on what we know about the area?
- Does the County have any additional qualifying data on the area to justify adding or removing properties?

Adjustments were made after applying these questions to each repetitive loss area. Based on the analysis and Floodplain Management Committee feedback, there were 223 properties in repetitive loss areas with 364 insurable structures.. The list of properties was put on an official repetitive loss area mailing list as a part of the unincorporated areas of Los Angeles County public information program.

2.4 Property Condition Assessment

To assess the condition of the structures in the repetitive loss areas, the planning team relied on the Quality Class value in the Los Angeles County Assessor's data. This value identifies the condition of the building relative to the following characteristics:

- Construction Type
  - Class A: Fireproof construction – structural steel frame
  - Class B: Fireproof construction – reinforced concrete frame
  - Class C: Fire-resistant construction – masonry walls, combustible roof, and interior
  - Class D: Non-fireproof construction – usually wood frame
  - Class S: Specialized buildings that do not fit in any of the above categories
- Quality Range (1.0 to 14.5 or "X")
  - The quality class concept is a function of all construction features, depending on quality of materials, construction methods, and workmanship. It considers specifications for foundation, structure, roof, floor, interior, exterior, heat, and bathrooms.
  - The quality value can range from 1.0 to 14.5 with 1.0 being the lowest.
  - An "X" quality rating is for unique or unusual construction that does not lend itself to being classified using the standard classification system.
- Shape Class (A, B, C, D)

  The shape class is based on the building's perimeter in relation to the total square footage. It's important to distinguish the shape class of a structure as a structure with a relatively large

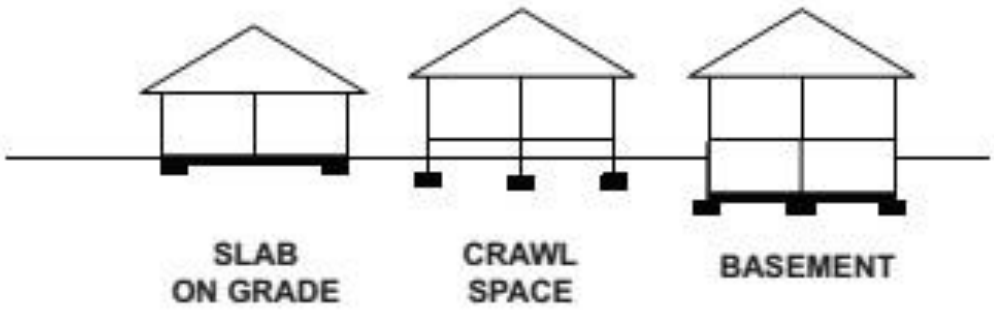
perimeter in relation to its square footage (many angles, turns, a 'cut-up' custom shape, etc.) typically costs more to construct than a simple square/rectangle structure.

- Shape A represents a relatively-square/rectangle structure. It has a relatively small perimeter compared to its total square footage.
- Shape D represents a structure with many angles, turns, etc. (a "cut-up" custom shape). It has a relatively-large perimeter compared to its total square footage.
- A structure with a "DX" Construction Type and Quality Range will usually not have a Shape Class.

2.5 Foundation Type

In Los Angeles County, there are generally three types of foundations (see Figure 2-1):

- A basement foundation has its floor below grade on each side. Walls may be poured concrete or blocks.
- A slab foundation is usually concrete poured directly onto the ground. This type of foundation uses concrete rather than wood to help support the weight of the home.
- A crawlspace, or raised foundation, is built above the ground, with just enough room to crawl underneath. There are stem walls on the perimeters, pierced in-between, with a girder system and floor joists on top of that. The foundation is high enough to leave at least 2 feet below to crawl into for access to the home's mechanical systems.



(International Code Council, 2020)

Figure 2-1: Foundation Types

3 Repetitive Loss Areas Outreach

3.1 CRS Outreach Requirements for RLAA

RLAA Step 1 (2017 CRS Coordinator's Manual Section 512.b) requires notification that an analysis is being conducted to the properties in the repetitive loss areas, with a request for input on the hazard and recommended actions. The notice (or any public document) must not identify which properties are on FEMA's repetitive loss list. There are no restrictions on publicizing what properties are in repetitive loss areas that have more than one property and there are no restrictions on publishing aggregate data, such as how many properties received claims or the average value of those claims. Floodplain management staff in the Stormwater Engineering Division may share insurance claim information with the owner of a property but may not make it available to anyone else.

- The notice can be sent to owners OR residents, at the community's discretion, as long as a representative of each property is notified.
- The notice cannot be done via a newspaper or newsletter notice or article.
- The notice must advise the recipients when and how copies of the draft report can be obtained and ask for their comments on the draft.

Several methods were deployed to engage repetitive loss area property owners during the course of this RLAA process. This chapter highlights those efforts.

RLAA Step 2 requires contact with agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding. The analysis report must identify contacted agencies and organizations (FEMA, 2017a).

3.2 Countywide Floodplain Management Planning Effort

This Repetitive Loss Area Analysis is considered by Los Angeles County Public Works to be the companion document to the 2025 Los Angeles County Comprehensive Floodplain Management Plan (FMP). The two plans were created in concert, with oversight by the same planning team. The development of this RLAA benefited from the planning process conducted to develop the FMP. The outreach effort used to develop the FMP included properties in the repetitive loss areas and provided a tangible benefit to the RLAA effort. This section provides an overview of the outreach conducted for the FMP.

3.2.1 Contact with Agencies and Organizations

The following agencies were invited to participate in the planning process from the beginning and were kept apprised of plan development milestones:

Floodplain Management Plan Committee

- Public Works Stormwater Engineering - CRS Coordinator
- Public Works Emergency Management Group
- Public Works Building & Safety
- Public Works Stormwater Maintenance
- Public Works Community Government Relations Group
- Public Works Stormwater Planning
- Public Works Stormwater Engineering – Hydrology & Hydraulics
- Los Angeles County Regional Planning
- Los Angeles County Fire Department
- City of Los Angeles Bureau of Engineering
- Altadena Town Council
- Malibou Lake Mountain Club
- Antelope Valley Resident
- Acton Resident
- Red Cross of Greater Los Angeles
- California Department of Water Resources
- Cal State Los Angeles Geography, Geology & Environment
- Environmental Restoration Group
- Tree People Land Trust

Other Stakeholders

- Acton Town Council
- Agua Dulce Town Council
- Ana Verde Hills Town Council
- Antelope Acres Town Council
- Association of Rural Town Councils
- Castaic Town Council
- City of Agoura Hills
- City of Arcadia
- City of Azusa
- City of Bradbury
- City of Calabasas
- City of Carson
- City of Claremont
- City of Compton
- City of El Monte
- City of El Segundo
- City of Gardena
- City of Glendale
- City of Glendora
- City of Harbor City
- City of Hawthorne
- City of Hidden Hills
- City of Industry
- City of Inglewood
- City of La Canada Flintridge
- City of La Habra Heights
- City of La Mirada
- City of La Puente
- City of La Verne
- City of Lancaster
- City of Lawndale
- City of Long Beach
- City of Malibu
- City of Monrovia
- City of Montebello
- City of Monterey Park
- City of Palmdale
- City of Pasadena
- City of Pomona
- City of Rancho Palos Verdes
- City of Rolling Hills Estates
- City of San Dimas
- City of San Marino
- City of San Pedro
- City of Santa Clarita
- City of Sierra Madre
- City of Temple City
- City of Torrance
- City of Walnut
- City of West Covina
- City of Westlake Village
- City of Whittier
- Crescenta Valley Town Council
- Fairmont Town Council
- Green Valley Town Council
- Insurance Services Office (ISO)-ISO/CRS Specialist
- Juniper Hills Town Council
- Kern County
- Lake Los Angeles Town Council
- Lakes Town Council
- Leona Valley Town Council
- Littlerock Town Council
- Monrovia/Arcadia/Duarte Town Council
- Mount Baldy Town Council
- Orange County Public Works
- Oso Town Council
- Pearblossom Rural Town Council
- Quartz Hill Town Council
- Roosevelt Town Council
- San Bernardino County Flood Control District
- San Gabriel Council of Governments
- Southern California Association of Governments
- Sun Village Town Council
- Three Points/Liebre Mountain Town Council
- Topanga Town Council
- Ventura County Watershed Protection District

These agencies received meeting announcements, meeting agendas, and meeting minutes by email throughout the FMP development process, which also informed the RLAA development. Public meetings, such as the Floodplain Management Committee meetings and Open Houses, provided accommodations compliant with the Americans with Disabilities Act and Title IV.

3.2.2 Strategy

The strategy for involving the public in developing the RLAA emphasized the following elements:

- Include members of the public on the Floodplain Management Committee (see Section 3.2.1).
- Attempt to reach as many citizens as possible using multiple media outlets.
- Use a survey to determine public perception of flood risk and support of mitigation actions.
- Identify and involve stakeholders.
- Develop a Program for Public Information.
- Conduct public meetings to invite the public's input.

3.2.2.1 Website

At the beginning of the development of the current plan, a floodplain management plan page was developed on the Los Angeles County Public Work's website to keep the public informed about planning activities and to solicit input (see Figure 3-1). The site's address, https://pw.lacounty.gov/WMD/NFIP/FMP2025/, was publicized in all social media releases, mailings, and public meetings. The site provided the public with information on the plan development process, the Floodplain Management Committee, a project survey, and drafts of the plan. Los Angeles County Public Works will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates.



Figure 3-1: Sample Page from Floodplain Management Plan Website

3.2.2.2 Survey

The planning team developed a "Flood Preparedness" survey (see Figure 3-2) with guidance from the Floodplain Management Plan Committee. The survey was used to gauge resident, household, and local business preparedness for potential flood hazards and the level of knowledge about the tools and techniques that might assist them in reducing their risk and loss from flooding. This survey was designed to help identify the types of information and resources needed in communities vulnerable to floods, and the tools and messaging that might work best to communicate with community members in the event of a flood hazard in their community. Survey responses also helped to guide the Floodplain Management Committee in affirming the goals and objectives identified during the planning process and in selecting mitigation actions.

Multiple methods were used to solicit survey responses:

- A web-based version of the survey was postedon the Floodplain Management Plan website.
- Mailings to residents and property owners notifying them of public meetings included links to the online survey (see Figure 3-3).
- All attendees at public meetings were asked to complete a survey, using the link on the Floodplain Management Plan web site or hard copies of the survey form available at the meetings.

- A flyer was prepared advertising the survey.
- E-mails were sent from Public Works to several of the town councils, requesting their input and help publicizing the survey.
- Individual Floodplain Management Plan Committee members shared the survey and contacted organizations to request that they publicize the link to the online survey.

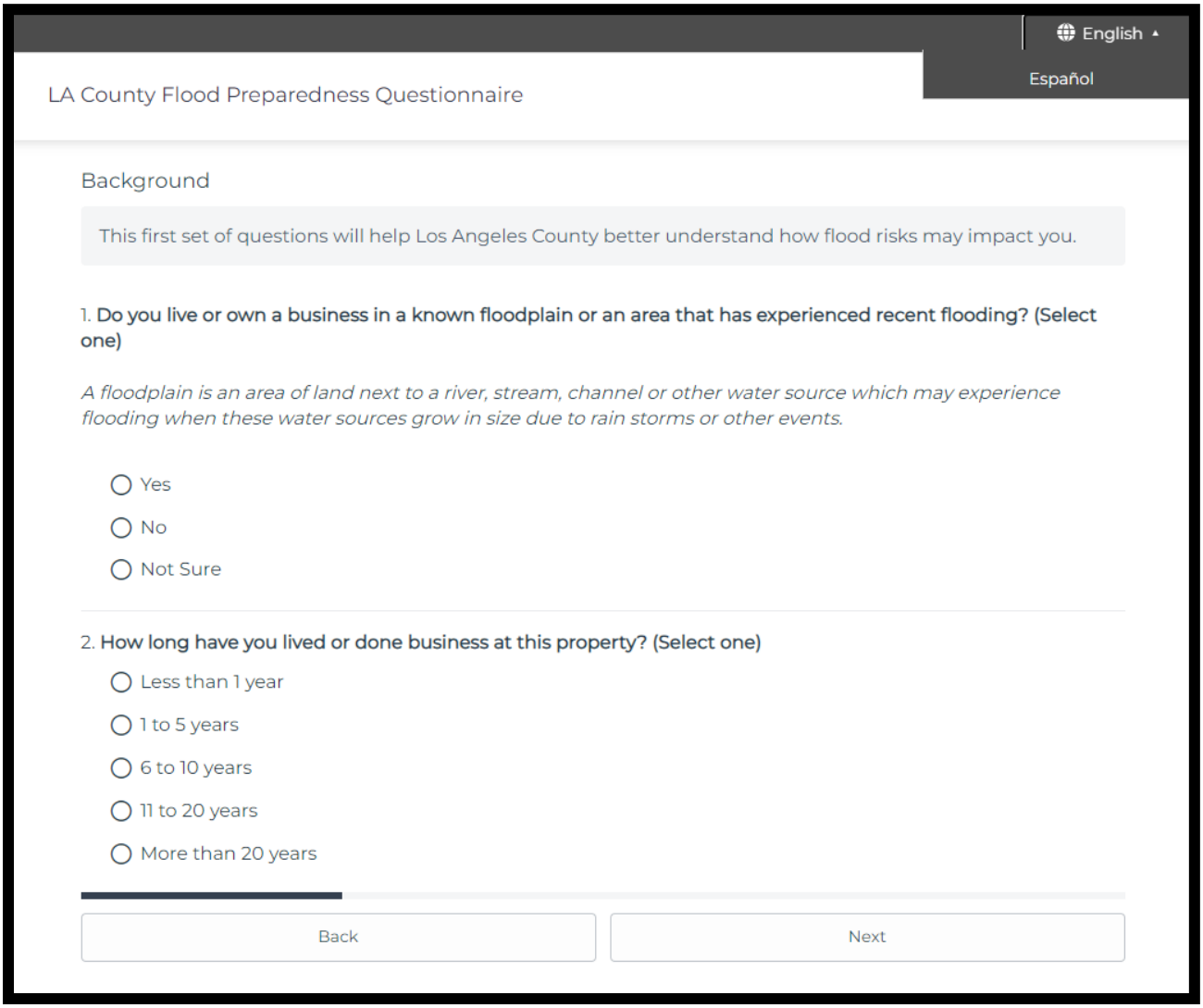


Figure 3-2: Sample Page from Survey



Figure 3-3: Post Card Mailing Advertising the Survey

3.2.2.3 Public Meetings

Meaningful public participation is always essential to the planning process. A public meeting was held in partnership with a local resident association in Malibou Lake to share information about the Floodplain Management Plan update and how residents can mitigate flood risk at their properties. Community members were also asked to share their thoughts about local flood hazards, programs and any questions they had about the plan and process. Information about the public meeting is summarized in Table 3-1.

Table 3-1: Floodplain Management Plan Public Meetings

When	Where
July 18th 2024 6:00-8:00pm	Malibou Lake Mountain Club 29033 Lake Vista Drive Agoura, CA 91301
April 3rd 2025 6:00-8:00pm	Quartz Hill Library 5040 West Ave M-2, Quartz Hill, CA 93536

Public Meeting Notification

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

- A notice of the public meeting was posted on the Floodplain Management Plan website.
- Flyers were developed and distributed throughout the community and through local resident association email lists (Figure 3-4).



Figure 3-4: Flyer Announcing Phase 1 Public Meeting for the Floodplain Management Plan

Public Meeting Format

At the public meeting, attendees examined maps and handouts and held conversations with project staff about their flood risks and past experiences with flood hazards at their properties. The project team introduced the goals for the Floodplain Management Plan update, and discussed and displayedinformation generated for the risk assessment via community maps, shared with attendees via a PowerPoint presentation. Computer mapping workstations loaded with the FEMA and Los Angeles County Flood Maps were set up to allow attendees to see information the hazards on their property. This tool was effective in illustrating local risks for several community members. Planning team members answered questions and asked attendees to complete a Flood Preparedness Survey. The project team also provided comment cards to participants to share additional thoughts and questions with the Floodplain Management Plan Committee. Example meeting activities are shown in Figure 3-5 and Figure 3-6.

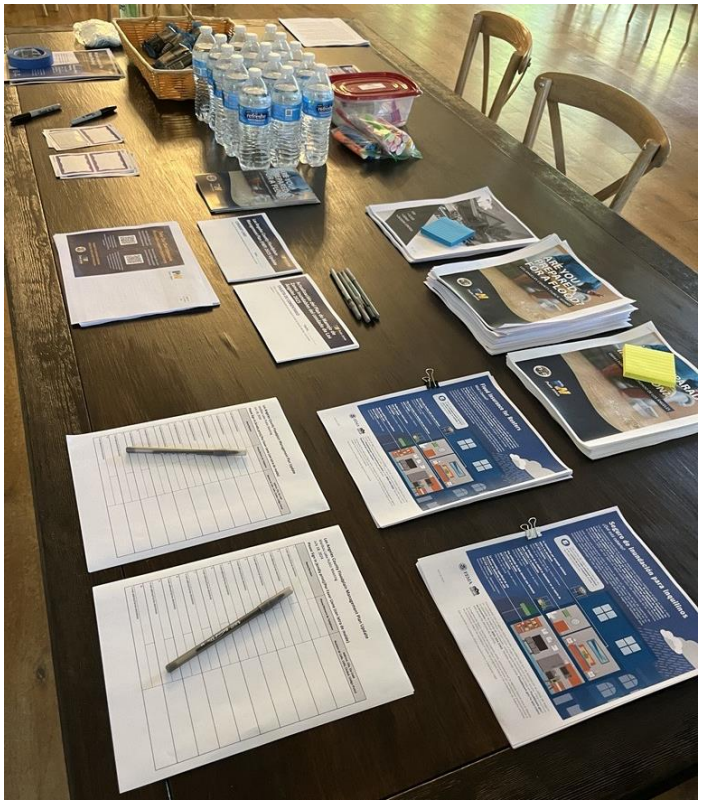


Figure 3-5: Printouts at Phase 1 Public Meeting



Figure 3-6: FMP Presentation at Malibou Lake Public Meeting Phase 1 July 18th 2024

3.2.3 Public Involvement Results

3.2.3.1 Survey Results

The County received 109 responses. 44 of these responses were complete (responded to all questions), 65 were partially complete (responded to some questions) and none were disqualified. The following percentages were rounded to the nearest whole number. Detailed results for the survey are provided in Appendix C.

Key results are as follows:

- Nearly half of respondents said their home or business is not located in a floodplain or experienced recent flooding; 36 percent said it is; 15 percent said they are not sure.
- Over half of respondents said they do not have flood insurance; 35 percent said they do; over 11 percent said they are not sure.
- The top responses for why those without flood insurance don't have it are that they feel they don't need it (property never flooded, located on high ground, or not in a flood zone, renting), they feel it is not worth it (too expensive, does not provide enough coverage), or they don't know about it (unsure if they qualify or if their other insurance covers it).
- 40 percent of the respondents said that the presence of a flood hazard at their current home was not disclosed to them prior to purchasing or moving into the property. 44 percent said such disclosure would have influenced their decision to buy or rent a home.
- The following flood hazards were identified as greatest issues of concern based on a scale of 1 (not concerned) to 5 (extremely concerned):
    - Post-fire mud/debris flow (weighted score of 3.05)
    - Detours caused by flooding of roads (weighted score of 2.98)
    - Failure of infrastructure (such as water/sewer main pipes, water storage tanks) (weighted score of 2.98)
    - Mud-flow hazards (weighted score of 2.95)
    - Climate change impacts (weighted score of 2.84)
    - Urban stormwater flooding/Drainage issues (weighted score of 2.78)
    - River/stream/channel overflow (weighted score of 2.62)
- 65 percent of respondents said they are at least adequately prepared for a flood event; 45 percent indicated feeling somewhat prepared or not at all prepared.
- About 28 percent of residents neither agree nor disagree that flood hazard and risk information is easy to find; 28 percent of residents somewhat agreed, 23 percent somewhat disagreed, 15 percent strongly agreed and 8 percent strongly disagreed.
- Respondents chose the following as the most effective means for providing general flood hazard and disaster information:
    - Internet (55 percent)
    - Community Events (38 percent)
    - Public awareness campaign, e.g., flood awareness week, winter storm preparedness month (38 percent)
    - Social media, such as X, Nextdoor or Facebook (38 percent).

  - Fire Department/ Rescue (30 percent)
  - Informational Brochures (25 percent)
  - Word of mouth (25 percent)
  - Local Government Newsletters (23 percent)
  - TV News (23 percent)
- Respondents' top preferred methods for receiving emergency notifications are text messages (73 percent), cell or mobile phone call (65 percent) , and email (50 percent).
- 73 percent of respondents agree or strongly agree that local, state and federal government should provide programs promoting resident action to reduce exposure to flood risks.
- Respondents ranked (1 for low priority and 3 for high priority) government-sponsored flood damage reduction projects in the following order of preference:
  - Retrofitting infrastructure (improving culverts, bridges, and local drainage) (weighted sore of 2.42)
  - Capital projects (dams, levees, flood walls, and drainage improvements) (weighted score of 2.41)
  - Projects that will mitigate future flood impacts caused by climate change (weighted score of 2.24)
  - Assisting vulnerable property owners with securing mitigation funding (weighted score of 2.19)
  - Providing better flood risk information to the public (weighted score of 2.11)
  - Strengthening codes and regulations to higher regulatory standards (weighted score of 1.94)
  - Acquiring vulnerable properties, removing any properties and maintaining them as open space (weighted score of 1.85)
- 20 percent of respondents stated they would not be willing to spend any money to retrofit their property to reduce flood risks, additionally, 17 percent stated they would only be willing to spend less than $1000. The respondents stated the following incentives would encourage spending money on retrofits:
  - Grand finding (55 percent)
  - Insurance premium discount (50 percent)
  - Mortgage discount (43 percent)
- 69 percent of respondents support the preservation of natural land containing a flood hazard and 17 percent of them support it only for properties other than their own.

3.2.3.2 Public Meeting Attendance

Table 3-2 summarizes participation in the public meetings that were held during the outreach effort.

Table 3-2: Summary of Public Meetings[1]

Date	Location	Number of Attendees	Number of Surveys or Comments Received
July 18th 2024 6:00-8:00pm	Malibou Lake Mountain Club 29033 Lake Vista Drive Agoura, CA 91301	4	2
April 3rd 2025 6:00-8:00pm	Quartz Hill Library 5040 West Ave M-2, Quartz Hill, CA 93536	TBD	See Footnote

3.3 Repetitive Loss Area Specific Outreach

During the development of the draft of this report, the Los Angeles County Public Works sent a letter to residents in each repetitive loss area informing them that their properties are in identified repetitive loss areas, requesting that they provide information about how flooding affects their properties, and informing them that the RLAA was being conducted and that they would be informed when the draft is ready for review. A copy of the letter is shown in Figure 3.7.

Upon the completion of a draft of this report, Los Angeles County Public Works disseminated the letter to residents in each repetitive loss area informing them of this report, where and how they would be able to review it, and where and how they might submit comments regarding it. The communication document is shown in Figure 3-8.

[1] To be Determined (TBD) based on recorded attendance for this future meeting. Survey period ended in December 2024.

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: SWE-7

August 12, 2024

«Property_Owner»
«Mailing_Address»
«Mailing_City»

Dear «Property_Owner»:

LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS
PROPERTY LOCATION: «SITE_ADDRESS», «SITE_CITY»

Your property at the listed location above has been identified to be in an area considered to be potentially vulnerable to repetitive flooding. In an effort to help reduce the risk of flood damage to properties, Los Angeles County Public Works is updating its Repetitive Loss Area Analysis that outlines the location of these areas, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events. The latest 2020 Repetitive Loss Area Analysis is currently undergoing updates and can be found at: https://pw.lacounty.gov/wmd/NFIP/FMP/RLAA.

You may recall that you received a postcard from Public Works in early July 2024 asking for your participation in a flood risk preparedness survey. This resident participation will allow Public Works to learn more about the flood hazards in the community and help Public Works identify suitable actions for improving its comprehensive Floodplain Management Program. If you have not already, please take our survey at the following link: https://bit.ly/LACFMPSurvey2025.

Repetitive Loss Areas have been delineated based on a list of Repetitive Loss Properties maintained by the Federal Emergency Management Agency, and properties in the vicinity that are not listed by Federal Emergency Management Agency but may be subject to similar flooding issues. A Repetitive Loss Property is any insurable building, which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period, since 1978.

If you would like to share any information about the flood hazards you many have experienced at your property or have any suggestions, please provide them by September 5, 2024, to:

«Property_Owner»
August 12, 2024
Page 2

Los Angeles County Public Works
Stormwater Engineering Division
Attention Mr. Anjero Asprer
900 South Fremont Avenue
Alhambra, CA 91803

You may also e-mail your suggestions to Mr. Asprer at aasprer@pw.lacounty.gov.

The draft Repetitive Loss Area Analysis is expected to be completed at the end of November 2024. Public Works will be sending a letter to offer you the opportunity to review and comment on the draft document before it is finalized.

Please note that specific property addresses and owner names will not be included in the report and flood insurance claims will be aggregated. This will be done for privacy reasons. We look forward to receiving your input.

If you have any questions, please contact Ms. Patricia Wood at (626) 458-6131 or pwood@pw.lacounty.gov, or Mr. Anjero Asprer at (626) 458-4337 or aasprer@pw.lacounty.gov.

Very truly yours,

MARK PESTRELLA, PE
Director of Public Works

for

STERLING KLIPPEL
Assistant Deputy Director
Stormwater Engineering Division

AA:og
P:\wmd\Flood Analyses\NFIP\Floodplain Management Plan Update\2025 FMP\RLAA\Outreach\1st Notification Letter

Figure 3-7: Repetitive Loss Area Target Mailing #1

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: SWE-7

December 12, 2024

«Property_Owner»
«MAILING_ADDRESS»
«MAILING_CITY»

Dear «Property_Owner»:

LOS ANGELES COUNTY REPETITIVE LOSS AREA ANALYSIS
PROPERTY LOCATION: «SITE_ADDRESS», «SITE_CITY»

This is a follow up to our August 12, 2024, letter to you. You may recall, we informed you that your property at the above listed location has been identified to be in an area considered to be potentially vulnerable to repetitive flooding. We also notified you that Los Angeles County Public Works is updating its Repetitive Loss Area Analysis for unincorporated areas. The Repetitive Loss Area Analysis outlines the location of these Repetitive Loss Areas like yours, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events. The County's current Repetitive Loss Area Analysis was adopted in July 2021, and can be found at: https://pw.lacounty.gov/wmd/NFIP/FMP/RLAA.aspx.

As stated in the August 2024 letter, Repetitive Loss Areas have been delineated based on a list of Repetitive Loss Properties maintained by the Federal Emergency Management Agency. A Repetitive Loss Property is any insurable building, for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period since 1978. Also included in the Repetitive Loss Areas are properties that are not listed as Repetitive Loss Properties, but are nearby and, therefore, may face similar flood risk and can benefit from information contained in the Repetitive Loss Area Analysis. Recipients of the letter were invited to share any information about the flood hazards they may have experienced at their properties. This property owner participation allowed us to learn more about the flood hazards in the community and helped us identify suitable actions for improving its Repetitive Loss Area Analysis.

Please note that specific property addresses and owner names are not included in the Repetitive Loss Area Analysis report and flood insurance claims have been aggregated (lumped together). This has been done to protect yours and other property owners' privacy.

«Property_Owner»
December 9, 2024
Page 2

We would like to offer you the opportunity to review and comment on the draft updated Repetitive Loss Area Analysis before it is finalized. A copy of the draft document is available at: https://pw.lacounty.gov/wmd/NFIP/FMP2025/DraftRLAA. If you would like to provide any comments on the draft document, please e-mail them by **January 31, 2025**, to Mr. William Saunders at wsaunder@pw.lacounty.gov.

You may also mail your comments to Mr. Saunders at:

Los Angeles County Public Works
Stormwater Engineering Division
900 South Fremont Avenue
Alhambra, CA 91803

Please contact Mr. Saunders if you would like a copy of the draft mailed to you on a Compact Disc.

If you have any questions, please contact Ms. Patricia Wood at (626) 458-6131 or pwood@pw.lacounty.gov, or Mr. Saunders at (626) 458-4355 or wsaunder@pw.lacounty.gov.

Very truly yours,

MARK PESTRELLA, PE
Director of Public Works

for

STERLING KLIPPEL
Assistant Deputy Director
Stormwater Engineering Division

WS:og
P:\wmd\flood Analysis\NFIP\Floodplain Management Plan Update\2025 FMP\RLAA\Outreach\2nd Notification letter\2025 RLAA 2nd Letter.2docx

Figure 3-8: Repetitive Loss Area Target Mailing #2

4 Relevant Programs and Regulations

This chapter provides a comprehensive review of existing laws, ordinances and plans at the federal, state, and local level that can support or impact action items identified in this RLAA. Federal, state, and local agencies share and coordinate responsibilities for flood protection in Los Angeles County. The two main federal agencies are the U.S. Army Corps of Engineers, which implements federal flood protection policies, and FEMA. The California Department of Water Resources (DWR) is responsible for managing the state's waterways. Los Angeles Public Works and the Los Angeles County Flood Control District (LACFCD) work to reduce flood risk in Los Angeles County. Development of the RLAA included a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process. Pertinent federal, state, and local laws are described below.

4.1 Federal and State

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

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

Agency, Program or Regulation	Local Relevance and Response
National Flood Insurance Program	The NFIP provides flood insurance against potential losses from flooding for participating property owners. Los Angeles County participates in the NFIP and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1980, and the first Los Angeles County FIRM was issued December 2, 1980. The index date for the current FIRM is June 2, 2021. Los Angeles County is currently in good standing with the provisions of the NFIP as monitored by FEMA Region IX and the California Department of Water Resources. Table 4-8 (at the end of this chapter) summarizes local NFIP capabilities of Los Angeles County. NFIP regulations are detailed in 44 Code or Regulations (CFR). 44 CFR regulations provide policies and procedures for disaster assistance, flood insurance, and floodplain management criteria. In 2023, the NFIP pricing approach, Risk Rating 2.0, was fully implemented. Under this pricing approach, flood zones are no longer used for the determination of flood risk and the CRS discount is applied uniformly to all policies throughout the community regardless of whether the structure is located inside the Special Flood Hazard Area (SFHA). Additionally, the Risk Rating 2.0 method for calculating NFIP flood insurance premiums accounts for an individual property's actual flood risk and cost to rebuild by considering additional flood risk variables such as flood frequency, river overflow, storm surcharge, coastal erosion, heavy rainfall, distance to a water source, property and structure attributes, and cost to reconstruct (Los Angeles County Public Works, 2024).

Agency, Program or Regulation	Local Relevance and Response
Community Rating System	Los Angeles County has participated in the CRS program since 1990. The County has a Class 6 rating (out of 10, 10 being the lowest rating), so NFIP policy holders in unincorporated areas of Los Angeles County can receive a 20 percent discount on residential and nonresidential structures in flood zones on flood insurance. This equates to an average savings of $4177 per policy, for a total countywide premium savings of $138,583 (FEMA, 2023a). To maintain or improve its rating, the County goes through recertification and re-verification every five years. This plan is developed to help the County maintain or enhance its CRS classification.
Disaster Mitigation Act of 2000	Los Angeles County, in conjunction with emergency services partners, has prepared a local All-Hazards Mitigation Plan that sets strategies for coping with the natural and man-made hazards. The scope of this plan is for the unincorporated County areas only. The plan correlates information from County departments with known and projected hazards that face Southern California. It was formally adopted by the Los Angeles County Board of Supervisors for use in the development of specific cost-effective hazard mitigation proposals. The plan complies with requirements of FEMA and the Governor's Office of Emergency Services and was first approved by both agencies in 2014. It has a 5-year performance period through 2019 and an updated All-Hazard Mitigation Plan was approved in 2020 (Los Angeles County, 2020).
Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014	The Biggert-Waters Flood Insurance Reform Act of 2012 required flood insurance premiums to reflect real flood risk, leading to increased premiums for homeowners. The Homeowner Flood Insurance Affordability Act for 2014 delayed the increases in premiums for renewed policies by limiting annual increases to a maximum of 18 percent.
Executive Order 11988: Floodplain Management	Executive Order 11988 requires Federal agencies to avoid long and short-term adverse impacts due to occupancy and modification of floodplains to the extent possible. They are also required to avoid direct or indirect support of floodplain development whenever a practicable alternative is feasible.
Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input	Executive Order 13690 establishes the Federal Flood Risk Management Standard which is a framework to increase resilience against flooding as well as preserve the floodplains' natural values. The Executive Order also sets a process for further consideration of public input.
Executive Order 14030: Climate-Related Financial Risk	This Executive Order requires the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President and National Climate Advisor to develop in coordination with the Secretary of the Treasury and the Director of the Office of Management and Budget, a comprehensive Government-wide strategy climate-related financial risk.
Endangered Species Act (ESA)	FEMA suspended processing two types of flood map revision requests in Los Angeles County after July 1, 2023, which will affect requests for Letters of Map Revision Based on Fill (LOMR-F) and Conditional Letters of Map Revision Based on Fill (CLOMR-F). The suspension will last at least until FEMA formally consults with the National Marine Fisheries Service and U.S. Fish and Wildlife Service required by Section 7 of the ESA (FEMA, 2023b).

Agency, Program or Regulation	Local Relevance and Response
Clean Water Act	The Clean Water Act provides regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff in order to support propagation of wildlife and recreation in and on the water.
National Incident Management System	Los Angeles County adopted the County of Los Angeles Operational Area Emergency Response Plan in March 2012. The Governor's Office of Emergency Services approved it on August 31, 2011, as fully compliant with the National Incident Management System (NIMS). An update to the plan was completed and approved in November 2023 continuing the County's compliance (Los Angeles County, 2023).
Americans with Disabilities Act	The Americans with Disabilities Act intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may implement a special-needs registry to identify the home addresses, contact information, and needs of residents who require more assistance for emergency management purposes.
Public Law 8499, Flood Control and Coastal Emergencies (33 U.S.C. 701n) (69 Stat. 186)	This law gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods. It authorizes the Corps' Chief of Engineers to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water in the event of drought or contaminated source.

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

Agency, Program or Regulation	Local Relevance and Response
California General Planning Law	The Los Angeles County 2035 General Plan provides a policy framework for how and where the unincorporated County will grow through 2035, while recognizing the County's diversity of cultures, abundant natural resources, and status as an international economic center. The Los Angeles County 2035 General Plan accommodates new housing and jobs in unincorporated areas in anticipation of population growth in the County and the region (Los Angeles County Department of Regional Planning, 2022).
California Environmental Quality Act	This RLAA does not require CEQA environmental review. It constitutes a feasibility and planning study for possible future actions, which the County has not approved, adopted or funded, and therefore is exempt from CEQA under Section 15262 of the CEQA Guidelines. However, future mitigation actions implemented as recommended by this plan may be subject to CEQA review

Porter-Cologne Act	The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality.
AB 162: Flood Planning, Chapter 369, Statues of 2007	Compliance with this law constitutes inclusion of certain General Plan elements. Los Angeles County's compliance with Chapter 369, Statutes of 2007 is described in Appendix B.
AB 2140: General Plans – Safety Element	This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans.
AB 747: General Plans—Safety Element	The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies.
AB 2800: Climate Change—Infrastructure Planning	This act requires State agencies to take into account the impacts of climate change when developing state infrastructure.
Senate Bill (SB) 92 and New Standards for Submitting Dam Inundation Maps	This bill (SB 92, part of the 2017-18 budget package) makes significant legislative changes related to dam safety. It requires owners of dams under the regulatory jurisdiction of the California Department of Water Resources' Division of Safety of Dams to prepare inundation maps and emergency action plans and provides for fees and enforcement.
SB 379: Land Use, General Plan, Safety Element	Los Angeles County's compliance with SB 379 is described in Appendix B.
California State Building Code	Los Angeles County has adopted the State's Building Codes by reference, except where the County has made amendments or revisions to apply higher standards such as the NFIP minimum standards for building in floodplains and the ASCE-24 standards. The permitting process in Los Angeles County ensures compliance with the State's Building Codes.
Standardized Emergency Management System	Los Angeles County has adopted an emergency response plan that is fully NIMS compliant (the County of Los Angeles Operational Area Emergency Response Plan in March 2012 then adopted the updated plan in November 2023. The Governor's Office of Emergency Services approved it as NIMS compliant.
California State Hazard Mitigation Plan	The 2020 County of Los Angeles All Hazards Mitigation Plan was determined to be consistent with the State Plan by the Governor's Office of Emergency Services during its review and approval of the plan in 2019.
Governor's Executive Order S-13-08	This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects. Climate impact information developed under this executive order is used in the climate change evaluation of the 2025 Los Angeles County Comprehensive Floodplain Management Plan.
California Civil Code 1102 and California Government Code Section 8589.45	The flood hazard disclosure requirements established under this code applies to all real estate transactions in Los Angeles County. and In every lease or rental agreement for residential property entered into on or after July 1, 2018, the owner or person offering the property for rent must disclose to the tenant any known flood hazards.
Local Flood Protection Planning Act	This State statute provides guidance on what a flood mitigation plan should include.

Water Code Division 5, Part 2, Chapter 4, Article 4	This code provides floodplain regulations for public agencies within a floodplain or the planning area of a floodplain management plan.
California Coastal Management Program	This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.

4.2 Local

4.2.1 General Plan

The Los Angeles County 2035 General Plan, adopted in October 2015 and updated in July 2022, is the latest update to the County of Los Angeles general plan. It provides a policy framework for how and where the unincorporated County will grow through 2035. It accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the broader region. The General Plan includes the following elements (Los Angeles County Department of Regional Planning, 2022):

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

General Plan elements that are particularly applicable to implementation of the floodplain management plan are: the Conservation and Natural Resources Element and the Safety Element. The Conservation and Natural Resources Element guides the long-term conservation of natural resources and preservation of available open space areas. In addition, the Safety Element, which reduces the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards is applicable to the floodplain management plan. By inclusion of these elements, the Los Angeles County General Plan is in compliance with California's First Validating Act of 2023. This Act refers to California's SB-878 which plays a role in flood planning by validating the organization, boundaries, acts, proceedings, and bonds of public bodies, including flood control districts. This validation is crucial for flood control projects because it verifies the legal and administrative frameworks governing these districts are recognized and upheld.

Conservation and Natural Resources Element

Watershed Management

The Conservation and Natural Resources Element of the General Plan addresses watershed management, noting that it is an effective and comprehensive way to address water resource challenges. Watershed

management integrates habitat enrichment and recreation availability with water supply, flood protection, and clean runoff (Los Angeles County Department of Regional Planning, 2022).

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

Significant Ecological Areas and Coastal Resources

The Conservation and Natural Resources Element of the General Plan establishes the Significant Ecological Area (SEA) designation for land in unincorporated areas that contains irreplaceable biological resources (SEAs also have been identified in cities, but they function differently from those in unincorporated areas). Coastal Resource Areas (CRAs) are located within the coastal zone and include biological resources equal in significance to SEAs. The General Plan identifies 21 SEAs and eight CRAs. SEAs and CRAs are shown in the table below. Two CRAs are linked to SEAs that are not entirely within CRAs (the Santa Monica Mountains Coastal Zone and Palos Verdes Coastline) (Los Angeles County Department of Regional Planning, 2022).

Table 4-3: Significant Ecological Areas and Coastal Resource Areas

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

*Indicate areas within unincorporated areas of Los Angeles County

The objective of the SEA program is to conserve genetic and physical diversity by designating biological resource areas that are capable of sustaining themselves into the future. However, SEAs are not wilderness preserves. Much of the land in SEAs is privately held, used for public recreation, or abuts

developed areas. The SEA program must therefore balance the overall objective of resource preservation against other critical public needs. The General Plan goals and policies are intended to see that privately held lands within the SEAs retain the right of reasonable use, while avoiding activities and developments that are incompatible with the long-term survival of the SEAs (Los Angeles County Department of Regional Planning, 2022).

Safety Element

Flooding is among the natural hazards addressed in the Safety Element of the General Plan. The element presents goals and policies for uses in flood hazard zones, as well as tsunami hazard areas and potential dam failure inundation areas. The Safety Element of the County's General Plan was updated July 2022 and is in compliance with the provisions of California's SB 379.

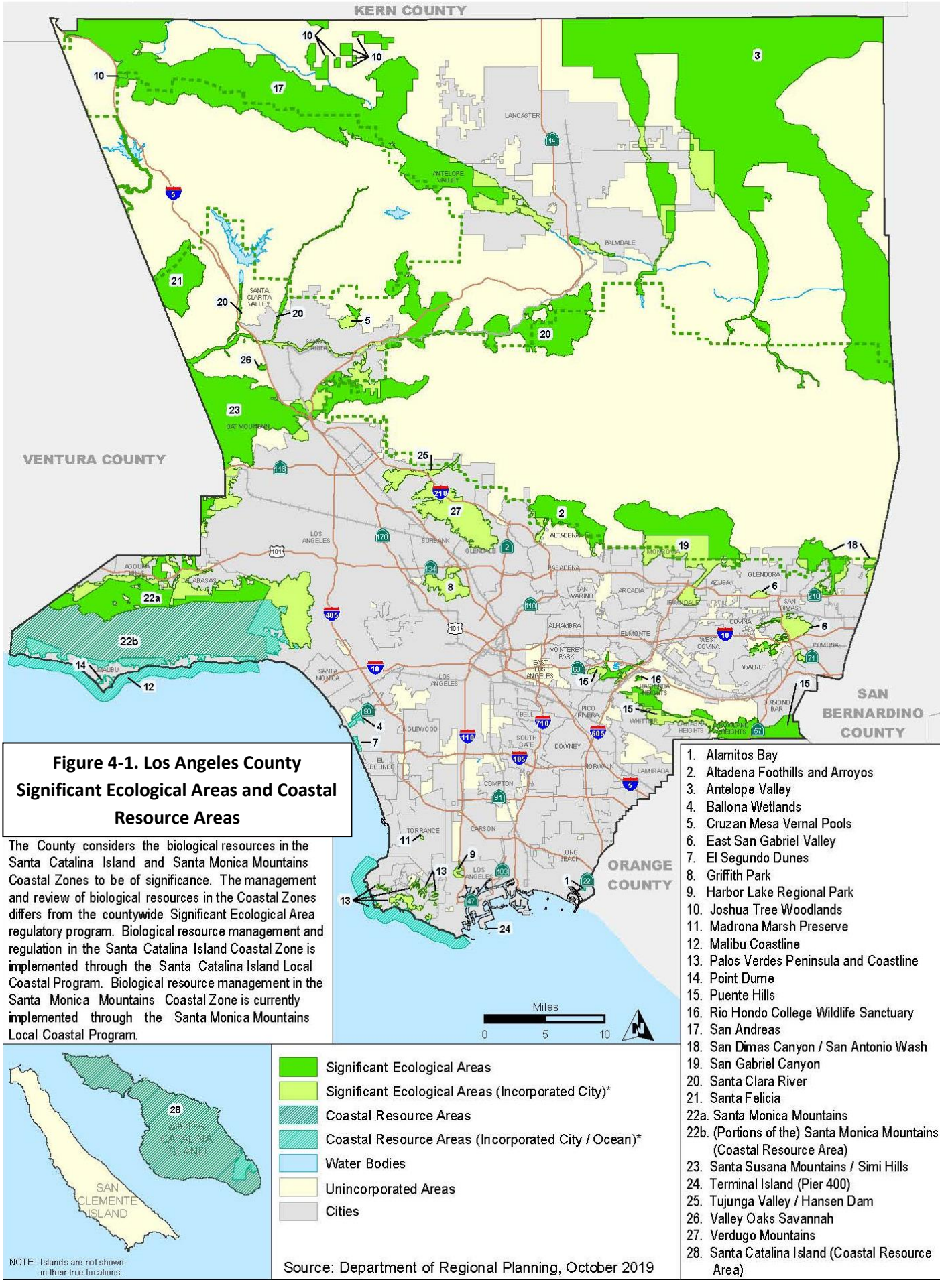


Figure 4-1. Los Angeles County Significant Ecological Areas and Coastal Resource Areas

The County considers the biological resources in the Santa Catalina Island and Santa Monica Mountains Coastal Zones to be of significance. The management and review of biological resources in the Coastal Zones differs from the countywide Significant Ecological Area regulatory program. Biological resource management and regulation in the Santa Catalina Island Coastal Zone is implemented through the Santa Catalina Island Local Coastal Program. Biological resource management in the Santa Monica Mountains Coastal Zone is currently implemented through the Santa Monica Mountains Local Coastal Program.

4.2.2 Community Plans

The Los Angeles County General Plan (2022) serves as the foundation for community-based plans, such as area plans, community plans, and coastal land use plans. Area plans focus on land use and policy issues that are specific to the planning area. Community plans cover smaller geographic areas within the planning area and address neighborhood and/or community-level policy issues. Coastal land use plans are components of local coastal programs; they regulate land use and establish policies to guide development in the state-designated coastal zone. The following is a list of adopted and in-progress community-based plans in unincorporated Los Angeles County (Los Angeles County Department of Regional Planning, 2022):

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

4.2.3 Watershed Management Program

Municipalities and community stakeholders throughout Los Angeles County developed a total of 31 collaborative Watershed Management Programs and Enhanced Watershed Management Programs for the county's six watersheds—Dominguez Channel, Los Angeles River, Los Cerritos Channel, San Gabriel River, Santa Monica Bay and Upper Santa Clara River. Each Watershed Management Group meets regularly to implement its plan (California Water Boards, 2023a).

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

- **Regional Multi-Benefit Projects**— Regional multi-benefit projects, such as the Alondra Park Multi-Benefit Stormwater Capture Project, retain, divert or treat stormwater and non-stormwater from sub watershed areas, while also providing water conservation, flood, recreation, habitat and other benefits. The Alondra Park Multi-Benefit Stormwater Capture Project, seen in Figure 4-2, is located in El Camino Village, Lawndale, CA and will capture and

divert or treat stormwater from 4,495 acres of land. This project is currently in construction, which started in late January 2024. (Los Angeles County Public Works, 2023a).



Figure 4-2: Alondra Park Multi-Benefit Stormwater Capture Project

- **Green Street Projects**— Green Street projects such as the 103rd Street Green Improvement Project, improve streets, sidewalks or other paved areas using permeable materials and drought-tolerant plants to capture, clean or infiltrate rainwater. Green infrastructure projects help to clean surface water bodies, recharge groundwater, beautify neighborhoods, and cool communities by increasing the amount of vegetation. The 103rd Street Green Improvement Project will construct a green street through 103rd street and portions of Ted Watkins Park to collect dry weather runoff and stormwater. The street will also be rehabilitated with improved sidewalks, curbs, and pavement. Project was completed in November 2020. (Los Angeles Public Works, 2023b).
- **Low Impact Development—** Low impact development consists of site design approaches and best management practices that address runoff and pollution at the source. These practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.

4.2.4 Greater Los Angeles County Region Integrated Regional Water Management Plan

The 2017 Integrated Regional Water Management (IRWM) Plan Update defines the direction for collaborative planning to achieve sustainable management of water resources in the Greater Los Angeles County Region. The update meets the California Department of Water Resources' 2016 updated IRWM

guideline requirements. The Plan identifies solutions to achieve the following objectives over the 25-year planning horizon (Greater Los Angeles County, 2014):

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

4.2.5 Los Angeles County Flood Control District

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

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

The Flood Control District boundaries encompass more than 2,700 square miles, six major watersheds, 86 incorporated cities, and most of the unincorporated County areas. The boundary does not encompass communities north of Avenue S. It excludes communities in Antelope Valley. Information on Antelope Valley's Plan is found in the following sections. A map of the LACFCD can be found using the link above. The Flood Control District's municipal flood protection and water conservation system is one of the largest in the world. It includes 14 major dams and reservoirs, 491 miles of open channels, 27 spreading grounds, 189 debris basins, operates 61 pump stations, 3,400 miles of underground storm drains, and an estimated 97,466 catch basins. Planning efforts to rehabilitate flood control facilities also consider other potential beneficial uses of those facilities, such as environmental restoration, enhancement of water quality, and recreation (Los Angeles County Public Works, 2023c).

4.2.6 Antelope Valley Comprehensive Plan and Amendments

Los Angeles County prepared and adopted the Antelope Valley Areawide General Plan in 1986, a comprehensive plan for the unincorporated County area of Antelope Valley. The Plan was updated in June 2015, renamed the Antelope Valley Area Plan. The Antelope Valley differs from other parts of the County because it lacks an ocean drainage outlet. It also lacks defined natural channels below the foothills, as well as an adequate flood control system, resulting in unpredictable and varying flood risk across the valley

floor. The Plan explores flood control and water conservation measures to reduce the negative effects of regional private development and to better address local flood hazard needs. It seeks to provide a cohesive approach to drainage, stormwater management, and flood risk mitigation. The Plan evaluates the fee structures available to finance drainage solutions (Los Angeles County Public Works, 1987). Two amendments to the original plan update costs and drainage fees to continue implementing recommended improvements (Los Angeles County Public Works, 1991; Los Angeles County Public Works, 2006). The most recent update to the plan in 2015 provided for zone changes, including residential, agricultural, commercial, industrial, special purpose, C-RU (rural commercial) and MXD-RU (rural mixed use) zones (Los Angeles County Department of Regional Planning, 2015).

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

The Antelope Valley IRWM group developed a water resource management plan in 2007. The 2007 plan was updated in 2013 and again in 2019 to include new information as required by the California Department of Water Resources' 2016 IRWM Proposition 1 Guidelines as well as updates to information from the previous IRWM. The 2019 Antelope Valley IRWM Plan explores key issues, including uncertain and variable water supply, water demand exceeding supply, water quality and flood management, environmental resources, water management and land use, and climate change. It identifies and prioritizes a series of projects to address key concerns in the region, particularly those related to water supply (Antelope Valley Integrated Regional Water Management Group, 2019).

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

4.2.8 Upper Santa Clara River Watershed Integrated Regional Water Management Plan

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

4.2.9 Sediment Management Strategic Plan

The Los Angeles County Flood Control District developed a Sediment Management Strategic Plan in response to challenges in managing sediment. These challenges included wildfires occurring in 2007, 2009 and 2020 that led to an increased inflow of sediment and debris and increased pressure on the capacity of sediment placement sites. This plan provides an overview of sediment management issues and

evaluates various projects. The plan, designed to be effective from 2012 to 2032, is guided by the following objectives (Los Angeles County Public Works, 2013):

- Maintaining flood risk management and water conservation
- Recognizing opportunities for increased environmental stewardship
- Reducing social impacts related to sediment management
- Identifying ways to use sediment as a resource
- Ensuring that the Flood Control District is fiscally responsible in its decision-making.

4.2.10 Local Coastal Programs

Los Angeles County local coastal programs (LCPs) comply with the 1976 Coastal Act, enacted by the California Legislature, which requires coastal cities and counties to establish coastal resource conservation and development programs. The LCPs consist of planning and regulatory measures that manage development in the coastal zone. Each LCP includes a land use plan and implementation program. LCPs must consider the unique factors of the coastal community, as well as regional and state concerns. There are five coastal areas within the unincorporated Los Angeles County jurisdiction: the Santa Monica Mountains, Marina Del Rey, Santa Catalina Island, San Clemente Island and Ballona Wetlands Area A. Of these five areas, three have certified LCPs: Marina del Rey, Santa Catalina Island, and the Santa Monica Mountains. Certified LCPs are not required for San Clemente Island or Ballona Wetlands Area A (Los Angeles County Department of Regional Planning, 2023).

4.2.11 Los Angeles County Low Impact Development Ordinance

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

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

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

4.2.12 County of Los Angeles Operational Area Emergency Operations Plan

The County of Los Angeles Operational Area Emergency Operations Plan provides details for coordinated response to large-scale emergency situations in the County, whether natural, man-made, or technological. In 2023, the 2012 Operational Area Emergency Response Plan was updated and renamed the County of Los Angeles Operational Area Emergency Operations Plan. It focuses on potentially catastrophic disasters that require more than normal response measures. It reviews capabilities in prevention, protection, response, recovery, and mitigation. It describes continuity of government plans and provides annexes for specific situations, including tsunamis, oil spills, and terrorism (Los Angeles County, 2023)

4.2.13 Topanga Creek Watershed Management Plan

The Topanga Creek Watershed covers 18 square miles, has the greatest diversity of native plants and animals of all the watersheds in the Santa Monica Mountains, and is the third largest drainage into the Santa Monica Bay. In 2002, the Topanga Creek Watershed Committee updated its original 1996 Topanga Creek Watershed Management Study with new preventive planning strategies and best management practices. These projects and practices were developed to maintain and enhance the watershed's current physical, chemical, biological, economic, and social characteristics, including its diversity in land use (i.e., residential, business development, infrastructure, wilderness recreation, and biological habitat). The plan also seeks to protect life and property from vulnerability to natural hazards such as stormwater runoff, floods, earthquakes, and wildfires (Topanga Creek Watershed Committee, 2002).

4.2.14 Rio Hondo Watershed Management Plan

The 2018 Rio Hondo Watershed Management Plan provides goals and strategies to all affected municipalities and conservation organizations as a way to improve water quality, health, habitat and recreational opportunities for the Rio Hondo watershed. The Rio Hondo watershed is a sub-watershed of the Los Angeles River watershed and is linked to the San Gabriel River watershed as a result of both natural hydrologic processes and human intervention. The watershed contains both rural and urban areas, with the San Gabriel Mountains and Angeles National Forest defining the upper reaches and the more urban and developed San Gabriel Valley below the foothills. The watershed encompasses 22 cities and six unincorporated communities in Los Angeles County (California Water Boards, 2022b).

4.2.15 Gateway Watershed Management Program

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

4.2.16 Los Angeles River Master Plan and Corridor Highlights

The Los Angeles River is 51 miles long, and its watershed covers 834 square miles. It extends from the Santa Monica Mountains to the Simi Hills in the west and from the San Gabriel Mountains in the east. The

Los Angeles River flows eastward from its headwaters in the mountains to the northern corner of Griffith Park, where the channel turns southward through the Glendale Narrows before it flows across the coastal plain and into San Pedro Bay near Long Beach. The river is a valuable resource for the County, as well as a major source of flooding.

The County developed the Los Angeles River Master Plan in 1996 to seek ways to utilize the natural assets of the Los Angeles basin for economic, recreational, and environmental benefits while maintaining the waterway as a flood protection resource. The plan highlights water conservation as a major concern, noting that 30 to 40 percent of the County's water supply comes from local sources. It also recommends multi-use and multi-benefit projects, which not only strengthen flood control measures but also educate residents, create environmental habitats, or increase recreational opportunities (Los Angeles County Public Works, 1996; Los Angeles County Public Works, 2022).

In 2005, the County released the Master Plan and Corridor Highlights document, which provides information about Master Plan projects implemented since the adoption of the original 1996 Master Plan and those planned at the time for future construction. Many of the projects were structural but highlights also included natural resource preservation and education and outreach projects. Where sufficient data was available, the report documented specific benefits as well as implementation and location information (Los Angeles County Public Works, 2005). The plan update was developed through four phases: analysis of existing plans and regional context, proposing changes for the future, drafting the update, and final plan update. Members of the public, a steering committee appointed by the Board of Supervisors made up of 41 organizations, and a Los Angeles County Public Works technical team were the three main groups that provided input during these phases (Los Angeles County Public Works, 2022).

4.2.17 Los Angeles County Annual Hydrologic Reports

Los Angeles County releases an annual report containing hydrologic data relevant to the County; the most recent report covers 2021 through 2022. The report is organized into eight major sections providing background and statistics on the following areas (Los Angeles County Public Works, 2024):

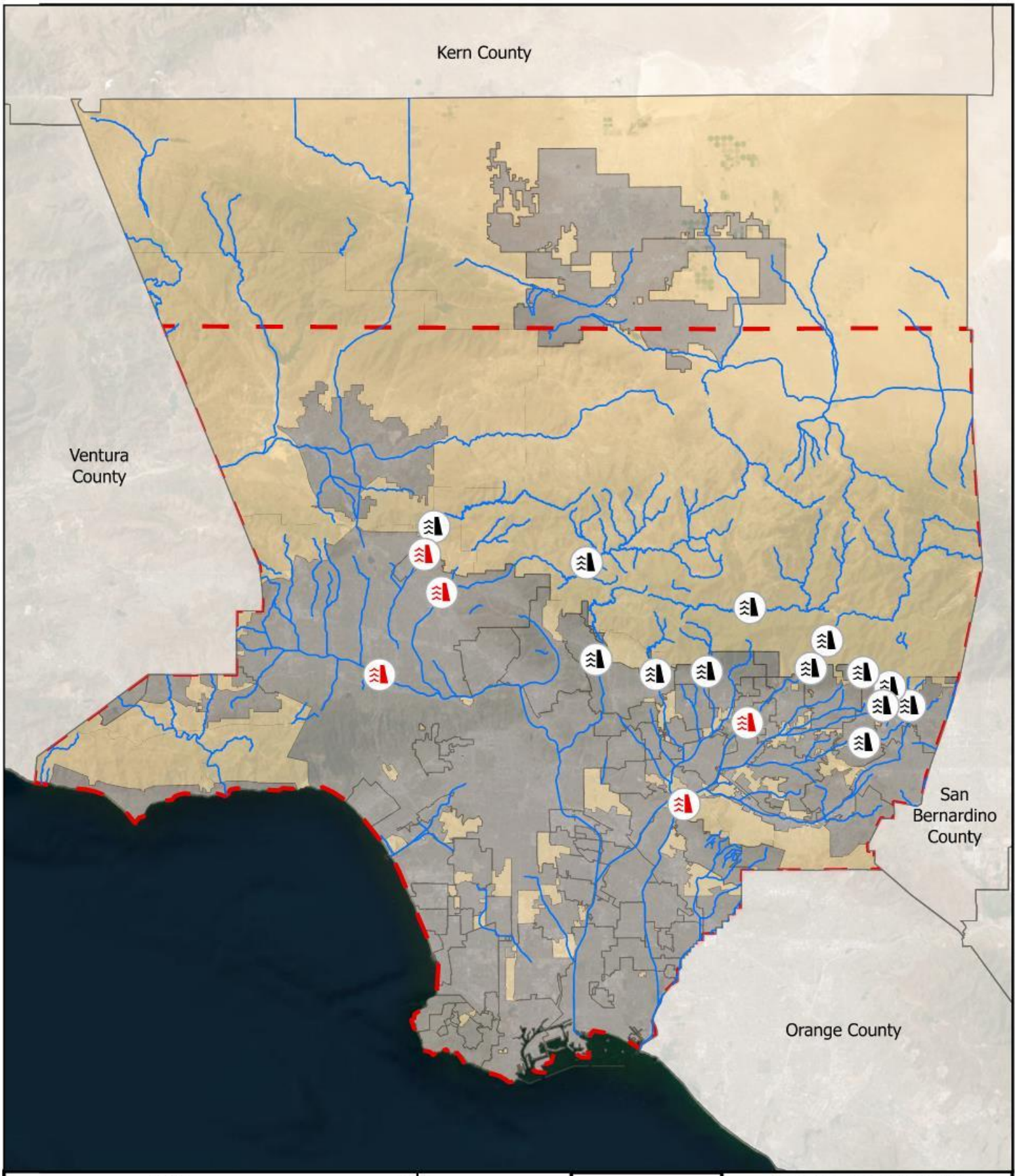
- Los Angeles County—County's topography, geology, and land use.
- Runoff—Mean daily and peak annual runoff flow rates for active stream gaging stations.
- Flood Control District—Flood events summaries.
- Reservoirs—Summary of annual inflow, outflow, and storage data for County dams and reservoirs.
-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

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

4.2.18 Los Angeles County Drainage Area

In 1915, the State Legislature created the Los Angeles County Flood Control District, shown in Figure 4-3 to control floods and conserve water. Early Flood Control District bond issues financed construction of 13 dams in the San Gabriel Mountains as well as flood channel modifications. The federal Emergency Relief

Appropriations Act of 1935 financed the construction of Eaton Wash Dam and several of the County's first debris basins. The federal 1935 Act and the Flood Control Act of 1936 made the U.S. Army Corps of Engineers a participant in Los Angeles County's flood protection program. Subsequent federal Flood Control Acts provided additional funding for flood control facilities. The Army Corps' Los Angeles River, San Gabriel River and Ballona Creek projects constructed five flood storage reservoirs or basins, 24 debris basins, 95 miles of main channels, 191 miles of tributary channels and two jetties. This regional flood control system is described in the LACDA study. It includes the Los Angeles River, San Gabriel River, Rio Hondo Channel and Ballona Creek. Flood control facilities in the Flood Control District and LACDA system fall into four general categories: debris basins, flood control reservoirs, improved tributary channels, and improved main channels. In total, the combined Flood Control District and LACDA systems consist of over 100 miles of main stem channel, over 370 miles of tributary channels, over 200 debris basins, 14 flood control and stormwater capture dams, and five flood control dams.



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Los Angeles County Floodplain Management Plan

Figure 4-3: Los Angeles County Flood Control District Area

Source: Los Angeles County Department of Public Works, 2023

Issued: 4/19/2024

4.2.19 Trash Best Management Practices

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

4.2.20 Los Angeles County Response to Americans with Disabilities Act

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

- Maintaining independence
- Communication
- Transportation
- Supervision
- Medical care.

These populations may include any of the following:

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

4.2.20.1 Reasonable Accommodations Ordinance

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

4.2.20.2 Plan Action Implementation

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

4.3 Capability Assessment

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out. Table 4-4 summarizes the legal and regulatory capability of Los Angeles County. This table describes the legal authorities available to the county and/or enabling legislation at the state level affecting planning and land management tools that can support floodplain management action items. Each of these capabilities represents an ongoing program that supports Los Angeles County's commitment to floodplain resilience. Any gap in capability identified in this table should be considered as an action by the County in the action plan component of this plan. The table identifies the following information for each program:

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

Table 4-4: Los Angeles County Legal and Regulatory Capability

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Codes, Ordinances & Requirements				
Building Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code: Title 26 – Building Code Title 30 – Residential Code				
Zoning Code	Yes	No	No	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning.				
Subdivisions	Yes	Yes	No	No
Comment: County of Los Angeles County Code, Title 21 – Subdivision Code. The California State Subdivision Map Act sets out how long a map approval can be valid, and the County cannot grant time longer than that.				
Post-Disaster Recovery	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 2 – Administration, Division 3 – Departments and Other Administrative Bodies, Chapter 2.68 – Emergency Services, Part 6 – Director of Recovery Operations.				
Flood Damage Prevention Ordinance	Yes	No	No	No

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Comment: County of Los Angeles County Code: Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites. Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations. Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard. Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation. Title 20, Division 5, Chapter 20.94 – Channels. Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control.				
Low-Impact Development Standards	Yes	No	No	Yes
Comment: County of Los Angeles Code, Title 12 – Environmental Protection, Chapter 12.84 Low Impact Development Standards.				
Real Estate and Rental Disclosure	Yes	No	No	Yes
Comment: State of California Natural Hazards Disclosure Act, effective June 1, 1998 (California Civil Code Section 1103.2). California Government Code Section 8589.45 effective July 1, 2018.				
Growth Management	No	No	Yes	Yes
Comment: County of Los Angeles County Code, Title 22 – Planning and Zoning, Chapter 22.46 – Specific Plans. Specific Plans are available for Santa Catalina Island, Marina Del Rey, Universal Studios, and East Los Angeles Third Street.				
Site Plan Review	Yes	No	No	No
Comment: County of Los Angeles County Code, Title 22 and Title 26 – Building Code, Chapter 1 – Administration, Inspections.				
Special Purpose (flood management, critical areas)	–	–	–	–
County of Los Angeles County Code, Title 11 – Health and Safety, Division 2 – General Hazards, Chapter 11.52 – Water Hazards. County of Los Angeles County Code, Title 11 – Health and Safety, Division 3 – Miscellaneous Regulations, Chapter 11.60 – Floodways and Water Surface Elevations. County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.80 – Stormwater and Runoff Pollution Control. County of Los Angeles County Code, Title 12 – Environmental Protection, Chapter 12.20 – Depositing Petroleum Products on Beaches or into Pacific Ocean. County of Los Angeles County Code, Title 20 – Utilities, Division 5 – Flood Control District Property and Facilities. County of Los Angeles County Code, Title 31 – County Green Building Standards Code. County of Los Angeles County Code, Flood Control District Code, Chapter 21 – Stormwater and Runoff Pollution Control.				
Planning Documents				
General Plan	Yes	No	No	Yes
The *Los Angeles County 2035 General Plan*, adopted by the Los Angeles County Board of Supervisors on October 6, 2015, provides a policy framework for how and where the unincorporated County will grow through 2035. Comprising 2,650 square miles, unincorporated Los Angeles County is home to over one million people. The General Plan accommodates new housing and jobs within the unincorporated areas in anticipation of population growth in the County and the region.				
Capital Improvement Plan	Yes	No	No	No
Los Angeles County Public Works develops and implements capital projects, and manages projects implemented by consultants. The 2035 General Plan Implementation Program identifies a goal project of Public Works and the Department of Regional Planning jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas. Some current community plans have capital improvements listed, but level of detail varies based on community and plan age.				
Economic Development Plan	Yes	No	No	No
Los Angeles County Strategic Plan for Economic Development, 2016. 2035 General Plan, Chapter 14 – Economic Development Element. Available online.				
Floodplain or Basin Plan	Yes	No	No	No
Los Angeles County Floodplain Management Plan, 2020. Available online.				
Stormwater Plan	Yes	No	Yes	Yes
Low Impact Development Standards Manual, February 2014.				
Watershed Management Plan	Yes	No	Yes	No

	Local Authority	State or Federal Prohibitions	Other Regulatory Authority	State Mandated
Enhanced Watershed Management Programs in progress and to be submitted for approval to the Los Angeles Regional Water Quality Control Board by June 28, 2015. These plans will include the County's five watersheds: Ballona Creek, Dominguez Channel, Marina Del Ray, Santa Monica Bay, and Upper Los Angeles River. All available online. Other unincorporated community watershed management plans: Topanga Creek, Upper Santa Clara River, Rio Hondo and Gateway Cities Region.				
Habitat Conservation Plan	Yes	No	Yes	No
2035 General Plan, Chapter 9 – Conservation and Natural Resources Element, Significant Ecological Areas. Available online. The General Plan has policies related to habitat and resource conservation, but the Conservation and Natural resources Element is not the equivalent of a habitat conservation plan. Other regulatory authority lies with the California Department of Fish & Wildlife or the U.S. Fish & Wildlife Service, depending upon the species.				
Shoreline Management Plan	Yes	No	No	Yes
Los Angeles County Stormwater Monitoring Reports, Section 1.1.1.4 – Shoreline Monitoring (released annually and with most recent report of 2014-2015). Local Coastal Programs (LCP). • Santa Monica Mountains LCP, adopted on August 26, 2014, and certified on October 10, 2014. • Marina Del Rey LCP, adopted in 1996, and amended and certified in 2012. • Santa Catalina Island LCP, adopted on March 15, 1983, and certified on November 17, 1983. All available online.				
Emergency Response Plan	Yes	No	No	Yes
County of Los Angeles Operational Area Emergency Operations Plan (ERP), 2012. Available online.				
Post-Disaster Recovery Plan	Yes	No	No	No
Recovery Annex to the Emergency Response Plan. Emergency Response Plan, Section 2.7: Recovery Considerations also reviews County Recovery Procedures.				
Sediment Management Plan	Yes	No	No	No
Sediment Management Strategic Plan, 2012-2032. Available online.				
Continuity of Operations Plan	Yes	No	No	Yes
All Los Angeles County departments and/or divisions must develop, exercise, and maintain plans for business continuity functions and processing resources. Each department and/or division must develop a plan for its business operations that can sufficiently support the service requirements of other operations and functions involved in the incident. Plans must address the full range of resources including data processing, data communications links, personnel, personal computers, terminals, workspace, voice communication, and documents. Additionally, Chapter 3 of the Emergency Response Plan includes Continuity of Government information.				
Water Resource Management Plan	Yes	No	Yes	Yes
Greater Los Angeles County Region Integrated Regional Water Management Plan, 2013, Antelope Valley Integrated Regional Water Management Plan, 2013, Upper Santa Clara River Watershed Integrated Regional Water Management Plan, 2014.				
Best Management Practices	–	–	–	–
Technical Report of Trash Best Management Practices, 2004. These best management practices were identified and evaluated to provide effective alternatives to meet the goals of the trash total maximum daily load for Los Angeles River and Ballona Creek.				

Table 4-5 summarizes the administrative and technical capability of Los Angeles County. This table inventories the staff/personnel resources available to Los Angeles County to help with floodplain management and the implementation of specific actions.

Table 4-5: Administrative and Technical Capability

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

Table 4-6 summarizes fiscal capability of Los Angeles County. This table identifies what financial resources (other than grants) are available to the county to support the implementation of repetitive loss area action items.

Table 4-6: Fiscal Capability

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

Table 4-7 summarizes community based classification programs that rate facets of a community's floodplain management capability. The Community Rating System is described in Section 1.1. The Building

Code Effectiveness Grading Schedule assesses the building codes in effect in a community and how the community enforces them, with emphasis on mitigation of losses from natural hazards. The National Oceanic and Atmospheric Administration administers the StormReady and TsunamiReady programs. StormReady helps arm communities with communication and safety skills needed to save lives and property before, during and after an event. It helps community leaders and emergency managers strengthen local safety programs.

Table 4-7: Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	6	4/01/2022
Building Code Effectiveness Grading Schedule	Yes	2/2	2021
StormReady	No	No	N/A
TsunamiReady	No	No	N/A

Table 4-8 summarizes the County's participation in national flood-related programs.

Table 4-8: National Flood Insurance Program Compliance

NFIP Criteria	County Information
Department responsible for floodplain management	Los Angeles County Public Works Stormwater Engineering Division
Community's Floodplain Administrator	Los Angeles County Public Works Stormwater Engineering Division
Date of Adoption of Flood Damage Prevention Ordinance	County of Los Angeles County Code: • Title 26, Chapter 1, Section 110 – Prohibited Uses of Building Sites, last amended by ordinance 2013-0048 § 2, effective 2013 • Title 11, Division 3, Chapter 11.60 – Floodways and Water Surface Elevations, last amended by ordinance 2016-0062 § 2, effective 2016 • Title 21, Chapter 21.44.320 – Land subject to flood hazard, inundation, or geological hazard, last amended by ordinance 11665 § 38, effective 1978 • Title 21, Chapter 21.44.330 – Flood-hazard area, floodway or natural watercourse designation, last amended by ordinance 11665 § 39, effective 1978 • Title 20, Division 5, Chapter 20.94 – Channels, last amended by ordinance 86-0032 § 1, effective 1986 • Title 22, Division 1, Chapter 22.52, Part 5 – Flood Control, last amended by ordinance 1494 Ch. 7 Art. 5 § 705.1, effective 1926
Most Recent Community Assistance Visit or Community Assistance Contact	Last Community Assistance Visit: December 19, 2019 Community Assistance Visit Report: July 13, 2020 Community Assistance Visit Closed: January 19, 2021 Issues: None
NFIP Compliance Violations	No issues that would render Los Angeles County out of full compliance with the provisions of the NFIP were identified during the last Community Assistance Visit.
Flood Hazard Mapping	Flood hazard mapping has been identified as an issue that needs to be addressed by this planning process. See Section 6.14 lists mapping issues, which are addressed by Mitigation #33 (Chapter 11).

NFIP Criteria	County Information
Floodplain Management Staff Training	Los Angeles County Public Works Stormwater Engineering Division staff actively participate in programs of the Floodplain Management Association as well as other trainings offered by the state and FEMA where feasible. County staff welcomes opportunities for training on floodplain management programs and principles.
CRS Participation and Classification	Los Angeles County has participated in the CRS since 10/1/1991 and received a CRS Class 6 in June 2021.

4.4 FEMA Special Flood Hazard Areas

Special flood hazard areas are defined in the 2008 and 2021, Digital Flood Insurance Rate Maps (FIRMs) for Los Angeles County, Letters of Map Change (LOMC) issued by FEMA, and FIRMs resulting from FEMA's final Physical Map Revisions in 2024. These areas include the following:

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

5 Mitigated Repetitive Loss Properties

5.1 Repetitive Loss List Correction

As part of their application and cycle verification obligations, CRS-participating communities must review their lists of repetitive-loss properties for accuracy, for correct addresses, to determine whether the properties are incorrectly assigned to the community, and to determine whether the insured buildings have been removed, retrofitted or otherwise protected from the cause of the repetitive flooding. The result of this review is recorded on a Repetitive Loss Update Worksheet (AW-501; see Figure 5-1).

A community with repetitive losses must sign the Repetitive Loss List Community Certification, CC-RL, indicating each address has been checked. If there are updates, the submittal must include corrected Repetitive Loss Update Worksheets (AW-501) with any required supporting documentation. The community must note the following situations in which the form should be updated:

1. The property is not located in the community's jurisdiction. The property may be outside the community's corporate limits, it may be in another city, or it may have been annexed by another community. If it can be determined in which community the property belongs, the property will be reassigned to the correct community. If a property is not in the community, it will not be reassigned unless the community in which the property does belong can be definitely identified.
2. There was an error in the repetitive loss data base, such as a duplicate listing or an incorrect address.
3. The property has subsequently been protected from the types of events that caused the losses. Buildings that have been acquired, relocated, retrofitted, or otherwise protected from the types of frequent floods that caused the past damage are not counted in determining the community's CRS requirements.
4. The property is protected from damage by the base flood shown on the current Flood Insurance Rate Map (FIRM). For example, the community may demonstrate that the building is elevated or flood-proofed above the base flood elevation but was flooded by a higher level. If the property is outside the Special Flood Hazard Area, the community may show that all of the repetitive losses were caused by events with recurrence intervals of over 100 years (e.g., two 200-year storms).

For corrections made under situations 3 or 4 above, future AW-501s issued for the community will be segregated into two categories: mitigated and unmitigated.

OMB Control Number: 1660-0022
Expiration: XX/XX/XXX

Federal Emergency Management Agency

National Flood Insurance Program

NFIP REPETITIVE LOSS UPDATE WORKSHEET (AW-501)

THE INFORMATION ON THIS FORM IS BASED ON CLAIMS ON OR BEFORE: 01/31/2017

REPETITVE LOSS NUMBER: 0012345

Internal use only ☐ A ☐ N/A ☐ FRR

NFIP Community Name: LOS ANGELES COUNTY	CID#: 012345
Local Property Identifier:	

Current Property Address	Previous Property Address/Community ID#
1234 MOCKINGBIRD LANE HOPE, ID 83836	
Last Claimant:	Last Claimant:
Insured: No / Name Insured:	
Date of Losses: 19800216; 19780303	Total Number of Losses for Property:2

REQUESTED UPDATES

MARK ALL UPDATES BELOW THAT APPLY (IMPORTANT - SEE INSTRUCTIONS)

1. ☐ **INFORMATION PROVIDED NOT SUFFICIENT TO IDENTIFY PROPERTY.**
   Choose this update if all attempts to locate the property fail. Please describe the steps you took to locate the property in the comments section below.

2. ☐ **COSMETIC CHANGES REQUIRED TO THE ADDRESS:**
   Update the address shown above and/or add our local alternative property identifier such as a Tax Assessor #.

3. ☒ **PROPERTY NOT IN OUR COMMUNITY OR JURISDICTION:**
   Choose this update if you have positively determined that the property shown is not located in your community. Please provide the correct NFIP community name and if known the NFIP community ID Number. If available, please attach a map showing the property location.
   ASSIGN TO NFIP COMMUNITY NAME: STATE OF CALIFORNIA NFIP COMMUNITY ID#: N/A

4. ☐ **FLOOD PROTECTION PROVIDED.**
   Choose this update only if some type of structural intervention has occurred to the building, prop-erty or the source of flooding that protects the building from future events similar to those that occurred in the past. The update must be supported by documentation such as an Elevation Certifi-cate and the Mitigation action and funding below must be provided.

   (Mitigation Action 1.) (Source of Primary Mitigation Funding 3.) (Secondary Source of Funding 3.)

CC-RL-2 (AW-501-1) *[continued on next page]*

Figure 5-1: Example AW-501

5.2 Mitigated Repetitive Loss Properties

Los Angeles County is using the 2023 ISO repetitive loss list and AW-501s dated May 2023 as the basis for this Repetitive Loss Area Analysis. This is the last officially sanctioned CRS repetitive loss data set issued to Los Angeles County. According to the AW-501s issued, Los Angeles County has 54 repetitive loss properties, none of which are officially recognized as “mitigated”. Four AW-501s were issued to remove properties in the community, an example form is shown above in Figure 5-1. These properties have been included in the analysis as they are not offically mitigated.

6 Mitigation Alternatives Considered

Although this report presents separate analyses for each identified repetitive loss area in unincorporated Los Angeles County, the list of potential measures to address repetitive flooding problems was the same for each area. This chapter summarizes the alternatives that were identified for consideration. These alternatives can be implemented by the County, the homeowner, or other entities. The selection of suitable alternatives for each at-risk property in the repetitive loss areas is described in the chapters presenting individual repetitive loss area analyses.

Many types of flood hazard mitigation exist, and there is not one mitigation measure that fits every case or even most cases. Successful mitigation often requires multiple strategies. The CRS Coordinator's Manual breaks the primary types of mitigation down as follows (FEMA, 2017a):

- Preventive activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.
- Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.
- Natural resource protection activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.
- Emergency services are measures taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.
- Structural projects keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.
- Public information activities advise property owners, potential property owners, and visitors about hazards and ways to protect people and property from them, as well as the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

6.1 Preventive

Los Angeles County regulates residential and commercial development through its building code, planning and zoning requirements, stormwater management regulations and floodplain management ordinances. Any project in an unincorporated area located in a floodplain outside state or federally owned lands, regardless of the project's size, requires a permit from Los Angeles County, unless the project can be characterized as routine maintenance.

6.2 Property Protection

These measures are generally performed by property owners or their agents. FEMA has published numerous manuals that help a property owner determine which property protection measures are appropriate for particular situations:

- FEMA 259, Engineering Principles and Practices of Retrofitting Floodprone Residential Structures.
- FEMA 312, Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding.
- FEMA 551, Selecting Appropriate Mitigation Measures for Floodprone Structures.
- FEMA 348, Protecting Building Utilities from Flood Damage.
- FEMA 511, Reducing Damage from Localized Flooding.
- FEMA 102, Floodproofing Non-Residential Structures.
- FEMA 84, Answers to Questions about the NFIP.
- FEMA 54, Elevated Residential Structures Book.
- FEMA 268, Protecting Floodplain Resources: A Guidebook for Communities.
- FEMA 347, Above the Flood: Elevating Your Floodprone House.
- FEMA 85, Protecting Manufactured Homes from Floods and Other Hazards.

The manuals listed above are available for review at FEMA's website. For a complete guide to retrofitting homes for flood protection, see FEMA P-312, Homeowner's Guide to Retrofitting 3rd Edition (FEMA, 2014). The primary methods of property protection in Los Angeles County are:

- Demolition/relocation.
- Elevation (structure or damage-prone components such as furnace or AC unit).
- Dry flood-proof (so water cannot get in).
- Wet flood-proof portions of the building (so water will not cause damage).
- Direct drainage away from the building.
- Drainage maintenance.
- Sewer Improvements.

6.2.1 Aquisition

One of the most effective approaches to preventing further flood damage to a building is acquisition and relocation or clearing of the structure. The property would then serve as open space or recreation area. Property owners retain the right to select this as a mitigation method. They may sell their property to a government agency or an agency dedicated to the preservation and management of local open space. The property owner can also relocate the building to another property. Alternatively, the building can be moved to another area of the same property, if that area is outside the flood hazard. The property owner can also take advantage of federal funding for such mitigation.

For the Los Angeles County RLAA, it has been determined that acquisition would not be a cost-effective alternative for structures with probable flood depths of 2 feet or less. "Cost-effective" means that the benefits of the action would equal or exceed the costs to implement the action. For this RLAA, a benefit is considered to be an avoided loss. The high value of property in Los Angeles County makes it unlikely that acquisition projects can be cost-effective.

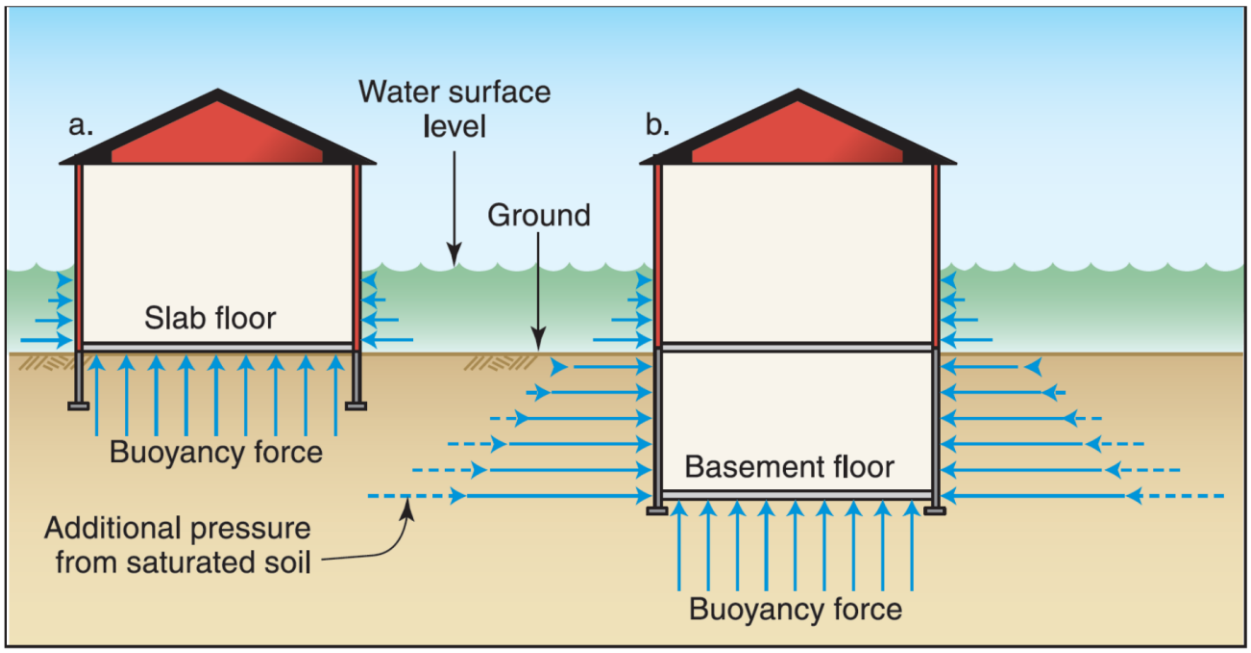
6.2.2 Home Elevation

Sometimes dry or wet flood-proofing are not enough and greater measures must be taken. For example, if the floodwaters are too high for dry flood-proofing and the inhabited area is too low for wet flood-

proofing, it may be necessary to raise the structure. Whenever the floor of a home is below the 1 percent annual chance (100-year) flood elevation, physically elevating the structure is often recommended as it is one of the most effective means to prevent flood damage. Financial assistance may be available for floodproofing. Los Angeles County requires substantially improved residential buildings to have their lowest floor elevated at least 1 foot above the 100-year elevation. No basements are allowed in the flood hazard.

6.2.3 Dry Flood-Proofing

Dry flood-proofing consists of completely sealing around the exterior of the building so that water cannot enter the building (see Figure 6-1). Dry flood-proofing is not a good option for areas where floodwater is deep or flows quickly. The hydrostatic pressure and/or hydrodynamic force can structurally damage the building by causing the walls to collapse or causing the entire structure to float. However, in areas that have minimal velocity and low depth, dry flood-proofing can be a good option.



(FEMA, 2014)

Figure 6-1: Dry Flood-Proofing Example

Many flood hazards can be mitigated with various forms of dry flood-proofing. Properties that do not have adequate protection of their low opening (window or basement door) can effectively raise the low opening height with a window well or a flood gate as shown in **Figure 6-2**. The ultimate height of the low opening depends on several factors, such as: the level of flood protection desired, the appearance, and cost. The flood protection elevation could be set 1 foot higher than the existing low opening elevation, or it could be set to match the elevation of the lowest opening into a home that cannot be raised. This might be the elevation of the threshold of a door, for example.



(Waterproof Masters, 2024)

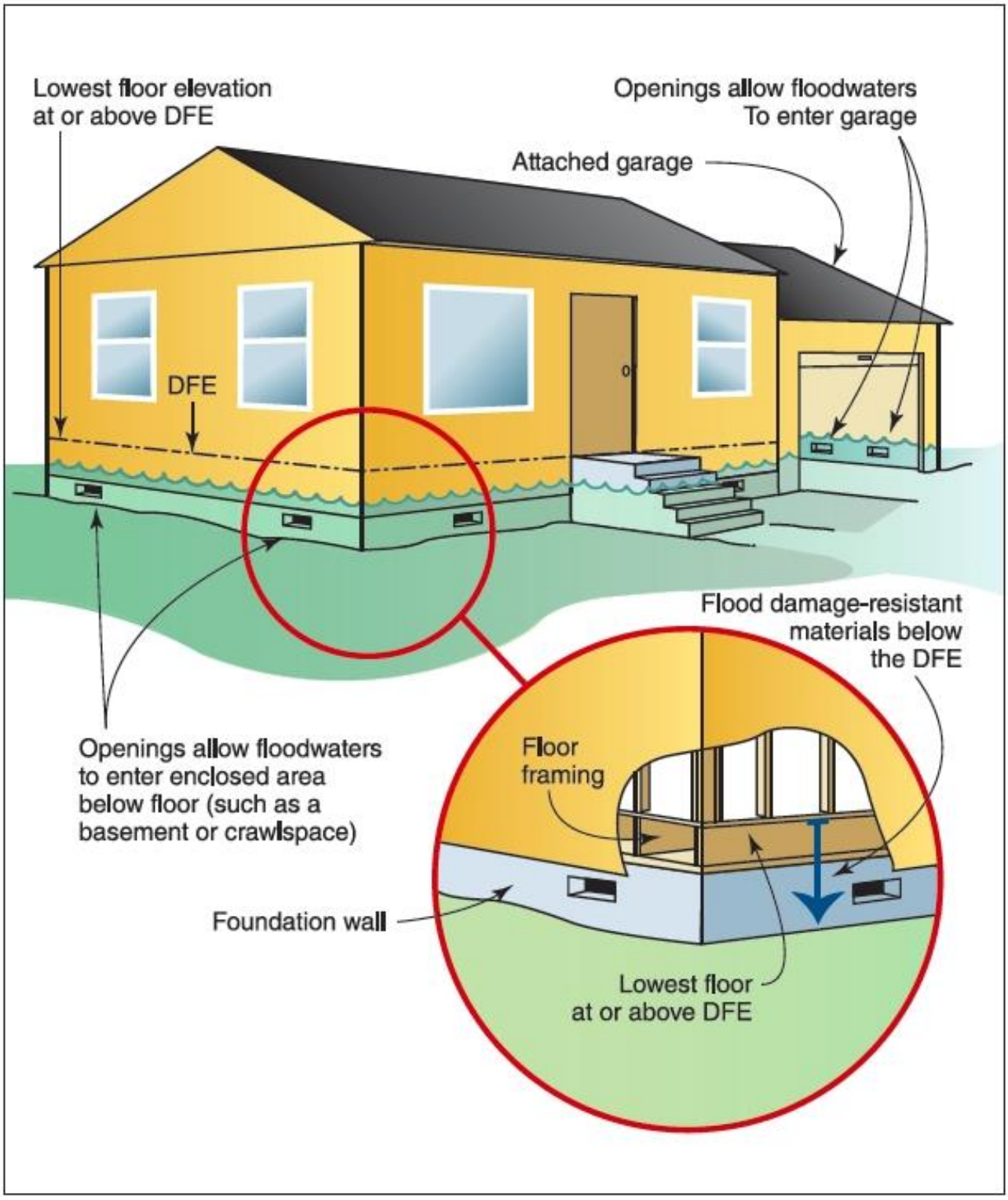
Figure 6-2: Window Well Example

The NFIP only allows dry flood-proofing for residential retrofits that are not classified as a substantial improvement. A substantial improvement is any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement.

6.2.4 Wet Flood-Proofing

Wet flood-proofing consists of modifying uninhabited portions of a home, such as a crawlspace, garage, or unfinished basement with flood-damage resistant materials, to allow floodwaters to enter the structure without causing damage (see Figure 6-3). Wet flood-proofing requires portions of the building to be cleared of valuable items and mechanical utilities.

A key component of wet flood-proofing is providing openings large enough for the water to flow through the structure such that the elevation of the water in the structure is equal to the elevation of the water outside of the structure. This equilibrium of floodwater prevents hydrostatic pressure from damaging structural walls. The NFIP requires the bottoms of the openings to be no more than 1 foot above the lowest adjacent grade, whether that lowest adjacent grade is outside the structure or in the crawlspace.



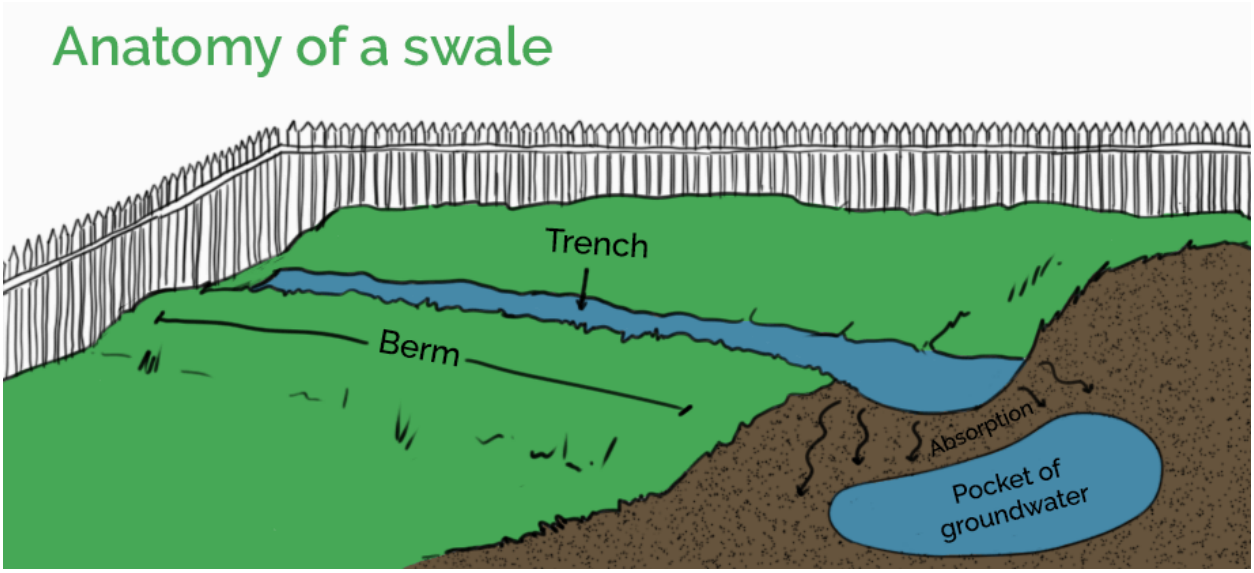
(FEMA, 2014)

Figure 6-3: Wet Flood-Proofing Example

6.2.5 Direct Drainage Away from the Building

In some cases, there are things that the property owner can do on-site such as directing shallow floodwater away from a flood-prone structure. Shallow flooding can often be kept away from a structure if some simple improvements are made to the yard. Sometimes structures are built at the bottom of a hill or in a natural drainage way or storage area, so that water naturally flows toward them.

One solution is to regrade the yard. If water flows toward the building; a new swale or wall can direct the flow to the street or a drainage way (Figure 6-4). Filling and grading next to the building can also direct shallow flooding away, which may also require a grading permit from the local jurisdiction. Although water may remain in the yard temporarily, it is kept away from the structure. When these types of drainage modifications are made, care must be taken not to adversely affect the drainage patterns of adjacent properties. Over time, the swales along the lot lines or in the back yard may get filled in as property owners build fences, garages, sheds, swimming pools, and other obstructions up to the lot line. These drainage problems can be fixed by removing the obstructions and restoring the swales so they will carry water away from the building.



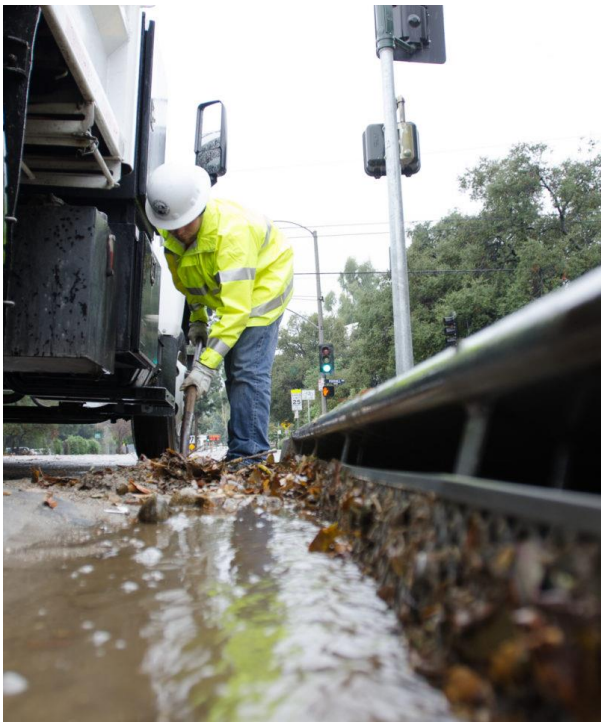
(Fantastic Team, 2018)

Figure 6-4: Example of a Residential Yard Swale

6.2.6 Drainage Maintenance

A drainage system consists of natural and man-made watercourses, conduits, and storage basins that collect rainfall and convey flood flows. It includes both open systems and those that are underground (FEMA, 2017a). The Los Angeles County Drainage Needs Assessment Program (DNAP) continues to be implemented to identify, evaluate, and prioritize local drainage issues within the Flood Control District. This includes cleaning debris and trash from drainage areas (Figure 6-5). Reported issues by unincorporated communities are maintained in a database and evaluated once a year for potential future project development using established criteria, including equity in infrastructure considerations (Los Angeles County Public Works, 2023c).

Dumping into the drainage system is a Los Angeles County Code violation. Debris can accumulate and restrict the flow of stormwater, increasing the potential of localized flooding. To report flood problems or illegal dumping to the drainage system, call (888) CLEAN LA (253-2652).

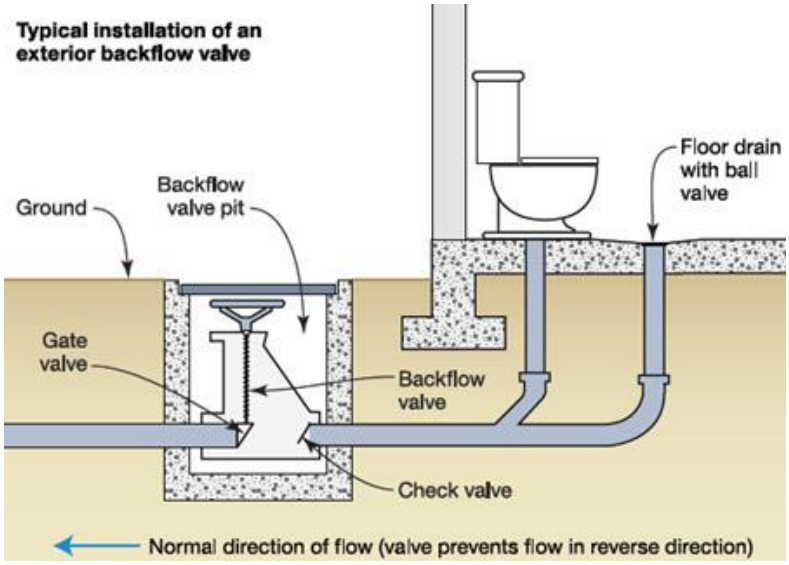


(Los Angeles County Department of Public Works)

Figure 6-5: Public Works employee clearing storm drains during rainy season.

6.2.7 Sewer Improvements

Heavy rains can saturate the soil and infiltrate the sanitary sewer system through leaky joints or cracks in the pipes. Heavy flows in the streets can also infiltrate the sanitary sewer system through the openings in and around the street shaft (manhole) covers. The inflow of stormwater floods the sanitary sewer system causing water to back up into the home through lower-level plumbing fixtures. This occurrence can be prevented by installing a sewer backflow preventer (see Figure 6-6). A backflow preventer will allow the sanitary sewer water to flow freely from the home to the sewer, but restrict the reverse flow. Backflow preventers do require maintenance and can fail if debris in the sewer prevents the valve from seating properly. An overhead sewer system pumps wastewater from basement-level plumbing fixtures up to an elevation near the ground level, where it can drain by gravity into the sewer service line. This higher sewer makes it unlikely that water will back-up into the building.



(FEMA, 2014)

Figure 6-6: Sewer Backflow Valve Installation Example

6.2.8 Permanent Temporary Barriers

Several types of barriers are available to address typical flooding problems. They work to direct drainage away from structures. Permanent barriers such as deflectors, concrete block walls, floodwalls, planted slopes, and slope drains can help prevent flooding and keep debris away from properties. The same principles apply to temporary barriers, such as sandbags, but they can be removed, stored, and reused in subsequent flood events. Sandbags are commonly used in Los Angeles County as shown in Figure 6-7.

Homes in erosive watersheds, like after a fire, have a higher risk of debris flow and should be prepared prior to the flow. This can protect not only the insured building but also the uninsured surroundings from major damage. This is especially important in rural areas where properties are larger and fires are more common. The Los Angeles County Department of Public Works Homeowner's Guide provides more instructions on how to properly use barriers. Figures from the guide are shown in Figure 6-8 and Figure 6-9.

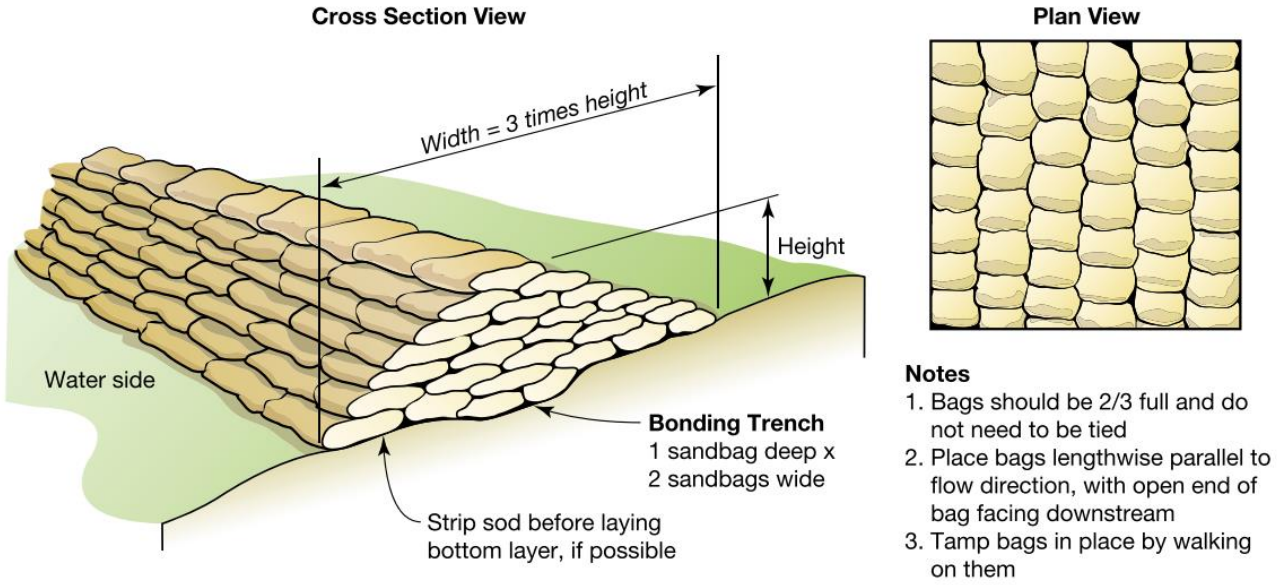
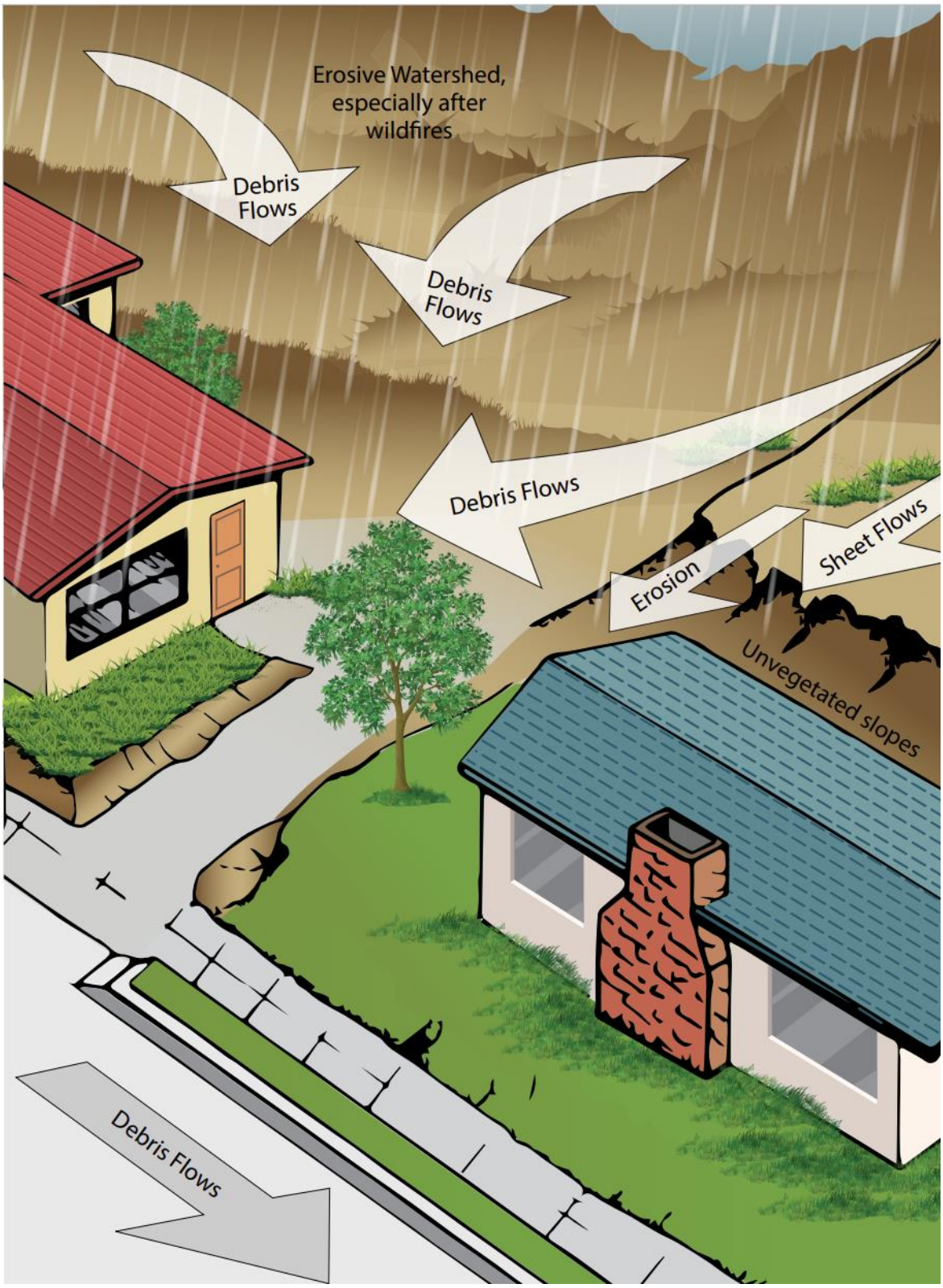


Figure 3-5. Techniques for proper placement of sandbags.

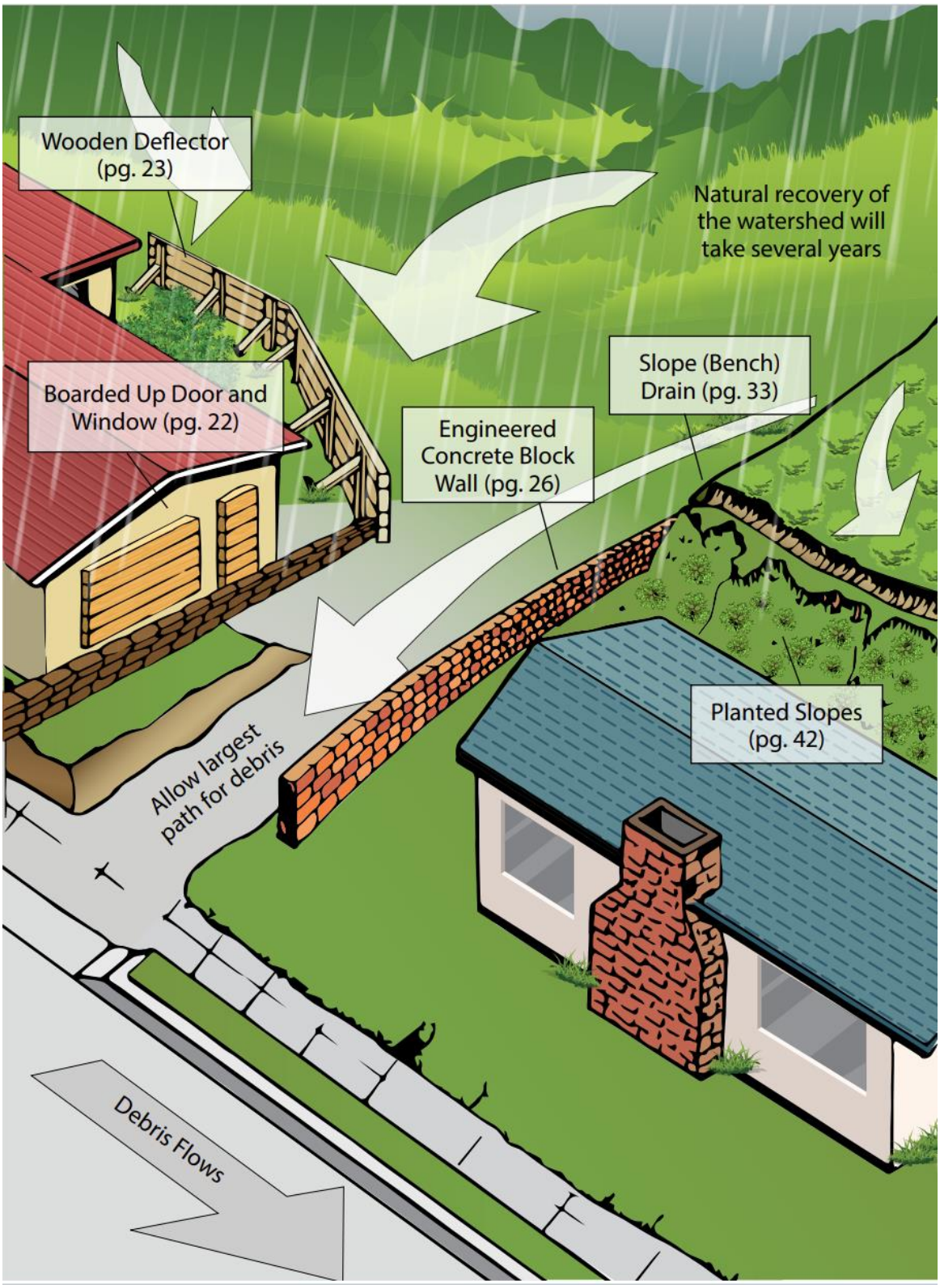
(FEMA, 2017b)

Figure 6-7: Sandbags as a Temporary Barrier



(Los Angeles County Department of Public Works, 2018)

Figure 6-8: Unprotected Homes



(Los Angeles County Department of Public Works, 2018)

Figure 6-9: Homes Protected from Major Damage

6.3 Natural Resouce Protection

Care should be taken to maintain the streams, wetlands and other natural resources within a floodplain or repetitive loss area. Removing debris from streams and channels prevents obstructions. Preserving and restoring natural areas provides flood protection, preserves water quality and provides natural habitat.

6.4 Emergency Services

Advance identification of an impending storm is only the first part of an effective Flood Warning and Response Plan. To truly realize the benefit of an early flood warning system, the warning must be disseminated quickly to floodplain occupants, repetitive loss areas and critical facilities. Appropriate response activities must then be implemented, such as: road closures, directing evacuations, sandbagging, and moving building contents above flood levels. Finally, a community should take measures to protect public health and safety and facilitate recovery. These measures may include cleaning up debris and garbage, clearing streets, and ensuring that citizens have shelter, food, and safe drinking water.

6.5 Structural Projects

Structural projects keep floodwaters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff. Los Angeles County Public Works develops and implements capital projects. The 2035 General Plan Implementation Program identifies a goal project of the Los Angeles County Department of Regional Planning and Los Angeles County Public Works jointly securing funding and setting priorities to prepare capital improvement plans for the County's 11 planning areas within the LACFCD.

6.6 Public Information

One of the most important, and often overlooked, aspects of mitigation is public awareness. Awareness starts with recognition of the flood risk. FEMA's Flood Insurance Rate Maps (FIRM) panels, which designate areas of a community according to various levels of flood risk, can be viewed at www.FEMA.gov. Public Works' Flood Zone Determination Website also has links to the FIRM panels as well as links to the County Floodway Maps. Also, real estate transactions (sales and rentals) require disclosure of known flood hazards. The next level of awareness is related to flood hazard mitigation measures. Often homeowners can greatly reduce their risks with mitigation efforts if they are aware of the risks. For that reason, as part of this analysis, every resident in the repetitive loss area has been contacted and informed of the opportunity to review this Report. In addition, Los Angeles County Public Works sends out an annual outreach letter to every resident in each repetitive loss area.

Los Angeles County has defined a program for public information as part of its 2025 Comprehensive Floodplain Management Plan. This program for public information includes a strategy for providing important information about property protection to property owners in the repetitive loss areas identified under this RLAA.

Part 2 – Analysis of Individual Repetitive Loss Areas

7 Agua Dulce A Repetitive Loss Area

7.1 Problem Statement

Figure 7-1 shows the Agua Dulce A Repetitive Loss Area. The 100-year and 500-year flood zones are mapped on the FEMA FIRM and included in Figure 7-1. This repetitive loss area is in the San Gabriel Mountains, northeast of Santa Clarita. The targeted repetitive loss property for this area is located within the floodplain of Mint Canyon. The property is in Zone AE, which has a significant risk from a 1 percent annual chance (100-year) flood. The culvert under Sierra Highway, approximately 250 feet upstream from the repetitive loss property, is subject to becoming obstructed by debris from upstream. When runoff exceeds the capacity of the culvert, street flooding occurs, and the subject property is subject to inundation. In addition, the property owner previously asserted that the upstream neighbor improperly altered the natural creek, encroached on the floodplain, and caused flow breakout from the channel. Mint Canyon borders the repetitive loss property, eroding and flooding its backyard. Previously, the property owner placed log retaining walls around the street-side property entrance. The County built a berm on top of the channel bank near the culvert under the Sierra Highway in an effort to contain the water inside the channel.

7.2 Identified Repetitive Loss Property

Table 7-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 7-1: Repetitive Loss Properties in Agua Dulce A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
91339	2/93, 2/98	$13,903	No
Identified Flood Cause: The property is located in the floodplain. Repetitive flooding is possibly caused by street flooding when storm flows exceed the capacity of an upstream culvert. No reported losses since 1998.			

7.3 Properties Included in Repetitive Loss Area

There are three properties with a total of 20 insurable buildings included in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 7-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation

measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 7-2: All Properties in Agua Dulce A Repetitive Loss Area

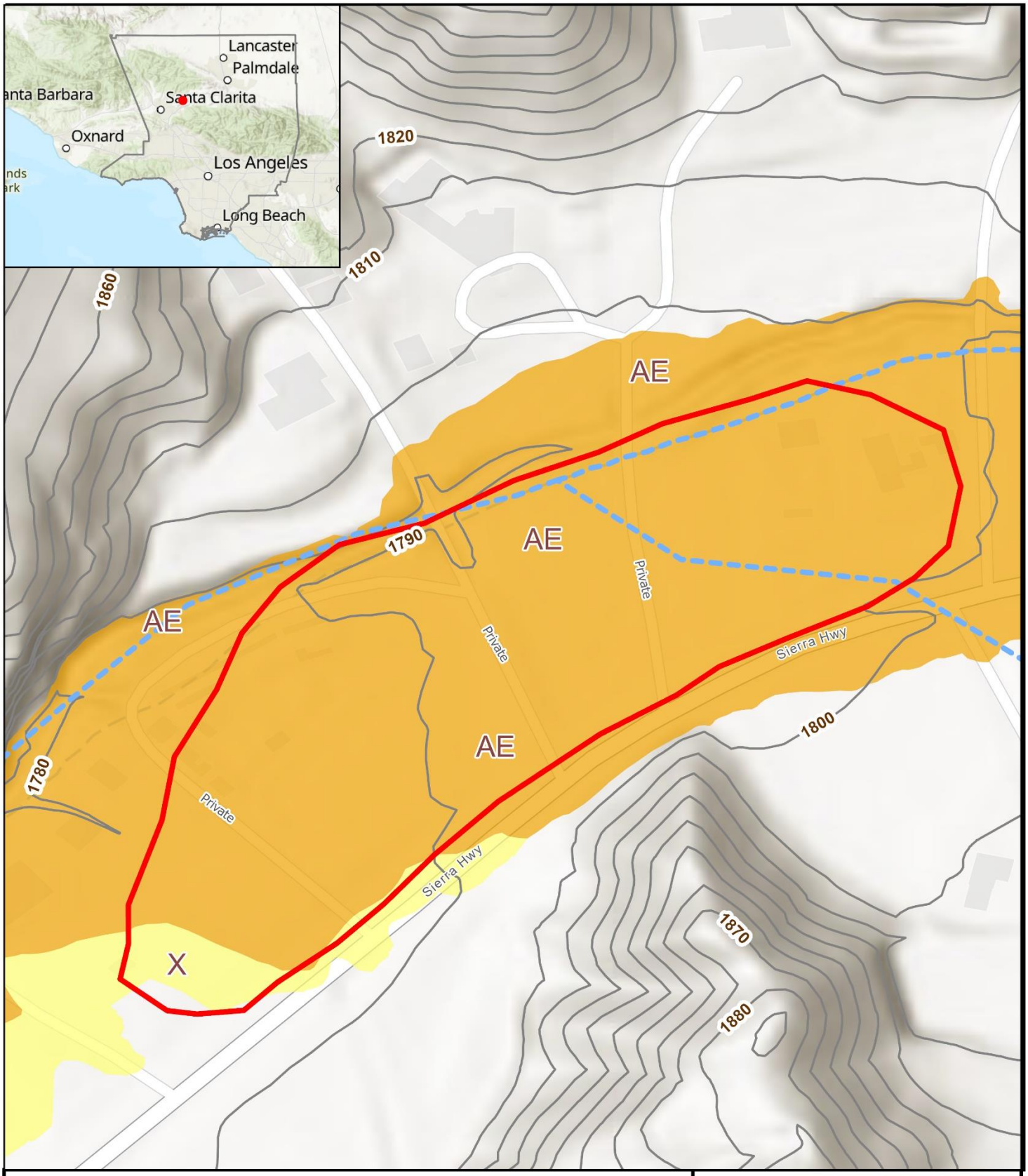
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
AD-A1	6	Crawlspace	D7B	Enlarge culvert [a] Drainage system maintenance[b] Acquisition [c] Elevation [d] Public education [a,d]
AD-A2	12	Crawlspace	D7	Enlarge culvert [a] Drainage system maintenance [d] Acquisition [b] Elevation [c] Public education [a,d]
AD-A3	2	Crawlspace	D55C	Enlarge culvert [a] Drainage system maintenance[d] Acquisition [b] Elevation [c] Public education [a,d]
Total	**20**			

(a) Public entity action

(b) Public entity action for storm drain in the public street/road, property owner action for private street/road and lot drainage

(c) Public entity action, but only with the cooperation of the property owner

(d) Property owner action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Agua Dulce A
Figure 7-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

8 Agua Dulce B Repetitive Loss Area

8.1 Problem Statement

Figure 8-1 shows the Agua Dulce B Repetitive Loss Area. This repetitive loss area is located east of the town of Agua Dulce and within the floodplain of Agua Dulce Canyon. The repetitive loss area is in a FEMA Zone AE, which has significant risk from a 1 percent annual chance (100-year) flood. The extent of the repetitive loss area was developed using the information from the reverse damage function, FEMA flood map information, and 1-foot elevation contour lines. The outcome of the reverse damage function and elevation of the FEMA property resulted in using the 2499-foot contour line to create the repetitive loss area around the property. The FEMA flood map boundaries were followed to draw the repetitive loss area around the adjacent and downstream properties. The repetitive loss area continues further downstream until the flood hazard zone discontinues due to the presence of a public road at higher elevations.

8.2 Identified Repetitive Loss Property

Table 8-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. FEMA provided the dates of previous flood claims and the average claim paid in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 8-1: Repetitive Loss Properties in Agua Dulce B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
302668	1/96, 2/98	$1,752	No
Identified Flood Cause: Flooding from Agua Dulce Canyon Creek			

8.3 Properties Included in Repetitive Loss Area

There are seven properties with a total of 15 insurable buildings included in this repetitive loss area. Table 8-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 8-2: All Properties in Agua Dulce B Repetitive Loss Area

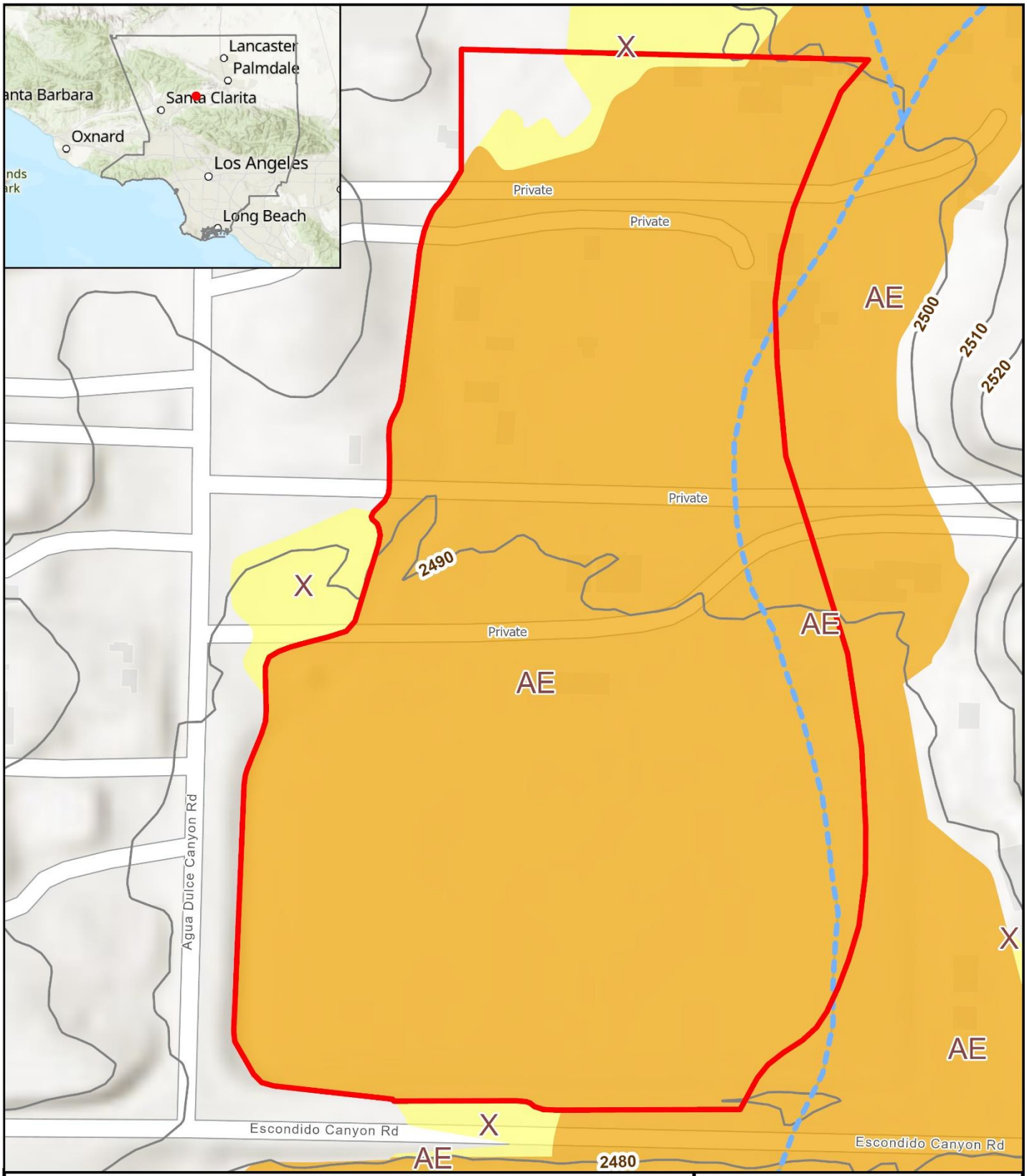
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
AD-B1	1	Slab	D45B	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B2	3	Slab	D2A	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B3	2	Raised	D6	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B4	3	Slab	D2B	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B5	2	Slab	D3A	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B6	3	Basement	C5C	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
AD-B7	1	Slab	D75C	Drainage system maintenance [a] Acquisition [b] Elevation [c] Public education [c,d]
Total	15			

(a) Public entity action for storm drain in the public street/road, property owner action for private street/road and lot drainage

(b) Public entity action, but only with the cooperation of the property owner

(c) Property owner action

(d) Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Agua Dulce B
Figure 8-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

9 Altadena A Repetitive Loss Area

9.1 Problem Statement

The Altadena A Repetitive Loss Area is located in the San Gabriel Mountains, east of Burbank, near Altadena. This is a single-property repetitive loss area. The property is in FEMA Zone D (an area of possible but unknown flood risk). No map of this repetitive loss area is provided herein due to privacy concerns. The area is located at the bottom of a hill and is possibly impacted by storm runoff from surrounding hills. There is a 2-foot-wide and 1-foot-deep dry earthen ditch running west of, but outside of the property. The property is on higher ground than the bank elevations of the ditch. Repetitive flood history in this area can be associated with post-wildfire conditions.

9.2 Identified Repetitive Loss Property

Table 9-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. FEMA provided the dates of previous flood claims and the average claim paid in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 9-1: Repetitive Loss Properties in Altadena A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
56933	2/91, 2/92	$2,725	No
Identified Flood Cause: Hillside drainage problem.			

9.3 Properties Included in Repetitive Loss Area

There is one property included in this repetitive loss area, with a total of two insurable buildings. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this repetitive loss area. Consequently, the repetitive loss area remains unchanged. Table 9-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 9-2: All Properties in Altadena A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ALT-A1	2	Crawlspace	No Information	Drainage improvement [a] Public education [a,b]
Total	2			

(a) Property owner action
(b) Public entity action

10 Altadena B Repetitive Loss Area

10.1 Problem Statement

The Altadena B Repetitive Loss Area is in the San Gabriel Mountains, east of Burbank, near Altadena. This is a single-property repetitive loss area. The property is in a FEMA Zone X. No map of this repetitive loss area is provided herein due to privacy concerns. The target repetitive loss property for this area is adjacent to a private, unmapped channel within a private residential community. Repetitive flood history in this area can be associated with post-wildfire conditions.

10.2 Identified Repetitive Loss Property

Table 10-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 10-1: Repetitive Loss Properties in Altadena B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
91348	3/95, 2/98	$4,321	Yes[a]
Identified Flood Cause: The property is located near the privately constructed channel within the private hillside residential community. The property owner, who resides in the community, previously reported that the channel has a concrete bottom but is not engineered. After a brush fire in 1993, hillside storm runoff in the channel destroyed a private studio in the floodplain and eroded the bank protections, which were restored and improved later. In a separate incident, the basement was flooded due to a backyard drainage deficiency, which was improved with a 6-inch berm.			

(a): an AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. The repetitive loss area will be removed once correction is processed by FEMA.

10.3 Properties Included in Repetitive Loss Area

There is only one property included in this repetitive loss area. It has three insurable buildings. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this repetitive loss area. Consequently, the repetitive loss area remains unchanged. Table 10-2 provides general information about the property, along with mitigation measures. As noted in Table 10-1, mitigation measures have been implemented by the property owner following flood events and recorded claims. An AW-501 form has been submitted to FEMA.

Table 10-2: All Properties in Altadena B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ALT-B1	3	Crawlspace	D7A	Mitigation measures have been implemented by the property owner, and a AW501 Form has been completed and submitted to FEMA
Total	3			

11 Calabasas A Repetitive Loss Area

11.1 Problem Statement

The Calabasas A Repetitive Loss Area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. This is a single-property repetitive loss area. The property is in a FEMA Zone X. No map of this repetitive loss area is provided herein due to privacy concerns. This area is a camping ground on privately owned land, located at the bottom of a hillside area. The steep hill at the west corner, the highest point of the property, is prone to mudflow from the hill whenever it rains. The flow then runs along the private road across the camping ground between the camp housing facilities to the natural creek at the east property boundary. The owner previously placed sandbags in some locations to temporarily protect the housing facilities near the bottom of the hill. The owner reported that the sandbags were strategically placed to protect the housing facilities, and if the pattern of hillside runoff changes, as it did in 1996 after the brush fire, the property would again be at risk. The subject property is not located in or near a FEMA-mapped floodplain.

11.2 Identified Repetitive Loss Property

Table 11-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 11-1: Repetitive Loss Properties in Calabasas A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
72498	2/92, 1/95, 1/95, 2/98	$6,584	No
Identified Flood Cause: Mudflow from the hillside at the east end of the property and along the private road within the property.			

11.3 Properties Included in Repetitive Loss Area

There is only one property included in this repetitive loss area. It has 12 insurable buildings. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 11-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private property, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but the owner is not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 11-2: All Properties in Calabasas A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CA-A1	12	Slab	D55A	Local drainage improvement [a] Drainage system maintenance [a] Public education [a,b]
Total	**12**			

(a) Property owner action

(b) Public entity action

12 Calabasas B Repetitive Loss Area

12.1 Problem Statement

Figure 12-1 shows the Calabasas B Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. This repetitive loss area is not within the FEMA 100-year flood Zone AE for Medea Creek, nor in a FEMA Zone D (an area of possible but unknown flood risk), but in a FEMA Zone X, defined as an area of minimal flood risk . The flooding appears to be associated with local drainage issues associated with flows in the private streets not collected by the publicly owned storm drains as well as grading issues from property to property. The repetitive-loss property for this area is located at the low point of the private street, and storm flows entering the front yard can be trapped and cause damage to the house, including foundation cracks.

12.2 Identified Repetitive Loss Property

Table 12-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 12-1: Repetitive Loss Properties in Calabasas B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
136718	2/98, 12/04	$4,105	No
Identified Flood Cause: This repetitive loss area is not within the FEMA 100-year flood zone for Medea Creek. The subject property is adjacent to a higher neighboring property and receives runoff that can seep into the house. A former problem is that runoff from the roof enters planters in front of the house. The owner has installed pipes and drains in the planters to evacuate the water from the planters. Street level is higher than the subject property, potentially creating a condition where runoff could enter from the street. However, the owner indicated that an existing storm drain adequately captures flows from the street.			

12.3 Properties Included in Repetitive Loss Area

Eighteen properties with 33 insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss area properties were identified, and no existing properties were removed in this repetitive loss area. Consequently, the repetitive loss area remains unchanged. Table 12-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. As summarized in Table 12-1, the owner of the FEMA-designated repetitive loss property has implemented measures regarding roof runoff entering planters and seeping into the house. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make

information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 12-2: All Properties in Calabasas B Repetitive Loss Area

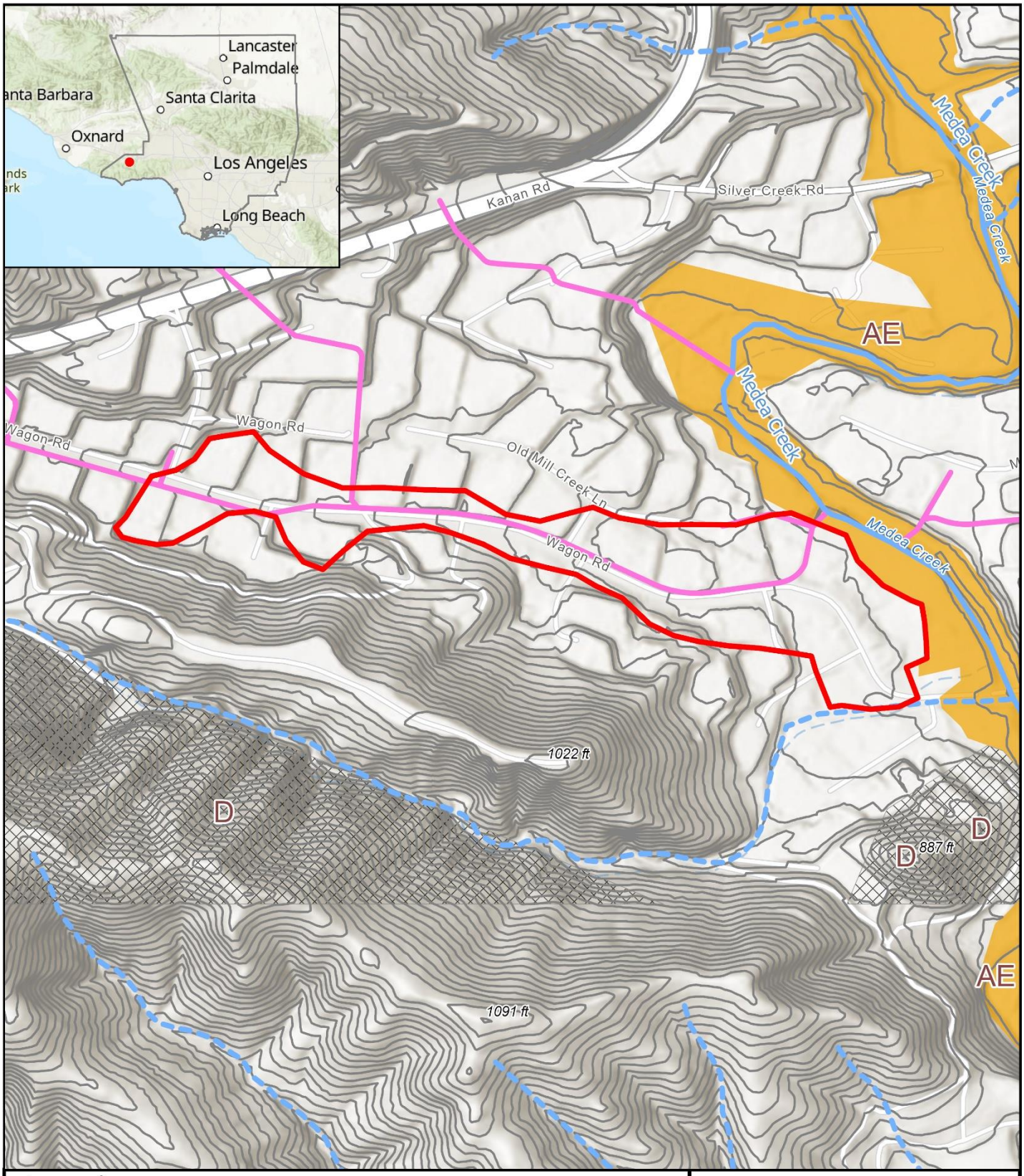
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CA-B1	2	Crawlspace	D11A	Drainage system maintenance [a] Public education [b,c] Construct a berm to prevent off-site flows from entering the property if street runoff is confirmed to be a source of seepage. [c] Confirm that the measures taken by the residents to address ponding within planters are effective. [c] Continue to inspect the foundation for cracks and repair. [c]
CA-B2	2	Crawlspace	D8C	Drainage system maintenance [a] Public education [b,c]
CA-B3	1	Crawlspace	No Info	Drainage system maintenance [a] Public education [b,c]
CA-B4	1	Crawlspace	D9B	Drainage system maintenance [a] Public education [b,c]
CA-B5	1	Crawlspace	D9C	Drainage system maintenance [a] Public education [b,c]
CA-B6	3	Crawlspace	D10D	Drainage system maintenance [a] Public education [b,c]
CA-B7	3	Crawlspace	D75D	Drainage system maintenance [a] Public education [b,c]
CA-B8	2	Crawlspace	D85C	Drainage system maintenance [a] Public education [b,c]
CA-B9	2	Crawlspace	D11D	Drainage system maintenance [a] Public education [b,c]
CA-B10	2	Crawlspace	D11A	Drainage system maintenance [a] Public education [b]
CA-B11	3	Crawlspace	D8C	Drainage system maintenance [a] Public education [b,c]
CA-B12	2	Crawlspace	D11D	Drainage system maintenance [a] Public education [b,c]
CA-B13	1	Crawlspace	D10C	Drainage system maintenance [a] Public education [b,c]
CA-B14	1	Crawlspace	D105A	Drainage system maintenance [a] Public education [b,c]

CA-B15	2	Crawlspace	D11A	Drainage system maintenance [a] Public education [b,c]
CA-B16	1	Crawlspace	D10B	Drainage system maintenance [a] Public education [b,c]
CA-B17	2	Crawlspace	D11A	Drainage system maintenance [a] Public education [b,c]
CA-B18	2	Crawlspace	D9B	Drainage system maintenance [a] Public education [b,c]
Total	**33**			

(a) Public entity action for public storm drain in the street, property owner action for private street and lot drainage

(b) Public entity action

(c) Property owner action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- Area of Undetermined Flood Hazard (Zone D)
- Pipeline (Underground)
- Intermittent Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

300 150 0 300

Scale in Feet

Repetitive Loss Area
Calabasas B
Figure 12-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

13 Cold Creek A Repetitive Loss Area

13.1 Problem Statement

Figure 13-1 shows the Cold Creek A Repetitive Loss Area. Since this is a smaller area containing few properties, street and building outlines are not shown on the map. Street names remain to provide spatial context. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. The single FEMA-designated repetitive loss property is within a FEMA Zone X, but the delineated repetitive loss area does parallel a FEMA 100-year flood Zone AE area mapped along Cold Creek. There is significant topographic relief in this area. The cause of repetitive flooding in the area is associated with the blockage or obstruction of contributory drainages to Cold Creek off the hillside areas. Drainage ways and flow paths can become blocked by debris (downed trees and shrubs, leaves, sediment, and trash) collected by overland flows. When the drainages are blocked, stormwater flows overland to the public streets, where there are few drains present. The properties in the Cold Creek A repetitive loss area are topographically subject to flooding when these situations occur due to their locations below roadways.

13.2 Identified Repetitive Loss Property

Table 13-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 13-1: Repetitive Loss Properties in Cold Creek A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
71255	2/92, 1/93	$23,983	No
***Identified Flood Cause*:** The property is located on high ground and flooded by excessive storm runoff from surrounding hills. It was also determined from the FEMA FIRM in Figure 13-1 that the property was not in the floodplain of Cold Canyon, adjacent to the property.			

13.3 Properties Included in Repetitive Loss Area

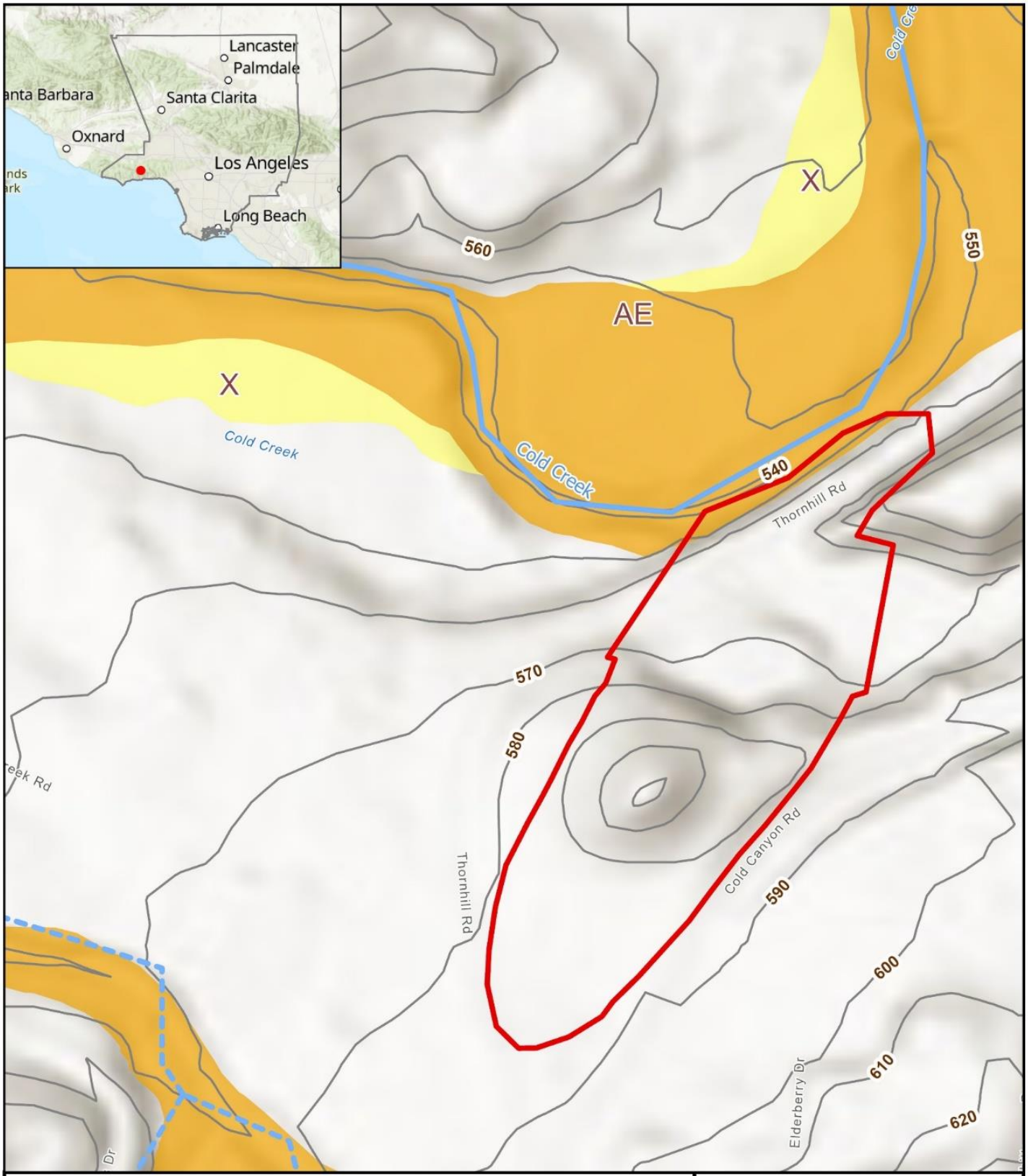
Two properties with two insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 13-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood

risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 13-2: All Properties in Cold Creek A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CO-A1	1	Crawlspace	D5A	Public education [a,b] Local drainage improvements [b] Drainage maintenance [c]
CO-A2	1	Slab	D9C	Public education [a,b] Local drainage improvements [b] Drainage maintenance [c]
Total	2			

(a) Public entity action
(b) Property owner action
(c) Public entity action for public storm drain in the street/road, property owner action for lot drainage



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Intermittent Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Cold Creek A
Figure 13-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/11/2024

14 Cold Creek B Repetitive Loss Area

14.1 Problem Statement

Figure 14-1 shows the Cold Creek B Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. The single repetitive loss property is within a FEMA Zone X, but the delineated repetitive loss area does parallel a FEMA 100-year flood Zone AE area mapped along Cold Creek. There is significant topographic relief in this area. The cause of repetitive flooding in the area is associated with the blockage or obstruction of contributory drainages to Cold Creek off the hillside areas. Drainage ways and flow paths can become blocked by debris (downed trees and shrubs, leaves, sediment, and trash) collected by overland flows. When the drainages are blocked, stormwater flows overland to the public streets, where there are few if any drainage conveyances. The properties in the Cold Creek B repetitive loss area are topographically subject to flooding when these situations occur due to their locations below roadways.

14.2 Identified Repetitive Loss Property

Table 14-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 14-1: Repetitive Loss Properties in Cold Creek B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
148768	3/83, 1/95, 12/04, 2/05	$7,081	No
Identified Flood Cause: Property is lower than the adjacent street, where flows concentrate during a rainstorm. The property is adjacent to Cold Creek (Zone AE in FIRM); however, the owner previously reported that no issues were caused by creek flows. The owner reported that perimeter berms and ditches along the streets to divert as much street flow as possible were installed. The owner also reported completing improvements to collect and convey the flows to the creek through the side yard. The owner reported that catch basin and ditch installed convey flows from the front yard to the side yard. Field survey to be conducted to confirm these measures have been installed and have been effective. Without proper diversion and control of runoff from the streets, future flood damage may occur.			

14.3 Properties Included in Repetitive Loss Area

Seven properties with eight insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 14-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. As summarized in Table 14-2, the property owner of the repetitive loss property has implemented measures to control runoff from the street. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These

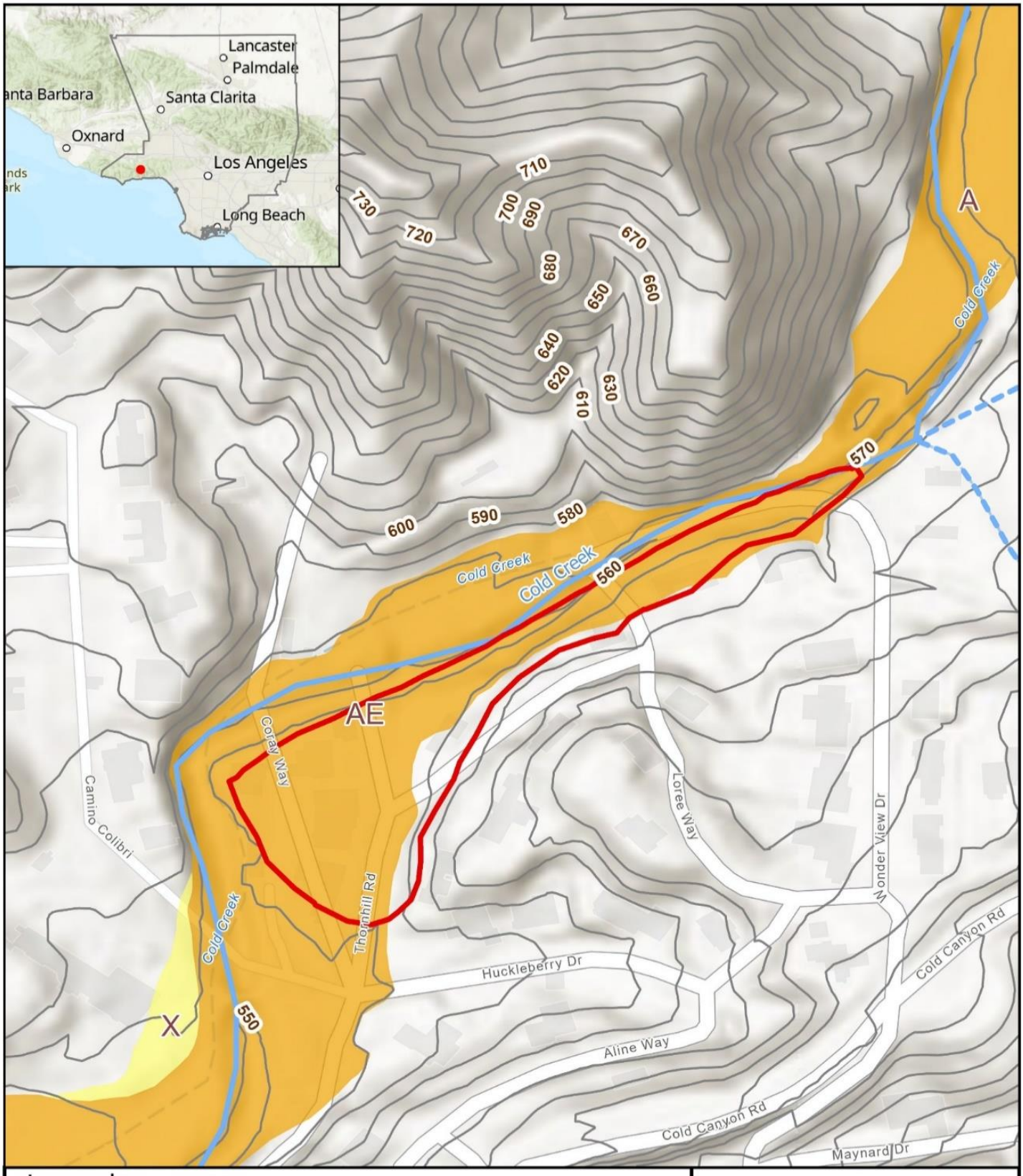
measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 14-2: All Properties in Cold Creek B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
CO-B1	2	Slab	D75C	Public education [a,b] Local drainage improvements [b] Drainage maintenance
CO-B2	1	Slab	D7C	Public education [a,b] Local drainage improvements [b] Drainage maintenance [b]
CO-B3	1	Slab	D75B	Public education [a,b] Local drainage improvements [b] Drainage maintenance [b]
CO-B4	1	Slab	D45A	Public education [a,b] Local drainage improvements [b] (Owner implemented measures as summarized in Table 14-1. Survey planned to confirm these measures have been implemented and are effective) Drainage maintenance [b] (Continue to monitor repaired foundation cracks and pumping system for the basement.)
CO-B5	1	Slab	D55B	Public education [a,b] Local drainage improvements [b] Drainage maintenance [b]
CO-B6	2	Slab	No Information	Public education [a,b] Local drainage improvements [b] Drainage maintenance [b]
CO-B7	1	Crawlspace	D4B	Public education [a,b] Local drainage improvements [b] Drainage maintenance [b]
Total	9			

a. Public entity action

b. Property owner action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Intermittent Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Cold Creek B
Figure 14-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/11/2024

15 Del Sur Repetitive Loss Area

15.1 Problem Statement

Figure 15-1 shows the Del Sur Repetitive Loss Area. This area is in the northwestern part of Los Angeles County. Flood zones are mapped on FEMA FIRMs. This repetitive-loss area is within a FEMA 100-year flood Zone AE, and the dates of loss for the claims on the property coincide with federally declared flood disasters. No other loss history suggests any flooding of this area other than from the riverine overbank flooding reflected in the FEMA FIRMs. The properties identified for this area analysis were selected due to their proximity to the stream.

15.2 Identified Repetitive Loss Property

Table 15-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. FEMA provided the dates of previous flood claims and average claim paid in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 15-1: Repetitive Loss Properties in Del Sur Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138781	1/05, 2/05	$14,034	No
Identified Flood Cause: This property is within a FEMA designated 100-year floodplain and the dates of loss for the two claims coincide with significant flood events in LA county that received federal disaster declarations (DR-1577 and DR-1585). The cause of flooding for this area is commensurate with the flood risk reflected on the FEMA FIRM for this area.			

15.3 Properties Included in Repetitive Loss Area

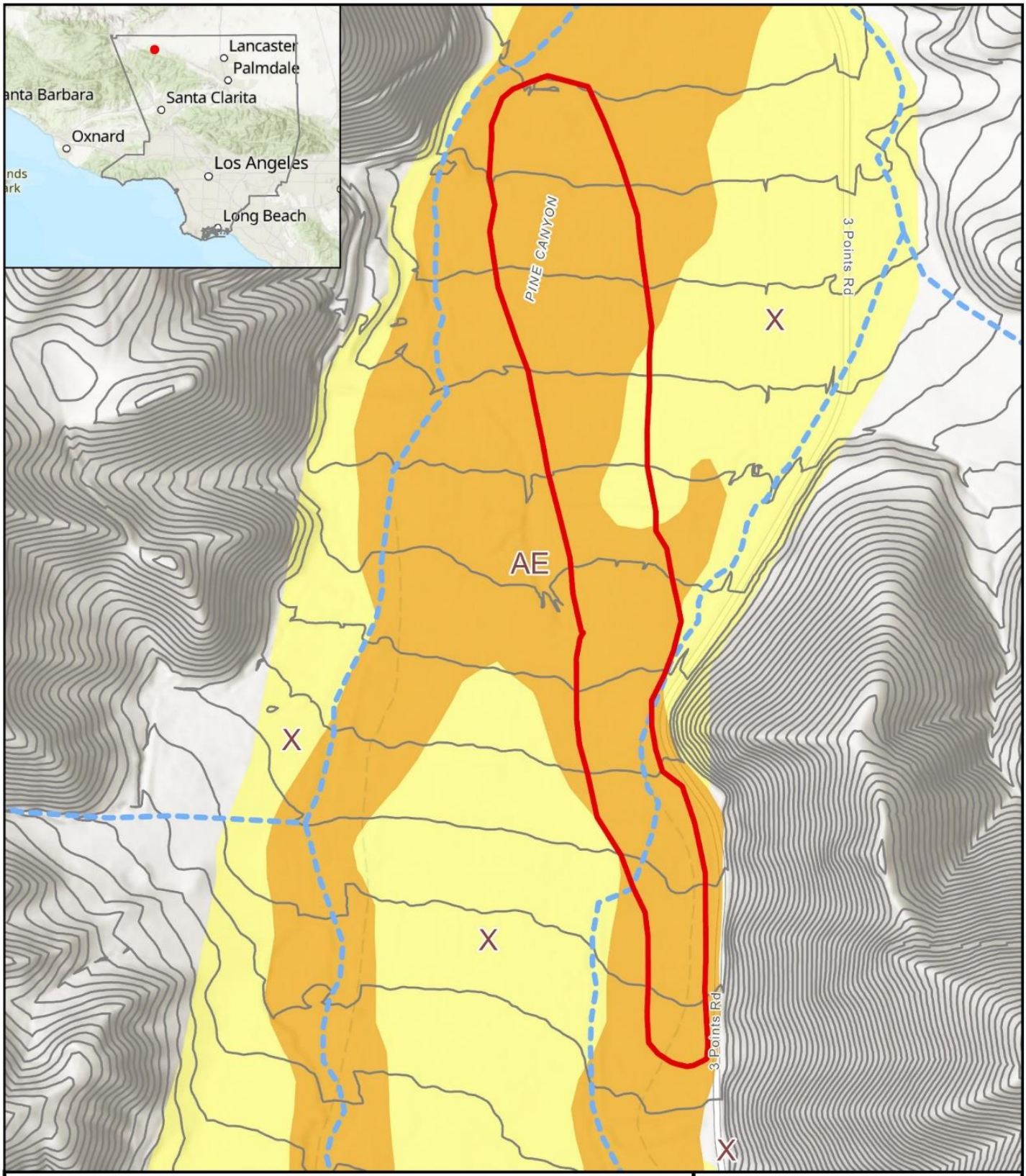
Two properties with ten insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 15-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 15-2: All Properties in Del Sur Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
DS-1	3	Crawlspace	D8B	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [a]
DS-2	7	Crawlspace	D75B	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [a]
Total	10			

a. Property owner action

b. Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

300 150 0 300

Scale in Feet

Repetitive Loss Area
Del Sur
Figure 15-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 5/30/2024

16 Lake Hughes Repetitive Loss Area

16.1 Problem Statement

Figure 16-1 depicts the Lake Hughes Repetitive Loss Area. This repetitive loss area is in the northwestern part of Los Angeles County. The repetitive loss area was made around the singular FEMA reported property using the information from the reverse damage function and the FEMA flood map information. Based on the information generated by the reverse damage function and the information depicted on the FEMA flood map, the 3,219-foot contour line was used to create the repetitive loss area. The repetitive loss area continues downstream to the confluence of two creeks. Flood zones are mapped on FEMA FIRMs. This repetitive loss area is within a FEMA 100-year flood Zone AO and a FEMA approximate 100-year flood Zone A.

Lake Hughes is situated in the unincorporated community of Lake Hughes, approximately 2,500 feet west of Munz Lake. It is a natural basin with a surface area of 21.4 acres. During the wet season, the lake's depth varies from 3 feet near the perimeter to 18 feet at the center. In addition to rainwater and street runoff which are depicted in Figure 16-1, Lake Hughes is replenished by the surrounding lakes (Lake Elizabeth and Munz Lake) as well as underground springs (Califonia Regional Water Quality Control Board, 2007).

16.2 Identified Repetitive Loss Property

Table 16-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 16-1: Repetitive Loss Properties in Lake Hughes Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
317907	10/15, 9/22	$13,598	No
Identified Flood Cause: This property is within a FEMA designated 100-year floodplain and the dates of loss for the two claims coincide with significant flood events in LA county (See FMP Section 6.5). The cause of flooding for this area is commensurate with the flood risk reflected on the FEMA FIRM for this area.			

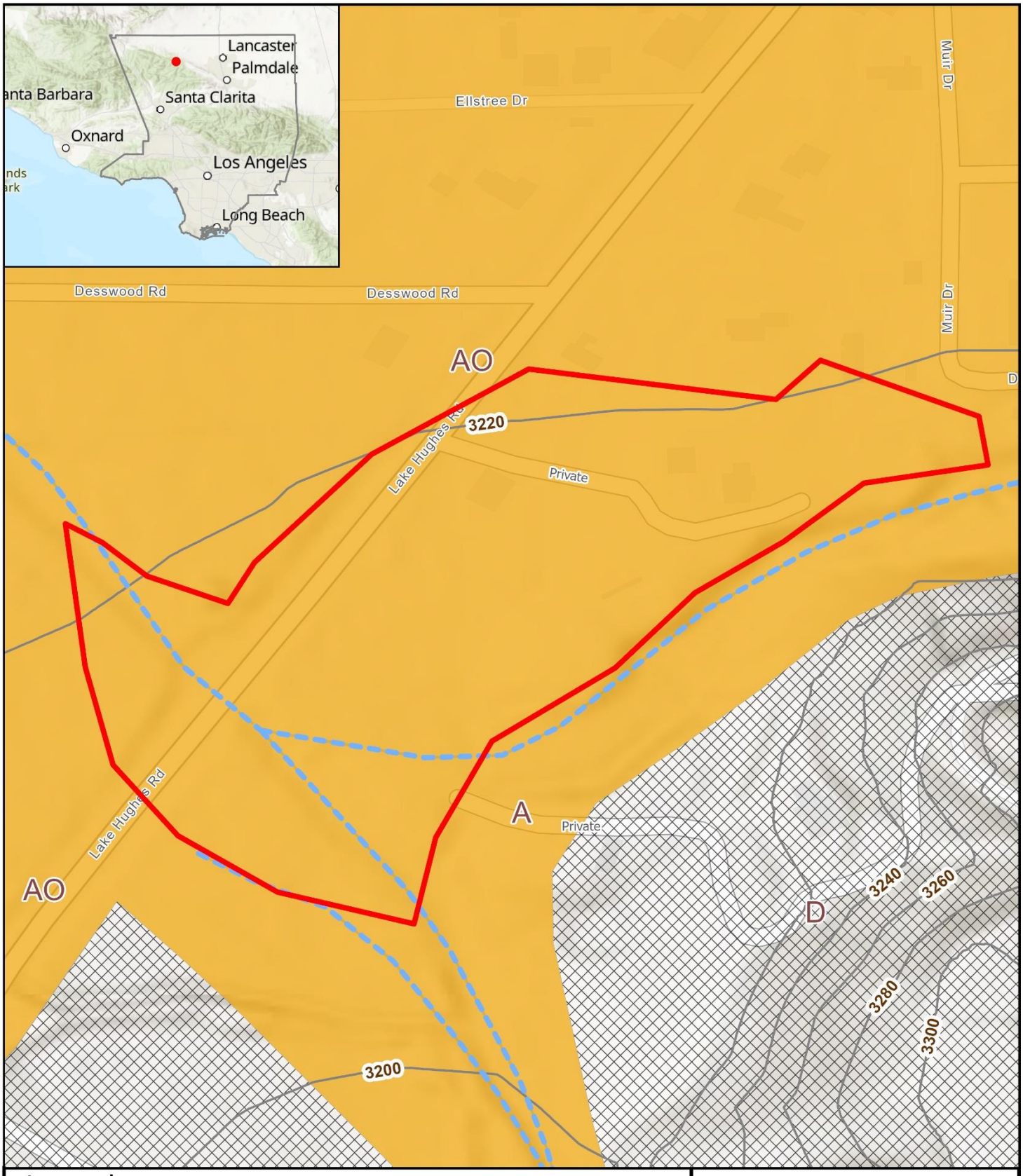
16.3 Properties Included in Repetitive Loss Area

Six properties with ten insurable buildings have been identified in this repetitive loss area. Table 16-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the identified measures have been determined to reduce the flood risks, but their implementation is in the discretion and responsibility of the property owner. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 16-2: Properties in Lake Hughes Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
LH-1	1	Slab	D6A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
LH-2	2	Slab	D6A/D45B	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
LH-3	3	Slab	D4B	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
LH-4	2	Raised	D45A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
LH-5	1	Slab	D6A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
LH-6	1	Slab	D55B	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
Total	**10**			

a. Property owner action
b. Public entity action
c. Public entity action for culvert in the public street/road, property owner action for private street/road and lot drainage



Legend

- FEMA 100 yr Flood Zone (Zone AO)
- Area of Undetermined Flood Hazard (Zone D)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Lake Hughes
Figure 16-1

BURNS McDONNELL℠

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

17 Lower Topanga Canyon Repetitive Loss Area

17.1 Problem Statement

The Lower Topanga Canyon Repetitive Loss Area is shown in Figure 17-1. This area is in the Topanga Canyon area of Los Angeles County, about 26 miles northwest of Downtown Los Angeles. All of the areas along the lower reach of the Topanga Canyon channel (sometimes referred to as the Rodeo Grounds area) were frequently inundated by Topanga Canyon flood flows and are located in a FEMA 100-year flood Zone AE. These properties are within the lower reach of Topanga Canyon, with ground elevation similar to the channel invert (i.e. lowest elevation of the channel). This information was derived from analysis of the topographic data as described in Chapter 2. Rodeo Grounds Road is higher than the invert; however, the berm is not sufficient to confine the floodwater and the Rodeo Grounds low-lying areas have been subject to severe flood damage. Previous insurance claims were filed by residents who leased the properties.

AW-501 forms were submitted for properties within this repetitive loss area as they are outside the communty and jurisdiction of Los Angeles County. They are managed and within the jurisdiction of State of California Parks and Recreation. The RLAA will be removed from Los Angeles County jurisdiction once the AW-501s have been processed by FEMA.

17.2 Identified Repetitive Loss Property

Table 17-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

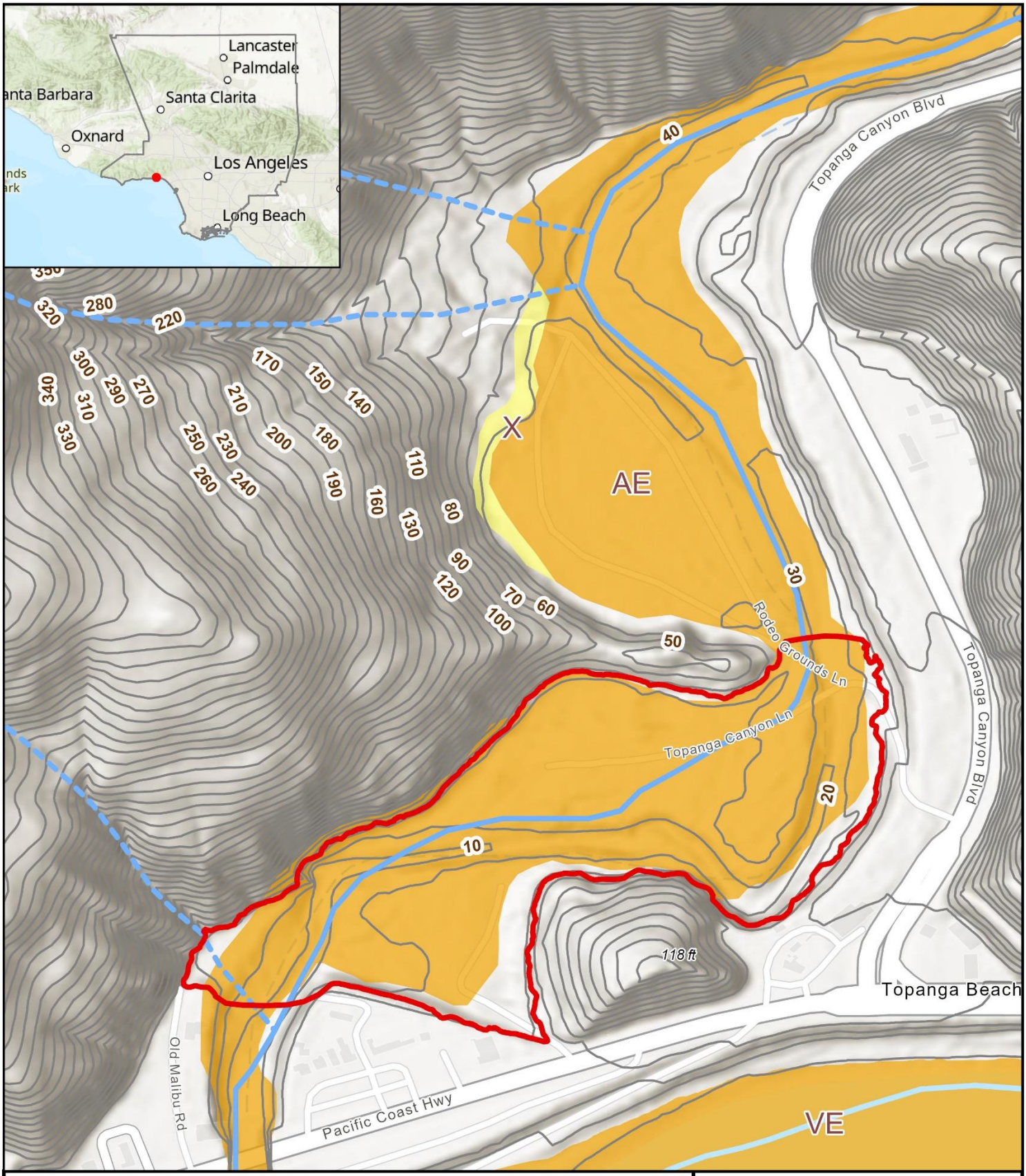
Table 17-1: Repetitive Loss Properties in Lower Topanga Canyon Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
14900	3/78, 2/80	$9,171	Yes[a]
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon			
17940	1/78, 3/78, 2/80	$3,999	Yes[a]
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon			
17941	1/78, 2/80, 1/83	$9,446	Yes[a]
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon			
17942	1/78, 3/78, 1/79, 1/80, 2/80, 2/80, 1/83, 2/92, 1/95	$10,326	Yes[a]
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon			
28440/58082	1/78, 3/78 / 1/83, 3/83, 1/88	$8,806/$7,035	Yes[a]
Identified Flood Cause: Property in the channel and in Flood Zone AE of Lower Topanga Canyon			

(a): The secondary analysis for this area determined that there are no longer structures on any of the properties. An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. The repetitive loss properties will be removed once the AW-501 is approved and fully processed by FEMA.

17.3 Properties Included in Repetitive Loss Area

The structures on the identified five repetitive loss properties within this repetitive loss area have been removed. The County submitted an AW-501 form for these properties, however corrections to the FEMA lists have not yet processed as of this RLAA. This repetitive loss properties will be removed from RLAA once the AW-501 is approved and processed by FEMA



Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/11/2024

18 Malibou Lake A Repetitive Loss Area

18.1 Problem Statement

Figure 18-1 shows the Malibou Lake A repetitive loss area, which lies within a FEMA 100-year flood Zone AE. This repetitive loss area was developed in the 2020 report. Two new properties were added to the FEMA list that were analyzed for inclusion in this repetitive loss area. The repetitive loss area for Malibou Lake developed for the 2020 FMP update was re-analyzed for these new properties. The 2020 repetitive loss area was developed using the FEMA flood map that defined the 100-year flood elevation at approximately the 737-foot contour. No updates were identified to this flood data since the 2020 update, and therefore the repetitive loss area boundary based on the FEMA map was retained. One of the new repetitive loss properties was located within the repetitive loss area. The second new repetitive loss property is located outside of the repetitive loss area and at a much higher elevation. A new and separate repetitive loss area was developed for this second new repetitive loss property (See Section 19, Malibou Lake B).

Malibou Lake A repetitive loss area includes 20 FEMA repetitive loss properties, one of which was added in 2023, one of which has been mitigated, one of which was destroyed, and 18 of which are unmitigated. Malibou Lake is a privately owned and operated reservoir in the southwest area of Los Angeles County near the Ventura County/Los Angeles County line. The contributing watershed starts in Ventura Hidden Valley in Ventura County, approximately 10 miles northwest of Malibou Lake. Stormwater runoff enters the ungated Lake Sherwood and flows through Potrero Valley Creek, Westlake Lake, and Triunfo Canyon Creek before emptying into Malibou Lake. Westlake Lake is 4.7 miles northwest of Malibou Lake and is in both Ventura and Los Angeles Counties. Malibou Lake also receives runoff from Medea Creek, a major tributary north of the lake. The total drainage area at the spillway of Malibou Lake is 64 square miles.

The lake has a surface area of approximately 20 acres at spillway elevation of the lake's dam. The contributory watershed covers portions of Ventura County and Los Angeles County and crosses the boundaries of three cities: Thousand Oaks, Agoura Hills, and Westlake Village.

Most of the repetitive loss properties in this area are damaged by the rising water of Malibou Lake during flood events. Malibou Lake lies at the confluence of Triunfo Canyon and Medea Creek. The terrain around the lake is steep and rocky, causing rainwater to concentrate at the lake quickly. In addition, the watershed is highly urbanized, which can result in high runoff volumes and peak flows, but the flows from the urbanized areas would contain significantly less sediment than flow from non-urbanized areas. The storage below the dam's spillway is ineffective for peak flow attenuation during normal times since the water elevation is maintained at the spillway elevation at all times for recreational purposes. During flood events, the lake is partially filled with sediments, reducing its recreational functions.

18.2 Identified Repetitive Loss Property

Table 18-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 18-1: Repetitive Loss Properties in Malibou Lake A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
1165	2/98, 1/01, 3/01, 2/03, 2/04, 1/05, 2/05, 1/08, 1/10, 3/11, 1/17, 2/17, 2/19, 12/21, 1/23	$21,981	No
12820	2/92, 2/93, 1/95, 2/98, 2/98, 3/01, 12/04, 1/05, 2/17, 2/19, 12/21, 1/23	$64,874	No
28444	3/78, 2/80, 2/80, 1/83, 3/83, 1/95, 3/95, 2/98	$17,287	No
28487	3/78, 2/80	$9,398	No
35727	2/80, 1/83, 3/83, 2/92, 1/95, 2/98	$25,272	No
39962	2/80, 2/92, 3/95, 2/98	$2,859	No
40087	2/80, 3/83	$15,836	No
46576	2/80, 3/83, 3/83, 2/92, 2/93, 1/95, 3/95, 2/98	$6,798	No
47197	2/80, 3/83, 2/92	$5,538	No
49496	3/83, 2/92, 1/95, 2/98	$9,792	No
52974	2/80, 1/83, 3/83, 2/92, 1/95, 3/95, 2/98, 1/05, 2/17	$14,207	No
57971	3/83, 2/92, 1/95	$9,150	Destroyed
71413	2/92, 1/95, 3/95	$16,264	Yes[a]
71417	2/92, 1/95, 2/98, 2/01, 1/05	$3,784	No
72406	2/93, 1/95	$4,391	No
73653	2/92, 1/95	$65,231	No
91232	2/98, 2/98, 1/05	$14,607	No
93872	1/95, 2/98	$5,895	No
137792	3/01, 1/05	$1,557	No
282562	2/17, 2/19	$59,190	No
Identified Flood Cause: Inundated by rising water of Malibou Lake during storms. The properties are located within the FEMA floodplain boundary and are subject to flooding by rising water of Malibou Lake, when the flood rainfall occurs in the drainage area of the Malibou Lake.			

(a) An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. The repetitive loss property will be removed from RLAA once the AW-501 is approved and fully processed by FEMA.

18.3 Properties Included in Repetitive Loss Area

Fifty-six properties with 58 insurable buildings have been identified in this repetitive loss area. Fifty-five of the properties in this repetitive loss area were also listed in the 2020 RLAA. This repetitive loss area includes an additional repetitive loss property that was added to the 2023 FEMA list. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document) and re-analyzed for the new repetitive loss property as discussed previously. The

boundary of the repetitive loss areas remained the same and the additional property is located within the repetitive loss area.

As noted in Table 18-1, all structures for one of the repetitive loss properties were destroyed. An AW-501 form will be submitted to FEMA for re-classifying the property. An additional repetitive loss property within this area has been submitted for re-classification through the AW-501 process. This property will be removed from the RLAA following AW-501 approval and processing by FEMA.

Table 18-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 18-2: All Properties in Malibou Lake A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A1	1	Crawlspace	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation [a] Acquisition [b] Public education [a,c]
ML-A2	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Public education [a,c]
ML-A3	1	Slab	D75B	Elevation [a] Flood-proofing [a] Floodwall [a] Public education [a,c]
ML-A4	0	-	-	All structures destroyed Acquisition [b]
ML-A5	1	Slab	D75B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A6	1	Slab	D75B	Elevation [a] Floodwall [a] Flood-proofing [a] Public education [a,c]
ML-A7	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A8	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A9	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A10	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A11	1	Slab	D75B	Public education
ML-A12	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A13	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Public education [a,c]
ML-A14	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Public education [a,c]
ML-A15	1	Slab	D75B	Elevation [a] Acquisition [b] Public education
ML-A16	1	Slab	D75B	Confine upstream inflow [a] Upsize the pipe opening [a] Improve storm drain [a] Add a truss rack at the inlet [a] Public education [a,c]
ML-A17	1	Slab	D75B	Elevation [a] Acquisition [b] Public education [a,c]
ML-A18	1	Slab	D75B	Install perimeter diversion ditches, walls, and berms to prevent street runoff entering the property [a] Raise and pave planting areas with ditches to drain [a] Build a cutoff wall to keep storm runoff from street flows away from the structure [a] Provide a ditch crossing the driveway to divert flows away from the structure [a] Build cutoff wall to prevent seepage [a] Public education [a,c]
ML-A19	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A20	1	Slab	D75B	Maintain drainage flow away from property [a] Public education [a,c]
ML-A21	1	Slab	D75B	Maintain drainage flow away from property [a] Public education [a,c]
ML-A22	1	Slab	D75B	Install perimeter diversion ditches, walls, and berms to prevent street runoff entering the property [a] Raise and pave planting areas with ditches to drain flows away from the structure. [a] Flood-proofing of the garage [a] Public education [a,c]
ML-A23	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A24	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A25	1	Slab	D75B	Flood-proofing [a] Public education [a, c]
ML-A26	1	Slab	D75B	Flood-proofing boat house[a] For the main house [a]: • Flood-proofing • Abandon lowest floor • Elevation Acquisition [b] Public education [a,c]
ML-A27	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A28	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A29	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A30	1	Crawlspace	D75B	Flood-proofing [a] Public education [a,c]
ML-A31	1	Crawlspace	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Flood-proofing [a] Floodwall [a] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A32	1	Slab	D75B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A33	1	Slab	D75B	Flood-proofing [a] Floodwall [a] Public education [c]
ML-A34	1	Slab	D75B	Floodwall [a] Flood-proofing [a] Public education [a,c]
ML-A35	1	Slab	D6B	Temporary barriers to protect doors, divert water around home, decrease water coming in from street/driveway [a] Public education [c]
ML-A36	1	Slab	D75B	Mitigation measures for main structure [a]: • Flood-proofing • Floodwall Acquisition [b] Public education [a,c]
ML-A37	1	Slab	D75B	Flood-proof basement garage [a] Floodwall [a] Public education [c]
ML-A38	2	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A39	1	Slab	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above base flood elevation[a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A40	1	Crawlspace	D6A	Elevation [a] Acquisition [b] Floodwall [a] Public education [a,c]

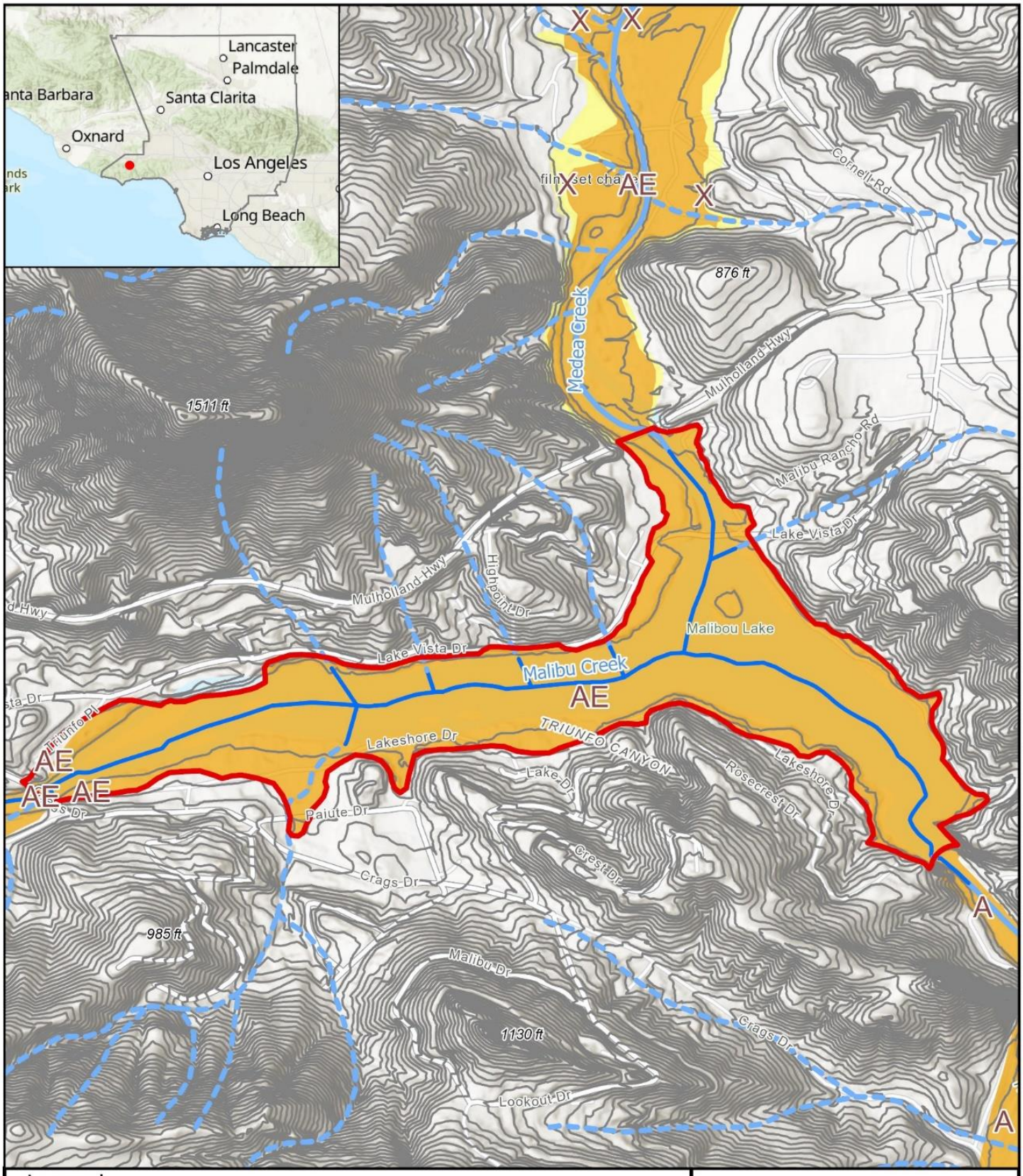
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A41	1	Slab	D75B	Elevation [a] Acquisition [b] Floodwall [a] Public education [a,c]
ML-A42	1	Slab	D75B	Acquisition [b] Floodwall [a] Public education [a,c]
ML-A43	1	Slab	D75B	Flood-proof basement garage [a] Floodwall [a] Public education [a,c]
ML-A44	1	Crawlspace	D75B	Flood-proofing [a] Temporary barriers (sandbags and such other items) [a] Acquisition [b] Public education [a,c]
ML-A45	1	Slab	D75B	Public education [a,c]
ML-A46	1	Slab/Crawlspace	D75B	Public education [a,c]
ML-A47	1	Slab	D75B	Flood-proofing [a] Public education [a,c]
ML-A48	1	Slab	D75B	Elevation [a] Acquisition [b] Floodwall [a] Flood-proofing [a] Public education [a,c]
ML-A49	1	Crawlspace	D75B	Floodwall [a] Flood-proofing [a] Public education [a,c]
ML-A50	1	Crawlspace	D5B	Flood-proofing [a] Public education [a,c]
ML-A51	2	Crawlspace	D75B	Abandon lowest floor or convert to parking and storage [a] Elevate lowest floor to above based flood elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
ML-A52	1	Crawlspace	D75B	Public education [a,c]
ML-A53	1	Crawlspace	D75B	Public education [a,c]
ML-A54	1	Slab	D75B	Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-A55	1	Crawlspace	D75B	Elevation [a] Acquisition [b] Floodwall [a] Flood-proofing [a] Public education [a,c]
ML-A56	1	Slab	D45D	Elevation [a] Acquisition [b] Floodwall [a] Public education [a,c]
Total	**58**			

a. Property owner action

b. Public entity action, but only with cooperation of property owner

c. Public entitiy action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Intermittent Stream
- Perennial Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

500 250 0 500

Scale in Feet

Repetitive Loss Area
Malibou Lake A
Figure 18-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/11/2024

19 Malibou Lake B Repetitive Loss Area

19.1 Problem Statement

Figure 19-1 shows the Malibou Lake B Repetitive Loss Area. This area includes one repetitive loss property. The area is located on a hill south of the lake, near, but not within, the Malibou Lake A repetitive loss area boundary. This property is not near water bodies or streams that could cause large scale flooding to the surrounding properties. A field visit completed by Los Angeles County determined flooding was caused due to local hillside drainage. This repetitive loss area includes the FEMA-designated repetitive loss property and adjacent properties at lower elevation that may be subject to the same drainage problem. The extent of the area was developed by using topographic contours and the nearby water drainage flow paths. The terrain in the area around the lake is steep and rocky, causing rainwater to concentrate quickly.

19.2 Identified Repetitive Loss Property

Table 19-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 19-1: Repetitive Loss Properties in Malibou Lake B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
57972	2/80, 2/92, 2/98	$6,964	No
Identified Flood Cause: Hillside drainage.			

19.3 Properties Included in Repetitive Loss Area

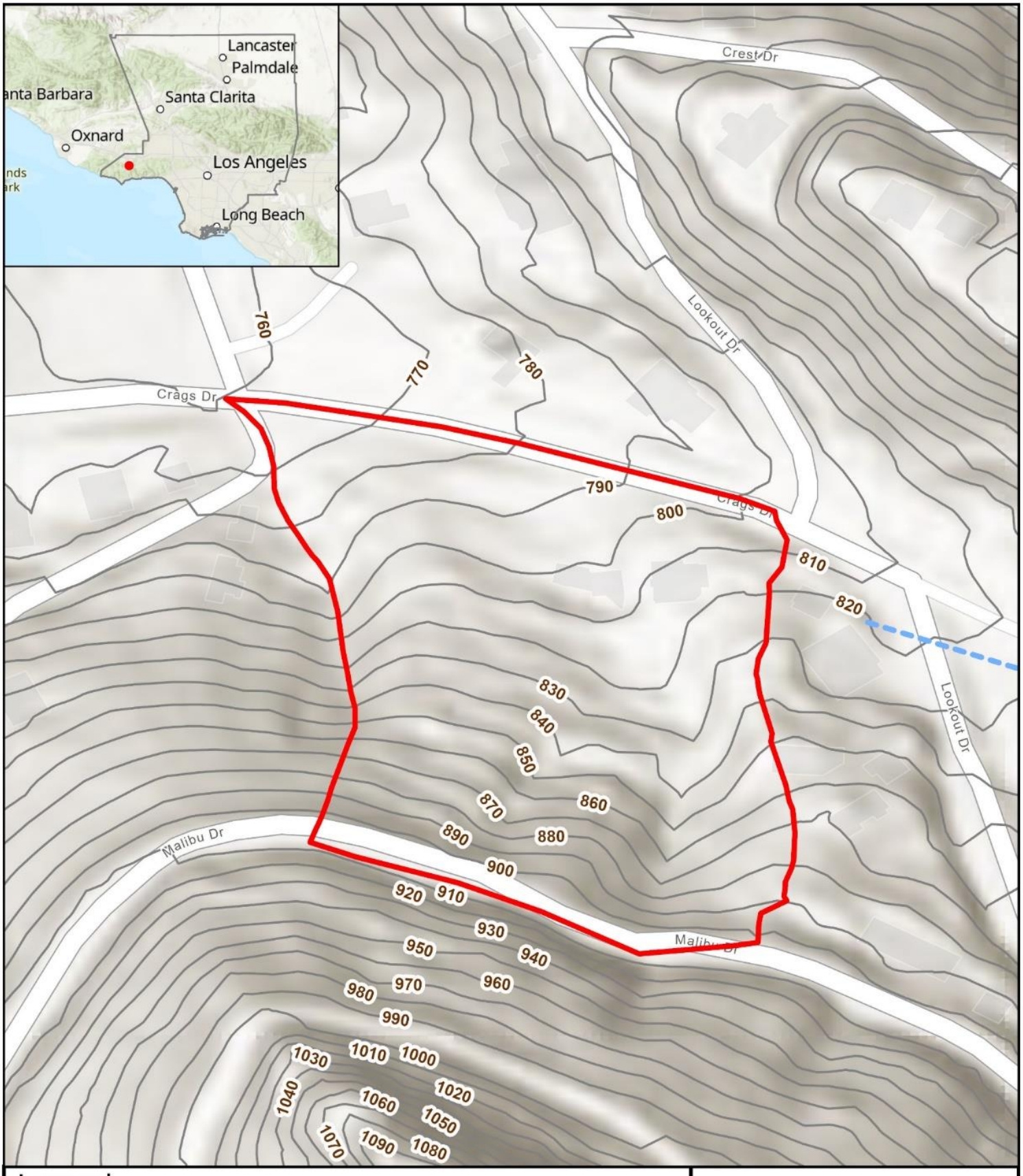
There are three properties included in this repetitive loss area with four insurable buildings. Table 19-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 19-2: All Properties in Malibou Lake B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ML-B1	2	Slab	D4A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
ML-B2	1	Slab	D8A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
ML-B3	1[2]	Under construction	N/A	Elevation [a] Public education [a,b] Local drainage improvements[a] Drainage maintenance [c]
Total	4			

a. Property owner action
b. Public entity action
c. Public entity action for culvert in the public street/road, property owner action for lot drainage

[2] A new home is currently being rebuilt after burning down in a fire.



Legend

- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Malibou Lake B
Figure 19-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/12/2024

20 Malibu Repetitive Loss Area

20.1 Problem Statement

Figure 20-1 shows the Malibu Repetitive Loss Area. This area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is one repetitive loss property in this area. The property is located at the lowest point of the street. The first floor of the house was built lower than the street level, and street runoff can enter the house through the driveway. An owner of this property built a 6-inch berm in front of the driveway to divert the water. This, however, may not have relieved the flood problem associated with major floods. The other properties in this area have similar circumstances, with the first floor of the houses built below the street within a similar elevation contour.

20.2 Identified Repetitive Loss Property

Table 20-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 20-1: Repetitive Loss Properties in Malibu Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
70079	2/92, 1/95, 3/98, 3/00	$5,524	Destroyed
Identified Flood Cause: House is located at the low point of the street.			

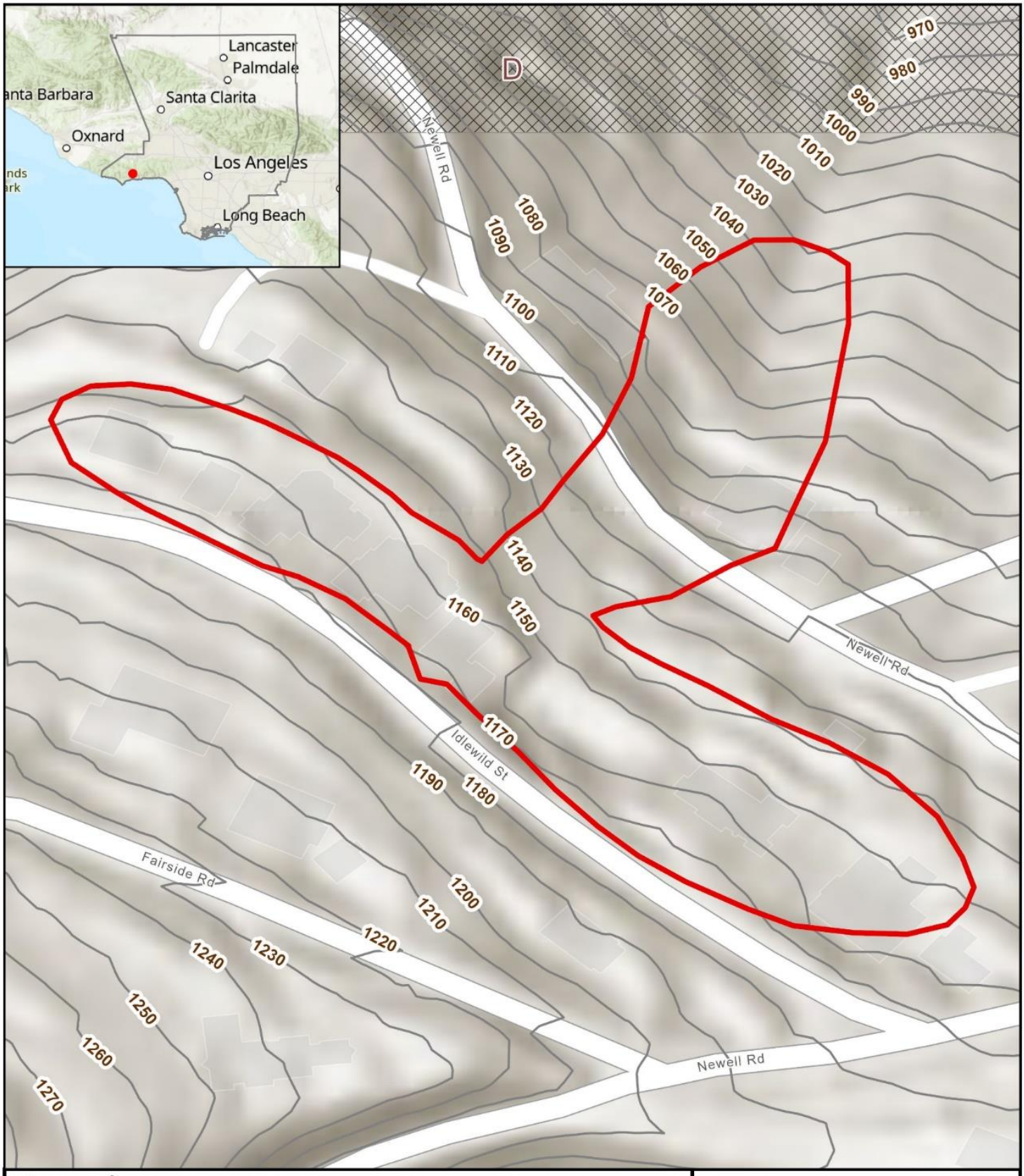
20.3 Properties Included in Repetitive Loss Area

Seven properties with ten insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 20-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 20-2: All Properties in Malibu Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
MAL-1	2	Slab	No Information	Diversion [a] Berm at driveway [a] Street grading [b] Public education [a,b]
MAL-2	1	Slab	No Information	Diversion Berm Street grading Public education [a,b]
MAL-3	2	Slab	No Information	Diversion Berm Street grading Public education [a,b]
MAL-4	1	Crawlspace	No Information	Diversion Berm Street grading Public education [a,b]
MAL-5	1	Crawlspace	D10A	Diversion Berm Street grading Public education [a,b]
MAL-6	1	Slab	D85A	Diversion Berm Street grading Public education [a,b]
MAL-7	2	Basement	D10D	Diversion Berm Street grading Public education [a,b]
Total	**10**			

a. Property owner action
b. Public entitiy action



Legend

- Area of Undetermined Flood Hazard (Zone D)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

50 25 0 50

Scale in Feet

Repetitive Loss Area
Malibu
Figure 20-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 5/30/2024

21 Quartz Hill A Repetitive Loss Area

21.1 Problem Statement

The Quartz Hill A Repetitive Loss Area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square mile, high desert neighborhood, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale. Flood studies of the Quartz Hill area show that the identified repetitive-loss property is located within FEMA Zone X, an area of minimal flooding. The repetitive flooding of this area is due to the overflow runoff from a detention basin, which has now been relocated southeast of the identified repetitive-loss property. This property is also possibly subject to sheet-flow along the Antelope Valley Drainage Corridor No. 9, (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991). According to the repetitive-loss property owner, the property was flooded when the retention basin, located a couple of blocks to the south, could not hold the stormwater, and the gate was forced to open. The overland runoff entered his property across empty lots, causing flooding at the property. The basin has been replaced by a golf course and relocated one half mile to the northwest, further downstream from the property, which eliminated further flooding problems. This is substantiated by the fact that there has been no subsequent flood damage to the property since the relocation of the retention basin. This is considered to be an isolated event, and no other properties were determined to be impacted. The County has submitted an AW-501 form for this property. Upon FEMA's approval and processing of the AW-501, this property will be classified by FEMA as "mitigated," and the area will be removed from obligation for annual repetitive loss mailing under the County's CRS program.

21.2 Identified Repetitive Loss Property

Table 21-1 lists the FEMA-designated repetitive loss property within this repetitive loss area, which is being listed as "mitigated." No other properties were identified for this area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 21-1: Repetitive Loss Properties in Quartz Hill A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
57385	1/92, 1/92, 2/92, 12/92	$15,228	Yes[a]
Identified Flood Cause: Overflow from detention basin, which has been relocated. Property no longer subject to repetitive flooding.			

(a): An AW-501 has been submitted for this property, but correction was not yet approved as of this RLAA. RLA will be removed once correction is processed by FEMA.

21.3 Properties Included in Repetitive Loss Area

There is only one property included in this repetitive loss area, with three insurable buildings. The property in this repetitive loss area was also listed in the 2020 RLAA. This repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). As noted in Table 21-2, an AW-501 form has been submitted for this repetitive loss property. Following approval

and processing of the AW-501 by FEMA, this property will be reclassified, and removed from the RLAA and the obligation for annual repetitive loss mailing under the County's CRS program.

Table 21-2 provides general information for the property. The property is listed as mitigated, so no new mitigation measures are recommended.

Table 21-2: All Properties in Quartz Hill A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-A1	3	Slab	D6C	N/A
Total	**3**			

22 Quartz Hill B Repetitive Loss Area

22.1 Problem Statement

Figure 22-1 shows the Quartz Hill B Repetitive Loss Area. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square mile, high desert neighborhood, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale.

None of the properties in this area are located within a FEMA-identified special flood hazard (100-year) area. However, the properties are located in a FEMA 500-year flood Zone X flood area. The flooding source for this repetitive-loss area is street runoff that breaks out from Antelope Valley Drainage Corridor No. 7 (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991) along 50th and 52nd Streets. The other properties in this area are at ground elevations similar to that of the identified repetitive loss property and have lowest floors with similar elevations as well. Drainage improvements were made along 50th Street W in the vicinity of Quartz Hill B Repetitive Loss Properties that mitigated for more frequent storm events. The drainage improvements were not sized to address the full 100-year storm event due to site constraints. Therefore, the status of Quartz Hill B remains unmitigated.

22.2 Identified Repetitive Loss Property

Table 22-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 22-1: Repetitive Loss Properties in Quartz Hill B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
91087	2/92, 12/97	$2,783	No
Identified Flood Cause: Property is located in Antelope Drainage Corridor. Sheet flow from Antelope Valley Drainage Corridor No. 7 flooded the property, displacing retaining walls. The property currently has a private earthen ditch and small berms along it to route the water through the property boundaries.			

22.3 Properties Included in Repetitive Loss Area

Twelve properties with 26 insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 22-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to

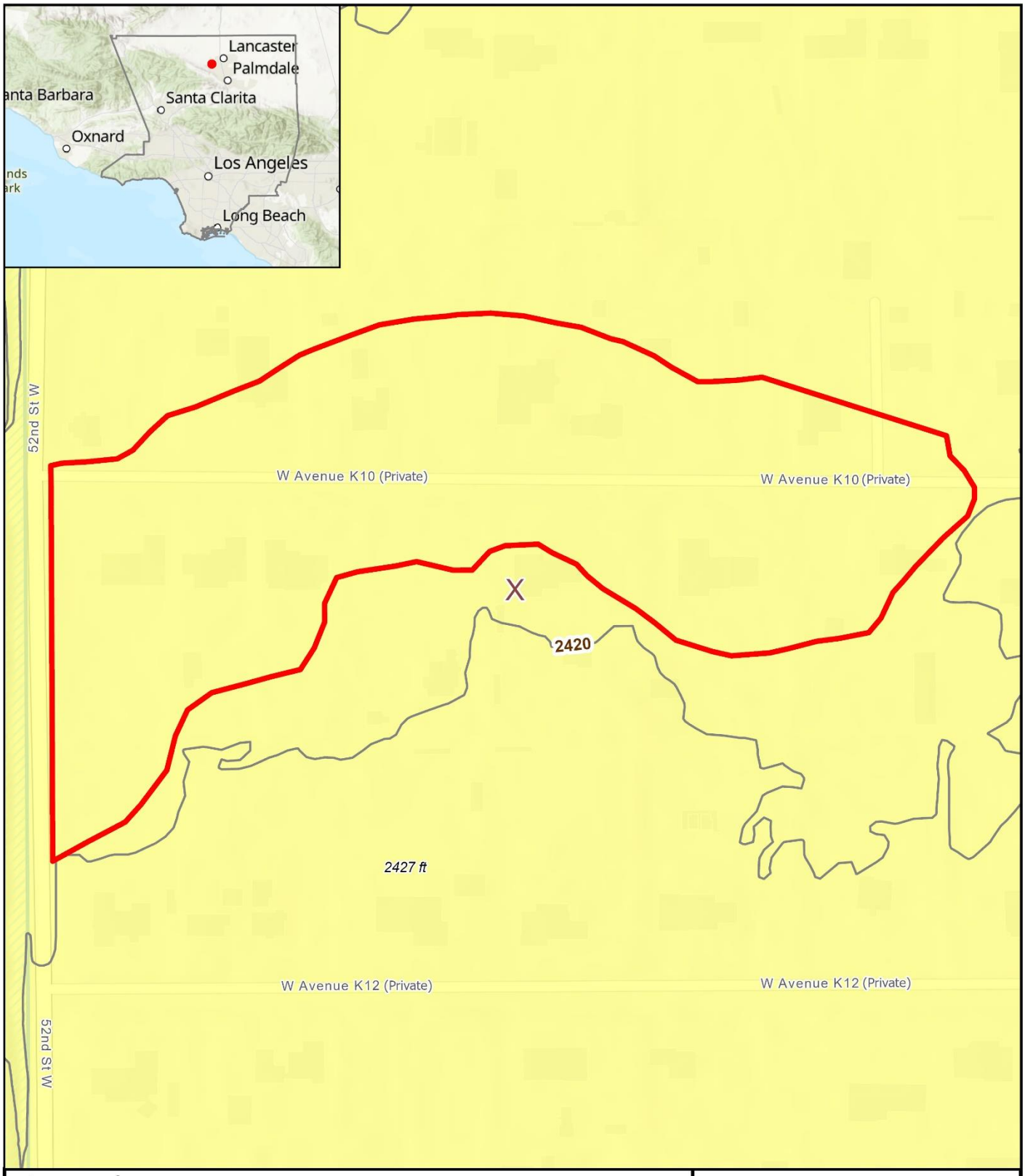
the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 22-2: All Properties in Quartz Hill B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-B1	2	Crawlspace	D5C	Improve private ditch [a] Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B2	1	Crawlspace	D65C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B3	1	Crawlspace	D55B	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B4	4	Crawlspace	D6B	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B5	1	Crawlspace	D75D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B6	3	Crawlspace	D65D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B7	5	Crawlspace	D55C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B8	2	Crawlspace	D8D	Improve private ditch [a] Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B9	3	Crawlspace	D45C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B10	2	Crawlspace	D75A	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-B11	1	Slab	D65D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-B12	1	Crawlspace	D55C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
Total	**26**			

a. Property owner action
b. Public entity action, but would require formation of a special district or incorporation of the area into the Los Angeles County Flood Control District
c. Public entity action



Legend

- FEMA 500 yr Flood Zone (Zone X)
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Quartz Hill B
Figure 22-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

23 Quartz Hill C Repetitive Loss Area

23.1 Problem Statement

Figure 23-1 shows the Quartz Hill C Repetitive Loss Area. This area is located in the Quartz Hill region of Los Angeles County. Quartz Hill, a 390-square mile, high desert community, is located in the westernmost part of the Mojave Desert north of the San Gabriel Mountains and west of Lancaster and Palmdale.

None of the properties in this area are located within a FEMA-identified special flood hazard area. However, the properties are located in a FEMA 500-year Zone X flood area. The repetitive loss area is within an alluvial fan in Antelope Valley Drainage Corridor No. 7 (identified in the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation*; Los Angeles County, 1991) which contributes flows to the property via surrounding streets. The FEMA-designated repetitive loss property is located at the low point of the street where flows can concentrate and enter the property. The other properties identified within this area have a topographic relationship with the identified repetitive loss property.

23.2 Identified Repetitive Loss Property

Table 23-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 23-1: Repetitive Loss Properties in Quartz Hill C Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
131222	2/04, 10/04, 12/04, 1/05, 2/05	$6,186	No
***Identified Flood Cause*:** The subject property is located within Flood Hazard Zone X-shaded (yellow) and is located in Antelope Drainage Corridor 7. The corridor flows may be conveyed to this property through streets and low-lying areas and trapped at the property (which is lower than the streets). The first floor is also lower than the streets and has been damaged frequently by historical floods. The owner has constructed berms at the entry gate and prepared a pump pit. Without a comprehensive and reliable berm and on-site pump system, this property may continue to experience flood damage and submit future claims. In addition, the interior household flows are being discharged to the side yard but should be disposed via a sanitary sewer or County-approved dry well.			

23.3 Properties Included in Repetitive Loss Area

Twelve properties with 26 insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 23-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation

measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owner. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 23-2: All Properties in Quartz Hill C Repetitive Loss Area

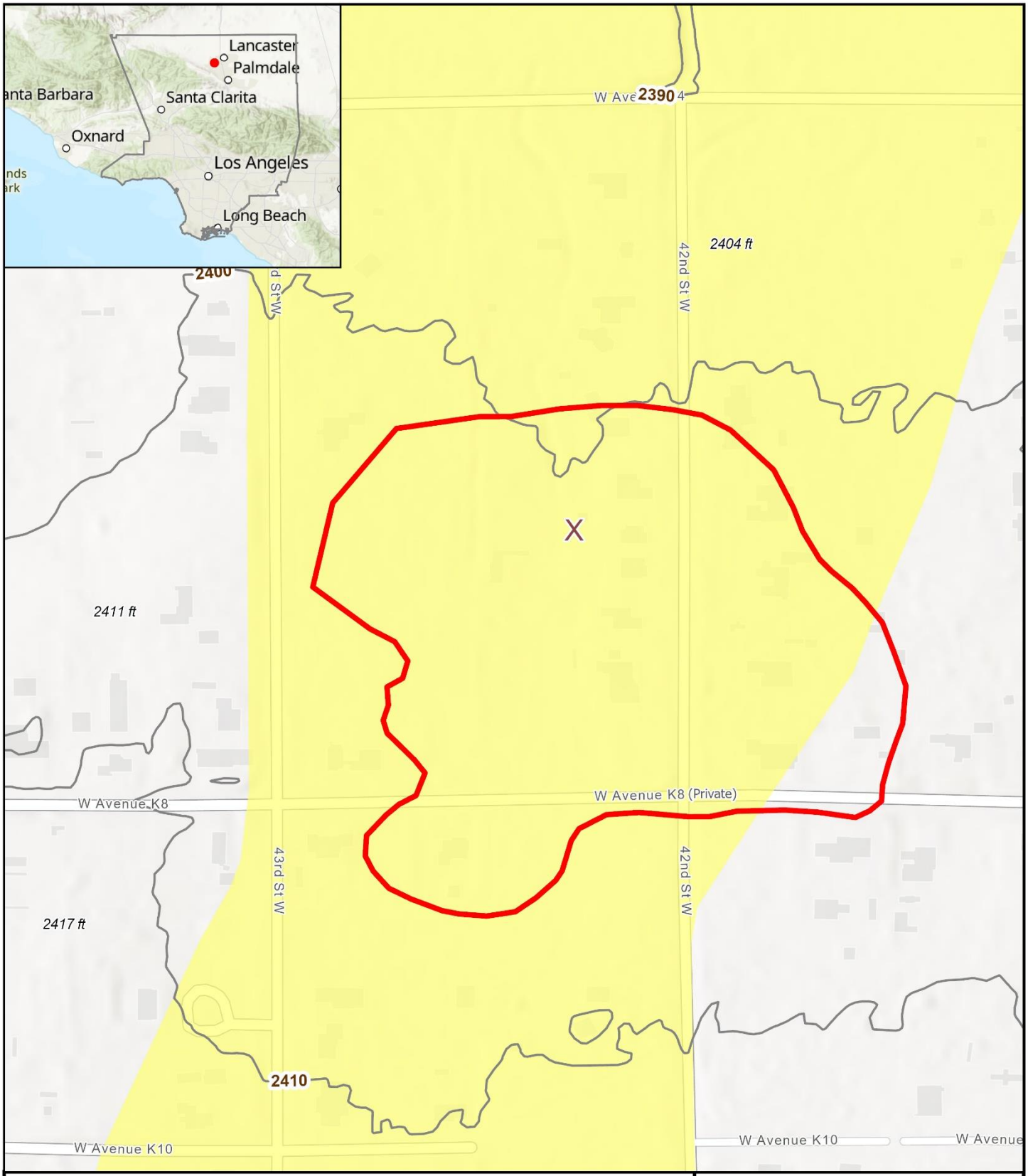
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-C1	2	Crawlspace	D35B	Stabilize the entry with rock or concrete blocks under the dirt. [a] Complete and raise the 1ft high side wall Install a permanent automatic control pump so that it activates if water reaches a predetermined level of 1 or 2 inches. [a] Install a dry well with dimensions of 2’ or 3’ diameter, 10’ or 15, depth to receive discharge. Connect the washer and bath flow to the dry well. [a] Construct an area-wide storm drain and flood retention system [b] Elevate the house if problem continues [a]
QH-C2	2	Crawlspace	D5A	Construct an area-wide storm drain and flood retention system Public education [a,c]
QH-C3	3	Crawlspace	D6D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C4	3	Crawlspace	D7B	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C5	2	Crawlspace	D4B	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C6	3	Crawlspace	D65D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C7	3	Crawlspace	D6C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
QH-C8	2	Crawlspace	D75D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C9	1	Crawlspace	D5B	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C10	2	Crawlspace	C5C	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C11	1	Crawlspace	D65D	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
QH-C12	2	Crawlspace	D8A	Construct an area-wide storm drain and flood retention system [b] Public education [a,c]
Total	**26**			

a. Property owner action

b. Public entity action, but would require formation of a special district or incorporation of the area into the Los Angeles County Flood Control District

c. Public entity action



Legend

- FEMA 500 yr Flood Zone (Zone X)
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

200 100 0 200

Scale in Feet

Repetitive Loss Area
Quartz Hill C
Figure 23-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

24 Roosevelt Repetitive Loss Area

24.1 Problem Statement

Figure 24-1 shows the Roosevelt Repetitive Loss Area. Flood zones are mapped on FEMA FIRMs. This area is within the floodplain of Little Red Rock Wash in Lancaster and located in the 100-year FEMA approximate Flood Hazard Zone A. Lancaster is approximately 70 miles north of Downtown Los Angeles in Southern California's Antelope Valley. It is separated from the Los Angeles Basin by the San Gabriel Mountain Range to the south and from Bakersfield and the San Joaquin Valley by the Tehachapi Mountain Range to the north. Lancaster's elevation is 2,500 feet above sea level on a high, flat valley surrounded by mountain ranges. The subject property lies below adjacent grade and receives runoff from the higher adjacent grade during rain events.

24.2 Identified Repetitive Loss Property

Table 24-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 24-1: Repetitive Loss Properties in Roosevelt Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137354	1/05, 2/05	$17,148	No
Identified Flood Cause: The property is located in FEMA Flood Hazard Zone A and in the floodplain of Little Red Rock Wash. The existing lot is lower than the adjacent grade and may receive runoff from adjacent properties during rain events.			

24.3 Properties Included in Repetitive Loss Area

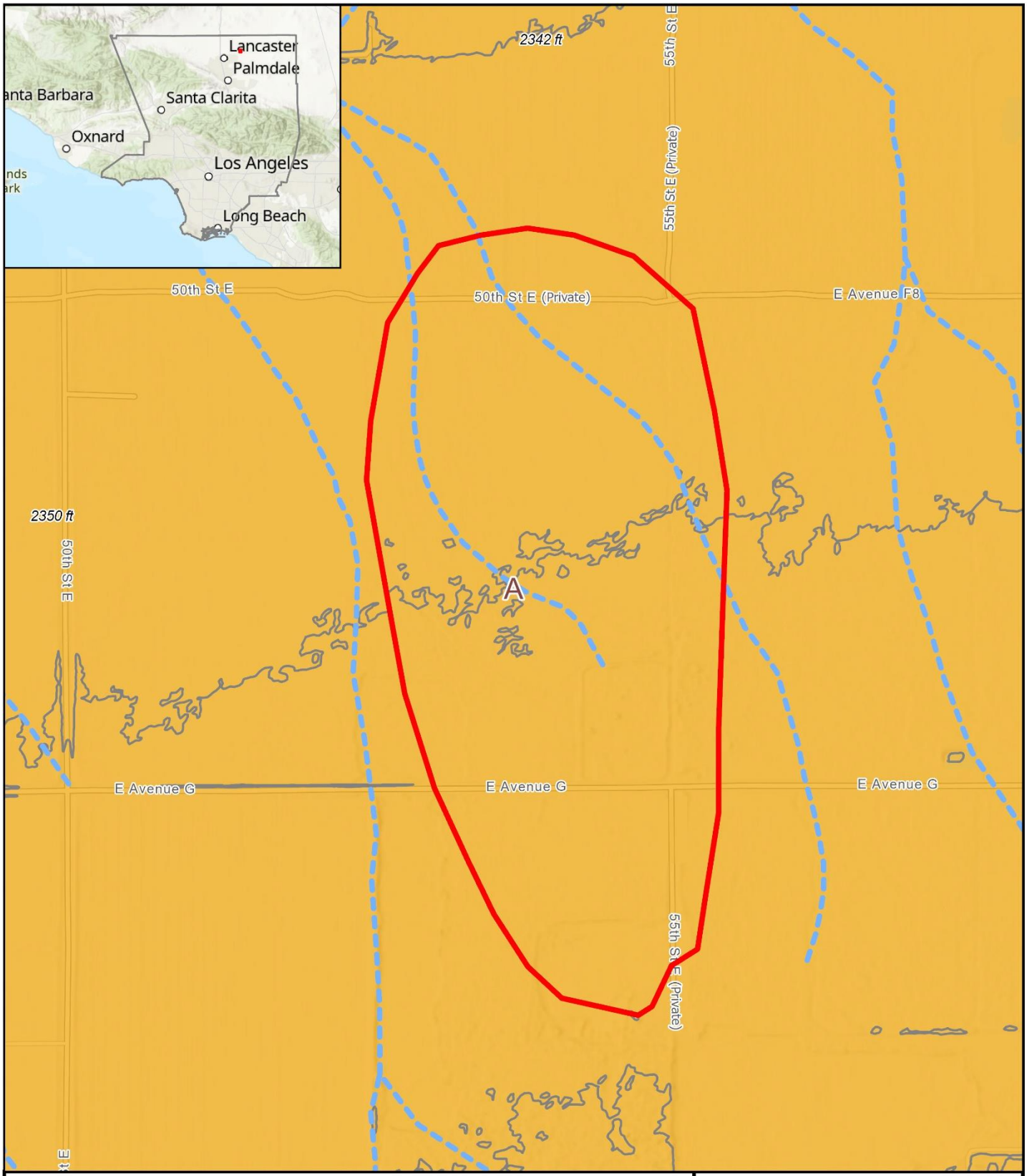
Three properties with seven insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 24-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 24-2: All Properties in Roosevelt Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ROO-1	4	Slab	D65C	Establish drainage flow paths around structure [a] Elevation [a] Drainage system maintenance [a] Public education [a,b]
ROO-2	2	Crawlspace	DX	Establish drainage flow paths around structure [a] Elevation [a] Drainage system maintenance [a] Public education [a,b]
ROO-3	1	Crawlspace	D6A	Establish drainage flow paths around structure [a] Elevation, drainage control and foundation elevation design during construction [a] Drainage system maintenance [a] Public education [a,b]
Total	**7**			

(a). Property owner action

(b). Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone A)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

500 250 0 500

Scale in Feet

Repetitive Loss Area
Roosevelt
Figure 24-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 7/11/2024

25 Rowland Heights Repetitive Loss Area

25.1 Problem Statement

The Rowland Heights Repetitive Loss Area is in Rowland Heights. This is a single-property repetitive loss area. No map of this repetitive loss area is provided herein due to privacy concerns. The area is about 9 square miles of unincorporated Los Angeles County near where Los Angeles County, Orange County, and San Bernardino County meet. The elevation is 540 feet above sea level. It is loosely bounded by the Puente Hills to the south and San Jose Hills to the north-northeast. The area is approximately 10 miles north of Anaheim and 34 miles east-southeast of Los Angeles.

Flood studies of the Rowland Heights area show that this repetitive-loss area is located within FEMA Flood Hazard Zone X, an area of minimal flooding. The repetitive-loss area is a single dwelling within a hillside development generally situated high above the floodplain. The possible flooding sources are storm flows and irrigation runoff from the adjoining neighboring property to the east, which is much higher than the subject property. The property may receive significant excess runoff from the elevated neighboring property, especially during large storms. There is also a possibility of slope erosion due to the high and steep nature of the slope. The flooding problem seems to have been partially fixed with a small toe wall. However, a more comprehensive wall and drain system will be required to prevent future claims. This repetitive flooding problem is considered to be localized and isolated to the identified repetitive loss property. The fact that no subsequent claims have been filed in the last ten years suggests that the problem has been rectified.

25.2 Identified Repetitive Loss Property

Table 25-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 25-1: Repetitive Loss Properties in Rowland Heights Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138651	3/01, 2/05	$9,734	No
Identified Flood Cause: The property is significantly lower in elevation than the neighboring property. Without insurance records to confirm, it seems that flows from the neighboring property to the side yard can be sufficient to cause damage. Additionally, the slope may be eroded and contribute to debris. Street flows may tend to collect in front of the property before moving down the steep street. The finished floor elevation, however, seems to be high enough to prevent damage by street flow.			

25.3 Properties Included in Repetitive Loss Area

One property with one insurable building has been identified in this repetitive loss area. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were

identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged.

Mitigation measures have been implemented by the property owner and a site survey is planned to verify reported and any subsequent measures. Additional measures are limited due to needed consent and agreements with the adjacent property owner.

Table 25-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 25-2: All Properties in Rowland Heights Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
ROW-1	1	Slab	D75B	Planned field review of site to verify mitigation measures and recent measures [a] Extend existing side wall and provide ditch to convey flows from the slope [b] Construct ditches, grate inlets, French drains and terrace drains to divert water away from the structure (Construction will require neighbor's consent) [b] Public education [a,b]
Total	**1**			

a. Public entity action

b. Property owner action

26 Topanga Canyon A Repetitive Loss Area

26.1 Problem Statement

The Topanga Canyon A repetitive loss area is near Garapito Creek, approximately 550 feet upstream of its confluence with Topanga Canyon. Topanga Canyon is located in the Santa Monica Mountains in southwest Los Angeles County. This is a single-property repetitive loss area near Garapito Creek, upstream of its confluence with Topanga Canyon. No map of this repetitive loss area is provided herein due to privacy concerns. The studies of Garapito Creek show this repetitive-loss area to be near two FEMA 100-year flood areas, approximately Zone A and Zone AE. The property is on the bank of Garapito Creek and is being accessed by a private bridge from the street. The ground elevation of the house appears to be lower than the street, and the house's front door and front wall were built on the slope of the creek bank. The problem is associated with limited creek capacity and backwater effect caused by the small bridge. The property, however, is subject to much greater risk due to high flood discharges estimated for the FEMA 1 percent annual chance (100-year) flood and the Los Angeles County Capital Flood (flooding produced by a 50-year rainfall frequency storm falling on a saturated watershed that has been burned and has had four years of recovery). The elevation for the lowest point of the house is about 920 feet, while the FEMA FIRM shows that the FEMA 100-year water surface elevation of Garapito Creek at the location is approximately 926 feet. The creek is moderately vegetated, which may also contribute to the high water.

26.2 Identified Repetitive Loss Property

Table 26-1 lists the FEMA-designated repetitive loss property within this repetitive loss area.

Table 26-1: Repetitive Loss Properties in Topanga Canyon A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
28394	3/78, 2/80, 3/83, 2/92, 1/93	$9,247	No
***Identified Flood Cause*:** The subject property is on the channel bank and partially in Garapito Creek. The problem is associated with limited creek capacity and a backwater effect caused by the small bridge.			

26.3 Properties Included in Repetitive Loss Area

There is one property included in this repetitive loss area. It has one insurable building. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 26-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them.

Table 26-2: All Properties in Topanga Canyon A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-A1	1	Slab	D45C	Waterproof the lower level of the house [a] Construct retaining walls around the Creekside of the house [a]
Total	**1**			

a. Property owner action.

27 Topanga Canyon B Repetitive Loss Area

27.1 Problem Statement

Figure 27-1 shows the Topanga Canyon B Repetitive Loss Area. This area is in the vicinity of Topanga Canyon, approximately 600 feet upstream of the Old Topanga Canyon confluence, within the Santa Monica Mountains in southwestern Los Angeles County. This repetitive loss area is subject to flooding from Topanga Canyon and is within the 100-year FEMA Flood Zone, which is commensurate with the AE flood risk identified in the FIRM. The elevation for the lowest point of the property is about 770 feet and is higher than the channel invert of Topanga Canyon (765 feet) by only 5 feet. Based on the FEMA FIRM, the water surface elevation of the area is 772 feet.

27.2 Identified Repetitive Loss Property

Table 27-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 27-1: Repetitive Loss Properties in Topanga Canyon B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
12818	1/80, 2/80, 3/91, 2/92, 1/95	$7,872	No
Identified Flood Cause: Property in the channel and FEMA Flood Zone AE of Topanga Canyon. The elevation for the lowest point of the house is about 770 feet and is higher than the channel invert of Topanga Canyon (765 feet) by only 5 feet. Based on the FEMA FIRM, the water surface elevation of the area is 772 feet, which would cause flooding of the house.			

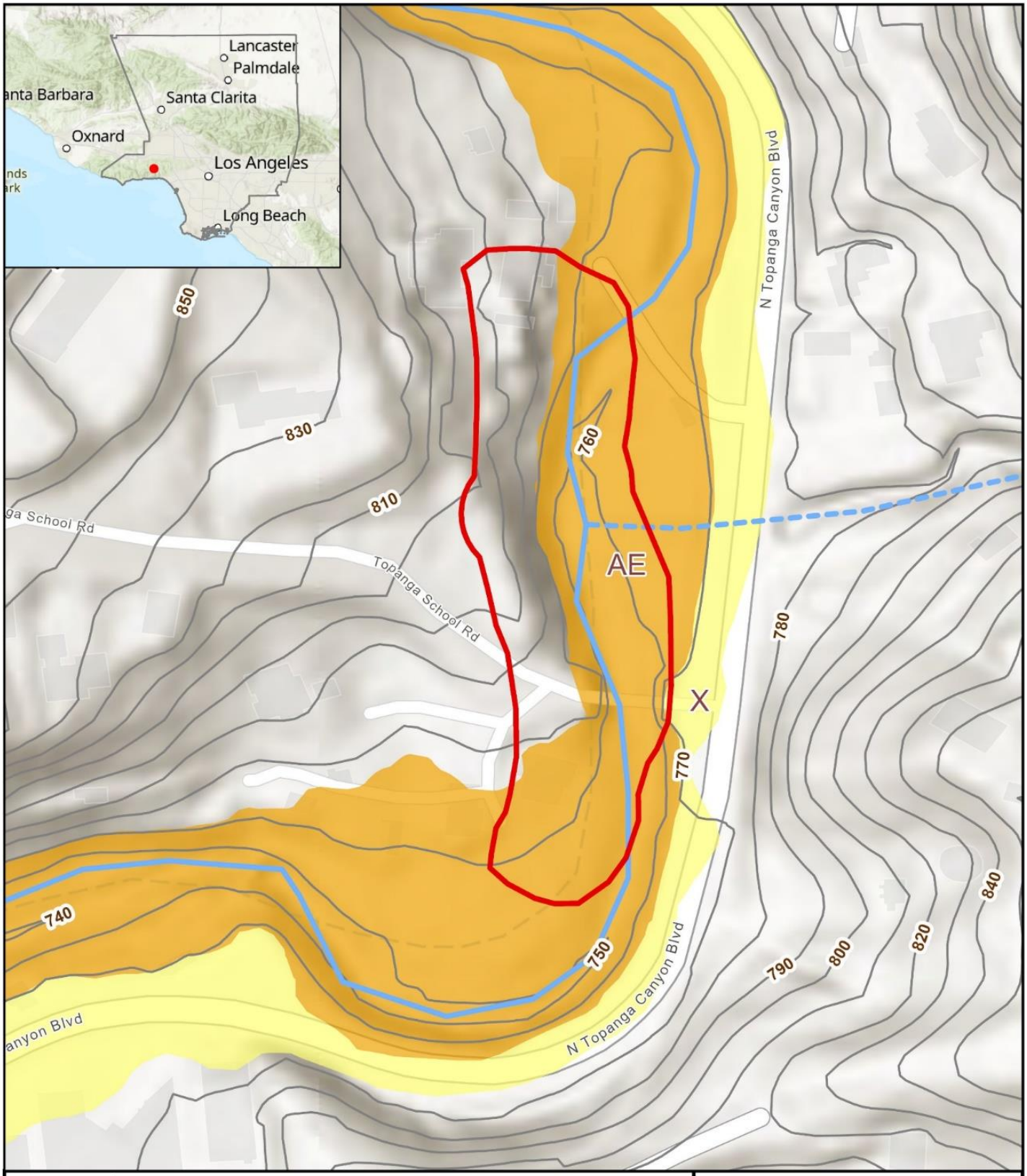
27.3 Properties Included in Repetitive Loss Area

Two properties with five insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 27-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 27-2: All Properties in Topanga Canyon B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-B1	1	Slab	D75B	Acquisition [a] Elevation [b] Convert flood-prone living space and replace with new story [b] Public education [b,c]
TOP-B2	4	Crawlspace	D45B	Acquisition [a] Elevation [b] Convert flood-prone living space and replace with new story [b]
Total	**5**			

a. Public entity action, but only with cooperation of property owner
b. Property owner action
c. Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- FEMA 500 yr Flood Zone (Zone X)
- Intermittent Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Topanga Canyon B
Figure 27-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/11/2024

28 Topanga Canyon C Repetitive Loss Area

28.1 Problem Statement

The Topanga Canyon C Repetitive Loss Area is in the vicinity of Calabasas in southwestern Los Angeles County. No map of this repetitive loss area is provided herein due to privacy concerns. This area is in a FEMA Zone D, which is defined as an area of possible but unknown flood risk. The identified repetitive-loss property is newer construction and is located on a knoll of an area with a lot of topographic relief. Flooding at this property appears to be associated with drainage from a surrounding hillside.

The repetitive flooding problem is considered to be isolated to the identified repetitive loss property. The fact that no claims have been filed in the last ten years suggests that the problem has been rectified.

28.2 Identified Repetitive Loss Property

Table 28-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 28-1: Repetitive Loss Properties in Topanga Canyon C Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
111971	2/98, 3/01	$15,698	No
Identified Flood Cause: Localized flooding associated with hillside drainage.			

28.3 Properties Included in Repetitive Loss Area

There is only one property included in this repetitive loss area. It has one insurable building. The property in this repetitive loss area is also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 28-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 28-2: All Properties in Topanga Canyon C Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-C1	1	Crawlspace	No Information	Establish drainage flow paths around structure [a] Drainage system maintenance [a] Floodwall [a] Public education [a,b]
Total	**1**			

a. Property owner action

b. Public entity action

29 Topanga Canyon D Repetitive Loss Area

29.1 Problem Statement

Figure 29-1 shows the Topanga Canyon D Repetitive Loss Area. Since this is a smaller area containing few properties, streets and building outlines are not shown on the map herein for privacy. Street names remain to provide spatial context. This area is in Topanga Canyon within the Santa Monica Mountains in southwestern Los Angeles County. The identified repetitive loss property for this area is not located in a FEMA-mapped Zone D (an area of possible but unknown flood risk) but not in a special flood hazard area, and the source of repetitive flood risk appears to be localized. The dates of loss correspond to storm events that occurred in early 2005. The property is located in a cul-de-sac. There is a gradient slope in this vicinity with properties above the identified repetitive-loss property as well as below it. The cause of flooding is most likely drainage flows from the uphill neighboring property. The other property within this area is at ground elevation similar to that of the FEMA-identified repetitive loss property and has its lowest floor with similar elevation as well.

29.2 Identified Repetitive Loss Property

Table 29-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 29-1: Repetitive Loss Properties in Topanga Canyon D Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137970	1/05, 2/05	$10,822	No
Identified Flood Cause: Localized drainage issue associated with interior drainage from private property			

29.3 Properties Included in Repetitive Loss Area

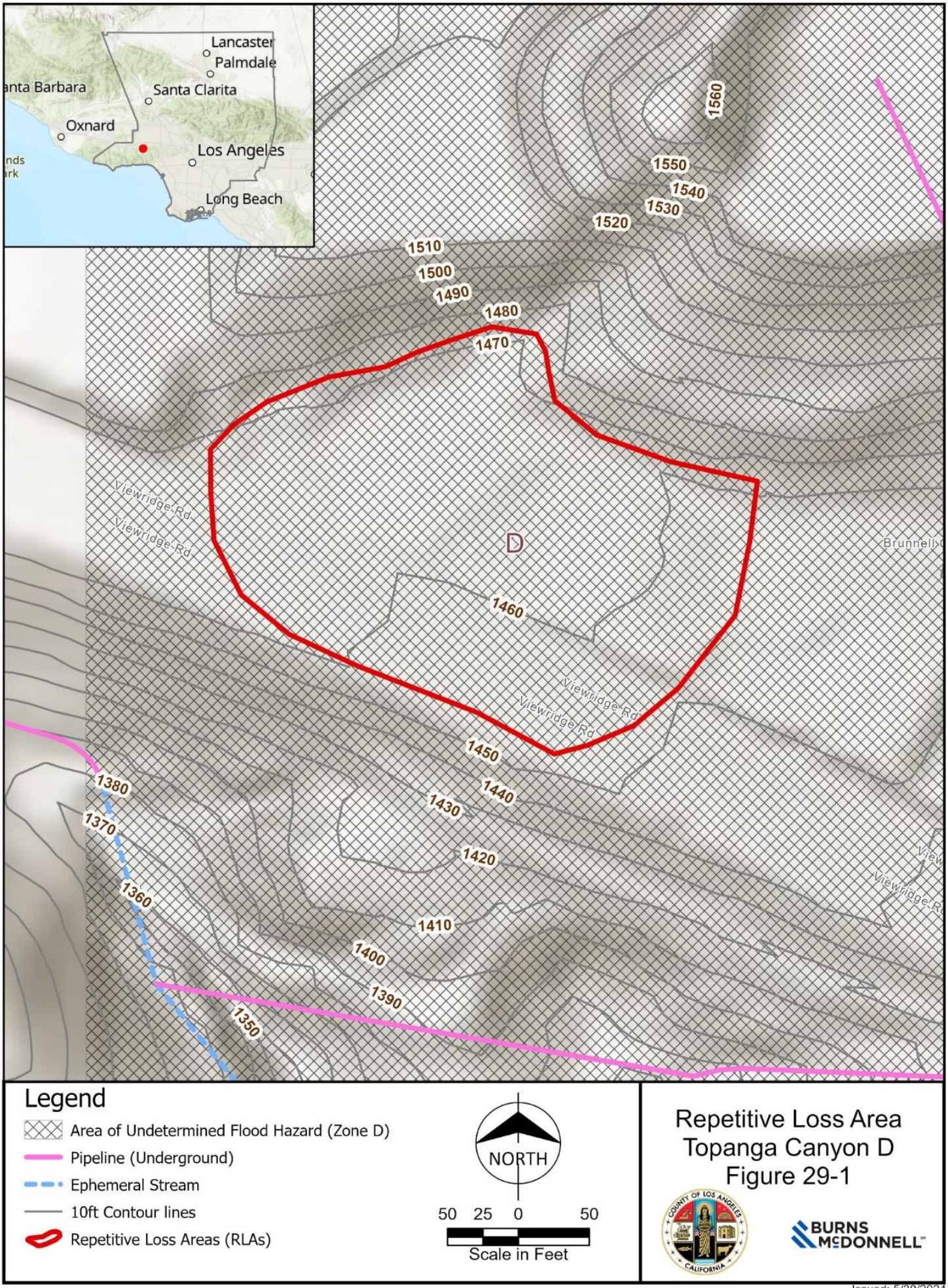
Two properties with two insurable buildings have been identified in this repetitive loss area. The property in this repetitive loss area is also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 29-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 29-2: All Properties in Topanga Canyon D Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-D1	1	Slab	D10B	Create/maintain flow paths to public storm drains-[a] Drainage system maintenance[a] Public education [a,b]
TOP-D2	1	Slab	D95B	Create/maintain flow paths to public storm drains [a] Drainage system maintenance[a] Public education [a,b]
AD-3	**2**			

a. Property owner action

b. Public entity action



Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 5/30/2024

30 Topanga Canyon E Repetitive Loss Area

30.1 Problem Statement

Figure 30-1 shows the Topanga Canyon E Repetitive Loss Area. This area is in the Santa Monica Mountains, in the southwestern area of Los Angeles County and the southeastern area of Ventura County. The identified repetitive loss property for this area is in the vicinity of Calabasas. The property backs up to steep terrain of the Santa Monica Mountains. The two events in 1995 and 2005 were 5-year and 13-year flood events, respectively, based on historical data. A 5-year flood event is a projected flood event that has a 20 percent chance of occurring in a given year; a 13-year flood event is a projected flood with a 7.7 percent chance of occurring in a given year. The area is near a FEMA Flood Hazard Zone AE but primarily in FEMA Zone D (defined as an area of possible but unknown flood risk). However, based on topography, the flooding problem appears to be associated with runoff from the surrounding hillside. This problem could be exacerbated by wildfire events within the region.

30.2 Identified Repetitive Loss Property

Table 30-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 30-1: Repetitive Loss Properties in Topanga Canyon E Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
138321	3/95, 1/05	$28,727	No
Identified Flood Cause: Hillside drainage.			

30.3 Properties Included in Repetitive Loss Area

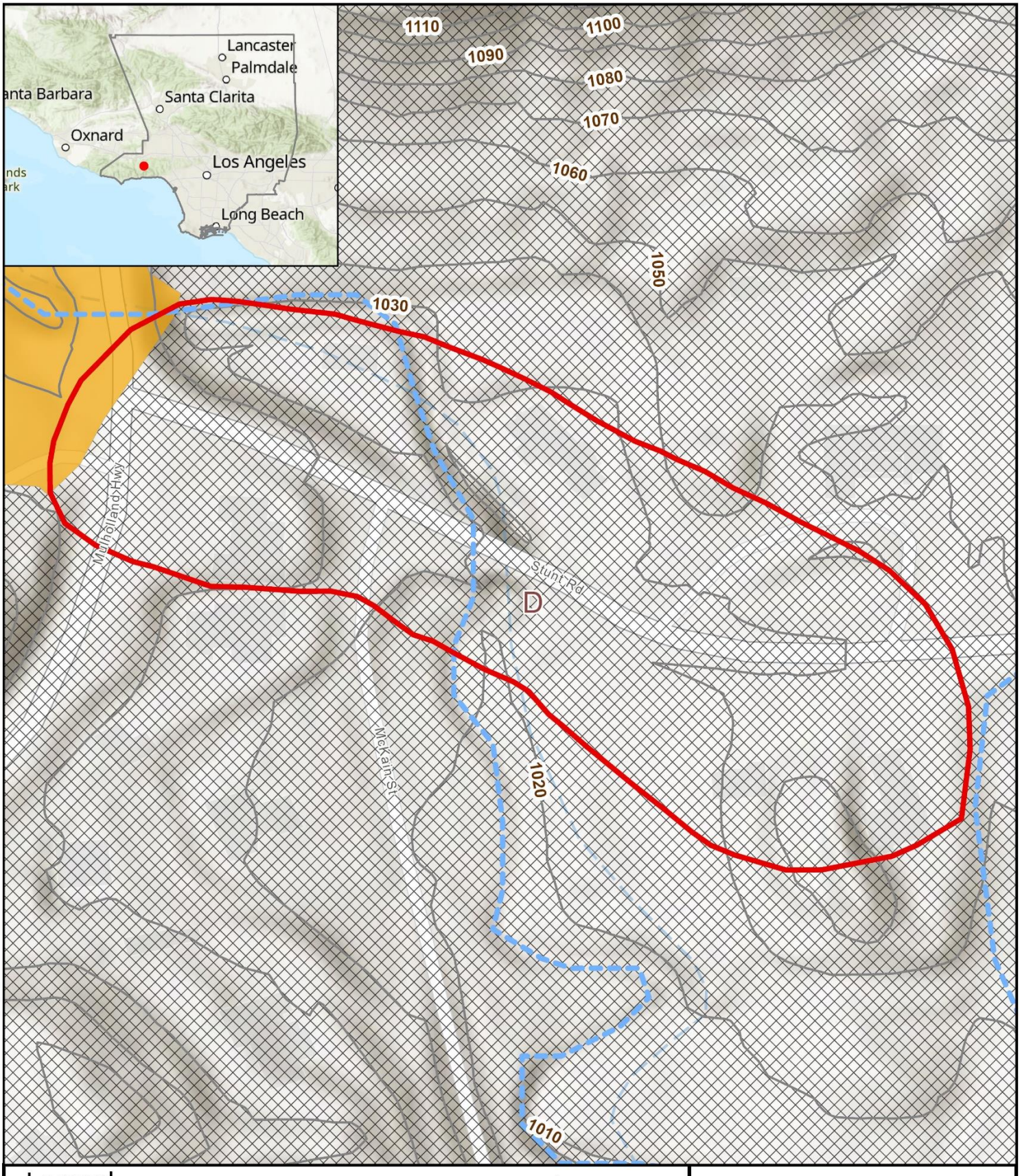
Four properties with five insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new RLPs were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 30-2 provides general information for the properties, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 30-2: All Properties in Topanga Canyon E Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-E1	2	Crawlspace	D75D	Establish/maintain flow paths around the structure to improved drainage system [a] Hillside retaining wall [a] Public education [a,b]
TOP-E2	1	Slab	D75C	Establish/maintain flow paths around structure to improved drainage system [a] Hillside retaining wall [a] Public education [a,b]
TOP-E3	1	Crawlspace	D2B	Establish/maintain flow paths around structure to improved drainage system [a] Hillside retaining wall [a] Public education [a,b]
TOP-E4	1	Slab	D75D	Establish/maintain flow paths around structure to improved drainage system [a] Hillside retaining wall [a] Public education [a,b]
Total	**5**			

a. Property owner action

b. Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- Area of Undetermined Flood Hazard (Zone D)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Topanga Canyon E
Figure 30-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 5/30/2024

31 Topanga Canyon F Repetitive Loss Area

31.1 Problem Statement

Figure 31-1 shows the Topanga Canyon F Repetitive Loss Area between Malibu and Topanga in southwestern Los Angeles County. The repetitive loss area is not located near a water body. It is in a FEMA Zone D (defined as an area of possible but unknown flood risk). This repetitive loss area includes the FEMA-designated repetitive loss property and nearby properties at higher elevations that may be subject to the same drainage problem as water flows down the hillside. This area was created by using topographic contours and the water drainage flow paths that could have led to flooding of the property. The identified repetitive loss property is located on a hillside in an area characterized by canyons and mountain slopes. A field visit concluded that the flooding could be caused due to hillside drainage issues for this single property. Therefore, the flooding at this property was determined to be an isolated incident.

Based on topography, the flooding problem appears to be associated with runoff from the surrounding hillside. This problem could have been exacerbated by wildfire events within the region.

31.2 Identified Repetitive Loss Property

Table 33-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and the average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 31-1: Repetitive Loss Properties in Topanga Canyon F Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
256028	12/04, 12/16, 12/21	$16,150	No
Identified Flood Cause: Hillside drainage.			

31.3 Properties Included in Repetitive Loss Area

Seven properties with seven insurable buildings have been identified in this repetitive loss area. Table 33-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

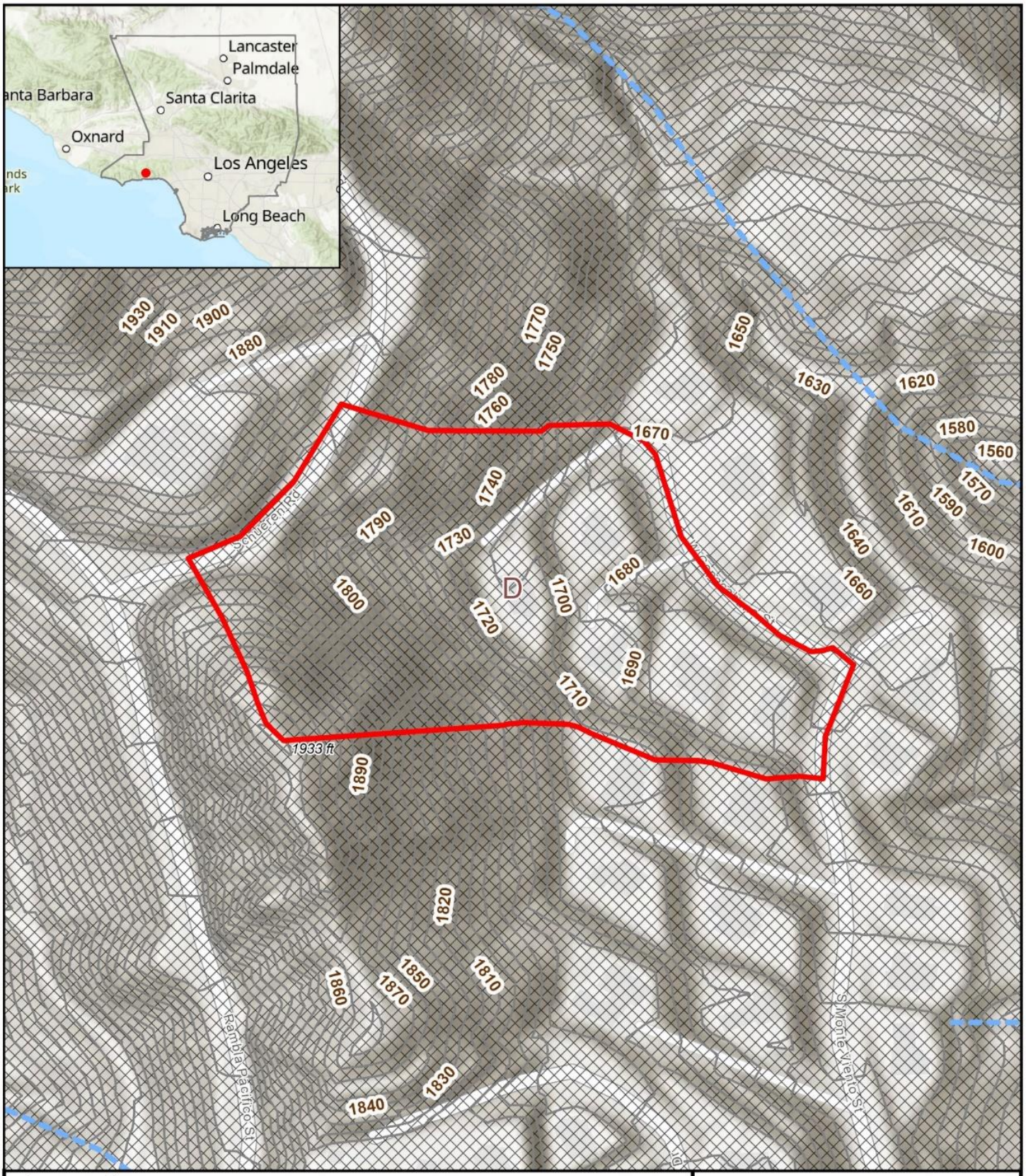
Table 31-2: All Properties in Topanga Canyon F Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TOP-F1	1	Concrete Slab	D8C	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
TOP-F2	1	Concrete slab	D8B	Create/maintain flow paths to public storm drains [a] Drainage system maintenance Public education [a,c]
TOP-F3	1	Concrete slab	D8B	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
TOP-F4	1	Concrete slab	D8B	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
TOP-F5	1	Concrete slab	D8C	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
TOP-F6	1	Concrete slab	D8B	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
TOP-F7	1	Concrete slab	D8A	Create/maintain flow paths to public storm drains [a] Drainage system maintenance [b] Public education [a,c]
Total	7			

a. Property owner action

b. Public entity action for culvert in the public street/road, property owner action for lot drainage

c. Public entity action



Legend

- Area of Undetermined Flood Hazard (Zone D)
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

100 50 0 100

Scale in Feet

Repetitive Loss Area
Topanga Canyon F
Figure 31-1

BURNS McDONNELL

Source: Esri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 6/12/2024

32 Triunfo Canyon A Repetitive Loss Area

32.1 Problem Statement

The Triunfo Canyon A Repetitive Loss Area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. There is a single-property repetitive loss area on Lobo Canyon Road. No map of this repetitive loss area is provided herein due to privacy concerns. This is an offsite drainage problem isolated to the single property. The property is located in the floodplain and FEMA 100-year flood Zone AE. In the past, small private bridges and culverts in the creek running behind the house clogged with debris, causing water to overflow and run along Lobo Canyon Road in front of the subject property.

32.2 Identified Repetitive Loss Property

Table 32-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 32-1: Repetitive Loss Properties in Triunfo Canyon A Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
95737	1/95, 2/98	$23,454	No
Identified Flood Cause: The property is in FEMA Flood Zone AE of Lobo Canyon (behind the house). Past clogging of small private bridges and culverts in the creek caused water to overflow onto the street and flood the property. No losses have been reported since 1998. The structure's windows are boarded up and it is assumed to be vacant.			

32.3 Properties Included in Repetitive Loss Area

There is one property included in this repetitive loss area. It has two insurable buildings. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Any renovations subject to substantial improvement or substantial damage shall be built to current flood resiliency requirements at the time of permit application. Table 32-2 provides general information for the property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 32-2: All Properties in Triunfo Canyon A Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TRI-A1	2	Slab	No Information	Acquisition [a] Elevation [b] Berm [b] Floodwall [b] Public education [b,c]
Total	**2**			

a. Public entity action, but only with cooperation of property owner
b. Property owner action
c. Public entity action

33 Triunfo Canyon B Repetitive Loss Area

33.1 Problem Statement

The Triunfo Canyon B repetitive loss area is in the Santa Monica Mountains in the southwestern portion of Los Angeles County. This is a single-property repetitive loss area on Hidden Highland Road where the structures have been demolished. No map of this repetitive loss area is provided herein due to privacy concerns. The repetitive loss property is at the base of a hillside and receives runoff from the adjacent hills. It is located in a FEMA Zone X. Based on topography, the property is subject to runoff from the hillside behind the property.

33.2 Identified Repetitive Loss Property

Table 33-1 lists the FEMA-designated repetitive loss property within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for the FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 33-1: Repetitive Loss Properties in Triunfo Canyon B Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
137793	2/98, 1/05	$13,473	Demolished
Identified Flood Cause: Based on topography, the property is subject to runoff from the hillside behind the property. The structures on the property has been demolished.			

33.3 Properties Included in Repetitive Loss Area

There is one property included in this repetitive loss area. The property in this repetitive loss area was also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. The property used to have two insurable buildings. Previous reports indicated the former buildings on this property were demolished. Any new structures to be built will meet current flood resiliency requirements. A site survey is planned to verify the current condition of the new buildings on this property. Table 33-2 provides general information for the property, but no mitigation measures are identified for the new structures.

Table 33-2 All Properties in Triunfo Canyon B Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
TRI-B1	0	Slab	No Information	Former buildings demolished. New construction will be subject to requirements for proper grading, drainage, erosion control, foundation elevation and floodproofing that meet or exceed NFIP standards.
Total	**0**			

34 Upper Topanga Canyon Repetitive Loss Area

34.1 Problem Statement

Figure 34-1 shows the Upper Topanga Canyon repetitive loss area. This repetitive-loss area is in the Topanga Canyon area in the Santa Monica Mountains in southwest Los Angeles County, 26 miles northwest of Downtown Los Angeles. Properties in the repetitive loss area are in or immediately adjacent to the FEMA 100-year flood Zone AE for Topanga Canyon. Topanga Canyon's contributing watershed is the second largest watershed in the Santa Monica Mountains. Sources of flooding in the Topanga Canyon area consist of storm runoff in Topanga Creek and associated storm drainage facilities. Historically, Topanga Canyon Road flooded because the upstream culvert at Topanga Canyon Road was blocked with debris. If the culverts are not properly cleaned, water can back up and can cause flooding. Based on historical information and FEMA's Flood Insurance Study, flooding occurs from 5-year or greater flood events. (A 5-year flood event is a projected flood event that has a 20 percent chance of occurring each year.) Because most of the repetitive loss properties are located within the low-lying floodplain areas immediately adjacent to the low-flow channels, it is expected that without mitigation, these properties will continue to be subject to future floods.

34.2 Identified Repetitive Loss Property

Table 34-1 lists the FEMA-designated repetitive loss properties within this repetitive loss area. The dates of previous flood claims and average claim paid were provided by FEMA in the 2023 repetitive loss property list. Field and desktop assessments were conducted for each FEMA repetitive loss property to determine the cause of flooding and describe any mitigation measures implemented.

Table 34-1: Repetitive Loss Properties in Upper Topanga Canyon Repetitive Loss Area

FEMA RL #	Flood Dates of Previous Claims	Average Claim Paid	Mitigated?
74656	1/95, 3/95	$6,972	No
Identified Flood Cause: Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by the 5-year return interval flood event in 1995. No reported damage since.			
74334	2/92, 1/95	$11,451	No
Identified Flood Cause: Property on the bank next to Old Topanga Canyon. Crawlspace foundation with finished floor below 100-year water surface elevation. Damage caused by the 5-year return interval flood event in 1995. No reported damage since.			
74553	1/95, 3/95	$10,276	No
Identified Flood Cause: In 1983, and 1993, the water from the natural creek tributary east of the house overtopped Old Topanga Canyon Road and poured into the house. The owner reported no more problems with the tributary flooding. The property is still subject to flooding from Old Topanga Canyon channel (Zone AE). The property is in Zone AE, which has significant risk from a 1 percent annual chance (100-year) flood. The tributary flow may continue to overtop the street if the culvert inlet becomes obstructed by debris from the upstream reach.			
76269	1/95, 3/95	$38,148	No
Identified Flood Cause: This property was not mapped by FEMA but was confirmed by field investigation to be subject to a high risk from Red Rock Canyon flooding. The property is on the opposite bank from Red Rock Road and is accessed by a pedestrian bridge crossing the creek. The creek is very shallow, without the capacity to carry the estimated 810 cubic feet per second of the 1 percent annual chance (100-year) flood discharge, and the bridge has a very low clearance, which can cause further flow blockage and higher backwater.			

34.3 Properties Included in Repetitive Loss Area

Fifty-six properties with 91 insurable buildings have been identified in this repetitive loss area. The properties in this repetitive loss area were also listed in the 2020 RLAA. The extent of this repetitive loss area was developed through the methodology presented for the 2020 RLAA (See Section 2 of this RLAA document). In the 2023 FEMA repetitive loss list provided to the County, no new repetitive loss properties were identified, and no existing properties were removed in this area. Consequently, the repetitive loss area remains unchanged. Table 34-2 provides general information for each property, along with mitigation measures that could be employed to address repetitive flood losses. For identified mitigation measures that are located on private properties, the decision on whether to implement the identified mitigation measures resides with the private property owners. These measures are recommended due to the flood risks, but owners are not obligated to implement them. Regarding education on flood risk and flood risk mitigation, it is a shared responsibility. Public entities make information on flood risk and flood risk mitigation available to the public. Property owners undertake the task of seeking and taking in flood risk and flood risk mitigation information and consulting the appropriate design professionals to implement flood risk and flood risk mitigation measures.

Table 34-2: All Properties in Upper Topanga Canyon Repetitive Loss Area

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-1	1	Crawlspace	D65B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-2	1	Slab	D45A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-3	2	Slab	D3A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-4	1	Slab	D75A	Elevation [a] Acquisition [b] Convert flood prone living space and replace with new story [a]
UTC-5	2	Slab	No Info	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-6	1	Slab	D75D	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-7	1	Crawlspace	D65B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-8	2	Crawlspace	D7C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-9	2	Crawlspace	D65C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-10	2	Crawlspace	No Info	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-11	1	Crawlspace	D45A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-12	1	Crawlspace	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-13	1	Slab	D6B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-14	2	Crawlspace	D55C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-15	1	Crawlspace	D45C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-16	3	Crawlspace	D45A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-17	1	Crawlspace	D6A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-18	2	Crawlspace	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education
UTC-19	2	Crawlspace	D6B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-20	1	Slab	D5B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]

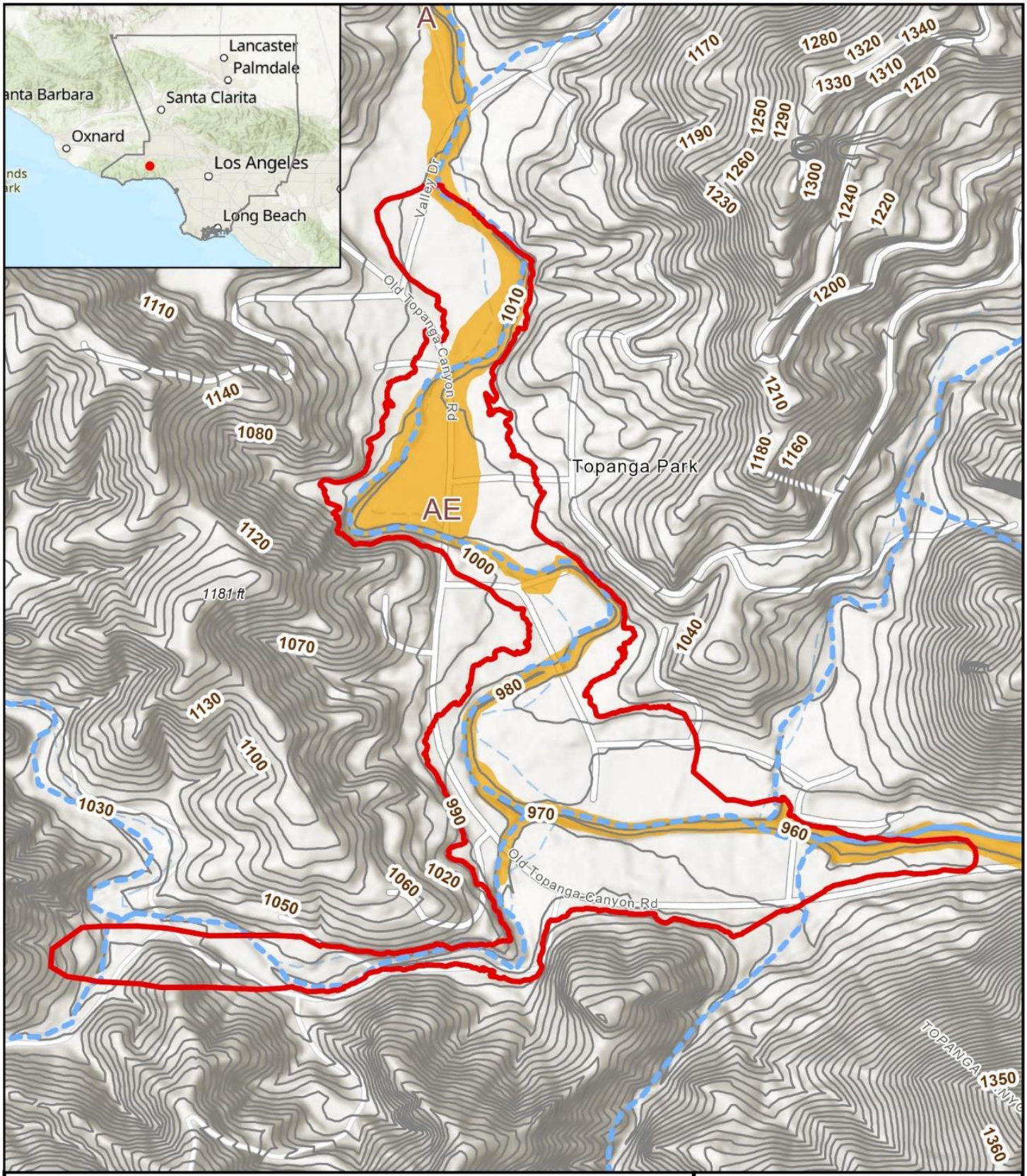
Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-21	1	Crawlspace	D75B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-22	1	Crawlspace	D65	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-23	1	Crawlspace	D6C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-24	1	Crawlspace	D55C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-25	2	Crawlspace	CX	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-26	1	Crawlspace	CX	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-27	1	Crawlspace	D6A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-28	1	Slab	D4C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-29	2	Slab	D45B	Elevation [a] Acquisition [b] Covert flood-prone living space and replace with new story [a] Flood-proofing [a] Public education [a,c]
UTC-30	3	Crawlspace	DX	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-31	2	Crawlspace	D55B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-32	2	Slab	D65C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-33	2	Crawlspace	D7D	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-34	3	Crawlspace	D5B	Elevation [a] Acquisition [b] Covert flood-prone living space and replace with new story [a] Flood-proofing [a] Public education [a,c]
UTC-35	1	Crawlspace	D6D	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-36	2	Crawlspace	D55A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-37	1	Slab	D8C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-38	1	Slab	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-39	2	Crawlspace	D65C	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-40	2	Crawlspace	D65A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-41	3	Crawlspace	D8A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-42	1	Slab	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-43	2	Crawlspace	D7A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-44	1	Crawlspace	D6A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-45	2	Crawlspace	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-46	1	Slab	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-47	3	Slab	No Information	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-48	1	Crawlspace	D7B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-49	1	Slab	D7A	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-50	2	Slab	D75B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education

Property ID	Number of Insurable Buildings	Building Description		Probable Mitigation Measures
		Foundation	Condition	
UTC-51	3	Crawlspace	No Information	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-52	3	Slab	D65B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education
UTC-53	1	Crawlspace	D5B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-54	2	Slab	D95B	Flood-proof lower level and retaining wall on creek side [a]
UTC-55	2	Crawlspace	D5B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
UTC-56	1	No Information	D55B	Elevation [a] Acquisition [b] Flood-proofing [a] Public education [a,c]
Total	**91**			

a. Property owner action
b. Public entity action, but only with cooperation of property owner
c. Public entity action



Legend

- FEMA 100 yr Flood Zone (Zone AE)
- Intermittent Stream
- Ephemeral Stream
- 10ft Contour lines
- Repetitive Loss Areas (RLAs)

NORTH

250 125 0 250

Scale in Feet

Repetitive Loss Area
Upper Topanga Canyon
Figure 34-1

BURNS McDONNELL

Source: Estri World Topographic Map, FEMA NFHL, USGS NHD, LA County GIS Database

Issued: 5/30/2024

35 Summary of Repetitive Loss Area Analysis

Table 35-1 summarizes the overall results of the Repetitive Loss Area analysis based on the 2023 FEMA list of repetitive loss properties and the repetitive loss area analysis. Table 35-1 lists for each repetitive loss area, the number of FEMA designated repetitive loss properties, total number of properties based on the repetitive loss area, the mitigated and destroyed properties, AW-501s submitted and official FEMA status. Also listed are the potential number of properties for which AW-501 are planned based on current survey data and the general cause of reported flooding in the repetitive loss area.

Table 35-1: Summary of Repetitive Loss Area Analysis

Repetitive Loss Area	FEMA-Designated Properties	Properties in Area	Properties Mitigated or Destroyed	Number of AW-501s Submitted	FEMA Status	Number of Potential AW-501s[3]	Cause of Flooding
Agua Dulce A	1	3	0	0	Not mitigated	0	In the 100-year floodplain
Agua Dulce B	1	7	0	0	Not mitigated	0	Agua Dulce Canyon Creek
Altadena A	1	1	0	0	Not mitigated	0	Hillside drainage
Altadena B	1	1	1	1	Not mitigated	0	Backyard drainage deficiency (now improved)
Calabasas A	1	1	0	0	Not mitigated	0	Hillside mudflow
Calabasas B	1	18	0	0	Not mitigated	1	Lower than street
Cold Creek A	1	2	0	0	Not mitigated	0	Excessive hillside storm runoff
Cold Creek B	1	7	0	0	Not mitigated	0	Lower than street
Del Sur	1	2	0	0	Not mitigated	0	In the 100-year floodplain
Lake Hughes	1	6	0	0	Not mitigated	0	In the 100-year floodplain
Lower Topanga Canyon	5	5	5	5	Not mitigated	0	In the 100-year floodplain
Malibou Lake A	20	56	2	1	Not mitigated	1	Rising water of Malibou Lake
Malibou Lake B	1	1	0	0	Not mitigated	0	Hillside drainage
Malibu	1	7	1	0	Not mitigated	1	Lower than street

[3] This column includes properties where additional surveys will be completed to determine if mitigation measures, or property status warrant a submission of an AW-501.

Repetitive Loss Area	FEMA-Designated Properties	Properties in Area	Properties Mitigated or Destroyed	Number of AW-501s Submitted	FEMA Status	Number of Potential AW-501s[3]	Cause of Flooding
Quartz Hill A	1	1	1	1	Not mitigated	0	Overflow from detention basin (now relocated)
Quartz Hill B	1	12	0	0	Not mitigated	0	Sheet flow from Antelope Valley Drainage Corridor No. 7
Quartz Hill C	1	12	0	0	Not mitigated	0	Sheet flow from Antelope Valley Drainage Corridor No. 7
Roosevelt	1	3	0	0	Not mitigated	0	In the 100-year floodplain
Rowland	1	1	0	0	Not mitigated	1	Flooding from neighbor (fixed elevation)
Topanga Canyon A	1	1	0	0	Not mitigated	0	Backup from Garapito Creek
Topanga Canyon B	1	2	0	0	Not mitigated	0	In the 100-year floodplain
Topanga Canyon C	1	1	0	0	Not mitigated	0	Hillside drainage
Topanga Canyon D	1	2	0	0	Not mitigated	0	Interior drainage from private property
Topanga Canyon E	1	4	0	0	Not mitigated	0	Hillside drainage
Topanga Canyon F	1	1	0	0	Not mitigated	0	Hillside drainage
Triunfo Canyon A	1	1	0	0	Not mitigated	0	In the 100-year floodplain
Triunfo Canyon B	1	1	1	0	Not mitigated	1	Hillside runoff
Upper Topanga Canyon	4	56	0	0	Not mitigated	0	In the 100-year floodplain

Part 3 – Repetitive Loss Area Action Plan

36 Repetitive Loss Area Action Plan

36.1 Mitigation Actions

This Los Angeles County Repetitive Loss Area Analysis was created in conjunction with the development of the *2025 Los Angeles County Comprehensive Floodplain Management Plan*. The floodplain management plan identified and prioritized an action plan that will have direct relevance to this RLAA. This action plan has been adapted to apply to the RLAA and is shown in Table 36-1. The following information is presented for each action plan item:

- Action item **number** and **description**
- **Lead agency** responsible for implementing the action item
- **Support agencies** expected to participate in the implementation
- Agencies or programs that may be able to provide **funding** to implement the action item
- An estimated **cost** range (see Section 31.2 for definition of high, medium and low cost ratings)
- A statement of **timing** for implementing the action item:
  - Ongoing—This action already occurs and will continue
  - Short term—This action would be implemented within five years
  - Long term— This action would be implemented after five years
- A list of the **repetitive loss areas that would be affected** by the action item
- Indication of whether the action item was **included in the previous RLAA** and, if so, its number in that previous document.

Table 36-1: Action Plan-Flood Mitigation Initiatives

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
1—Promote awareness of flood hazards to residents in flood hazard areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Building and Safety Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; County Regional Planning Department	Low	Ongoing	All	Yes-1
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Building and Safety Division, Land Development Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-2
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Los Angeles County Chief Executive Office/Office of Emergency Management (CEO OEM), Public Works (Disaster Services Group) ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	Agua Dulce A, Agua Dulce B, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lake Hughes, Lower Topanga Canyon, Malibou Lake A, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Topanga Canyon E, Triunfo Canyon A, Upper Topanga Canyon	Yes-3

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • **Annually notify owners regarding local flood hazards and proper protection activities** • **Provide technical advice regarding flood protection and flood preparedness** • **Distribute a revised questionnaire to new Repetitive Loss Properties.** ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-4
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials. ***Lead Agency:*** Fire Department, Public Works (Administrative Services Division, Stormwater Engineering Division) ***Support Agencies:*** Public Works (Community & Government Relations Group) ***Funding Source***: FEMA; Cal EMA; Fire Department; Public Works	Low	Ongoing	All	Yes-5
6—Provide public education about maintaining the stormwater system free of debris. ***Lead Agency:*** Public Works (Stormwater Quality Division) ***Support Agencies:*** Public Works (Community & Government Relations Group, Stormwater Engineering Division, Stormwater Maintenance Division, Stormwater Planning Division, Road Maintenance Division, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-6
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Maintenance Division, Stormwater Planning Division, Transportation Planning and Programs Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-7

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Community & Government Relations Group) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	All	Yes-8
9—Provide emergency preparedness and flood protection information to the general public. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Stormwater Engineering Division, Program for Public Information, Stormwater Planning Division, Community & Government Relations Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works; USC Sea Grant	Low	Ongoing	All	Yes-9
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events. ***Lead Agency:*** CEO OEM, Public Works (Disaster Services Group) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Community & Government Relations Group, Program for Public Information) ***Funding Source:*** FEMA; Cal EMA; CEO OEM; Public Works	Low	Ongoing	All	Yes-10
11—Develop and maintain a list of priority maintenance-related problem sites. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	Altadena A, Altadena B, Calabasas A, Calabasas B, Cold Creek A, Cold Creek B, Malibou Lake A, Malibou Lake B, Malibu, Roosevelt, Quartz Hill B, Topanga Canyon C, Topanga Canyon D, Topanga Canyon E, Topanga Canyon F, Triunfo Canyon B	Yes-11
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites. ***Lead Agency:*** Public Works (Stormwater Maintenance Division, Road Maintenance Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-12

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management. ***Lead Agency:*** Public Works (Stormwater Maintenance Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-13
14—Evaluate LACFCD storm drain, open channel, and flood retention basin facilities for future improvements. Drainage infrastructure outside of the LACFCD may be covered by the Road Maintenance Division where applicable. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Public Works (Design Division, Stormwater Maintenance Division, Stormwater Engineering Division, Stormwater Quality Division) Stakeholders ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-14
15— Pursue appropriate flood hazard mitigation grant funding (i.e. Building Resilient Infrastructure and Communities (BRIC)) for projects that use the Community Lifeline Framework, and address multiple hazards, where applicable. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Disaster Services Group, Stormwater Planning Division), CEO OEM ***Funding Source:*** Public Works; CEO OEM	Low	Ongoing	All	Yes-15
16—Consider the conversion of high-risk properties into open space. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department; County Parks and Recreation	High	Ongoing	All	Yes-16

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
17—Refine the plan check system to track properties in the flood zone and address drainage. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division) ***Funding Source:*** Public Works	Low	Ongoing	Agua Dulce A, Agua Dulce B, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lake Hughes, Lower Topanga Canyon, Malibou Lake A, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Topanga Canyon E, Triunfo Canyon A, Upper Topanga Canyon	Yes-17
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-18
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Chief Information Office) ***Funding Source:*** Public Works	Low	Ongoing	Agua Dulce A, Agua Dulce B, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lake Hughes, Lower Topanga Canyon, Malibou Lake A, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Topanga Canyon E, Triunfo Canyon A, Upper Topanga Canyon	Yes-19
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects where applicable and grant funding available. ***Lead Agency:*** Public Works (Stormwater Planning Division) ***Support Agencies:*** Regional Planning Department, Public Works (Stormwater Engineering Division), Stakeholders ***Funding Source:*** FEMA, U.S. EPA; Cal EMA; Cal EPA; Public Works; County Regional Planning Department, Safe Clean Water (SCW) Program (applicable to LACFS, State Water Resources and Conservation Agencies Grant Projrams for Nature Based Solutions	Low	Ongoing	All	Yes-20

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains. ***Lead Agency:*** Public Works (Stormwater Planning Division, Stormwater Quality Division) ***Support Agencies:*** Public Works (Transportation Planning and Programs Division, Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; State Water Resources and Conservation Agencies Grant Programs for Nature-Based Solutions	High/ Medium	Long Term	Agua Dulce A, Agua Dulce B, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lake Hughes, Lower Topanga Canyon, Malibou Lake A, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Topanga Canyon E, Triunfo Canyon A, Upper Topanga Canyon	Yes-21
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits. ***Lead Agency:*** Fire Department, Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Regional Planning Department, Public Works (Environmental Programs Division, Stormwater Quality Division, Stormwater Planning Division, Stormwater Engineering Division, Project Management Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; County Fire Department; Public Works	Low	Ongoing	All	Yes-22
23—Maintain the Operational Area Emergency Response Plan. ***Lead Agency:*** CEO OEM ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Low	Ongoing	All	Yes-23
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution. ***Lead Agency:*** Public Works (Building and Safety Division, Design Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division, Stormwater Quality Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-24

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division, Transportation Planning and Programs Division, Land Development Division) ***Funding Source:*** Public Works; County Regional Planning Department	Low	Ongoing	All	Yes-25
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Regional Planning Department, Parks and Recreation, Public Works (Building and Safety Division, Transportation Planning and Programs Division) ***Funding Source:*** FEMA Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; U.S. HUD; Cal EMA; Public Works; CEO OEM; County Regional Planning Department; County Parks and Recreation	Low	Ongoing	All	Yes-26
27—Use risked-based information from the *Los Angeles County Comprehensive Floodplain Management Plan* and the *Los Angeles County Hazard Mitigation Plan* to update the Safety Element of the County's General Plan. ***Lead Agency:*** Regional Planning Department ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** County Regional Planning Department; Public Works	Low	Short Term	All	Yes-27

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Building and Safety Division, Land Development Division, Stormwater Maintenance Division), Regional Planning Department ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-28
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; U.S. EPA; Cal EMA; Cal EPA; Public Works; USC Sea Grant	Low	Long Term	All	Yes-29
30—Identify flood-warning systems for properties where such systems can be beneficially employed. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Sheriff's Department, Public Works (Stormwater Maintenance Division, Disaster Services Group), National Weather Service ***Funding Source:*** FEMA Hazard Mitigation Grant Program , Pre-Disaster Mitigation Grant Program, and Flood Mitigation Act; Cal EMA; Public Works; CEO OEM	Low	Ongoing	All	Yes-30
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** CEO OEM, Public Works (Disaster Services Group), National Weather Service ***Funding Source:*** FEMA; Cal EMA; Public Works; CEO OEM	Medium/ Low	Long Term	All	Yes-31

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties. ***Lead Agency:*** Public Works (Building and Safety Division, Land Development Division) ***Support Agencies:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-32
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** : Public Works (Stormwater Planning Division, Design Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Medium/ Low	Ongoing	Agua Dulce A, Agua Dulce B, Calabasas B, Cold Creek A, Cold Creek B, Del Sur, Lake Hughes, Lower Topanga Canyon, Malibou Lake A, Quartz Hill A, Quartz Hill B, Quartz Hill C, Roosevelt, Topanga Canyon A, Topanga Canyon B, Topanga Canyon E, Triunfo Canyon A, Upper Topanga Canyon	Yes-33
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Funding Source:*** FEMA; Cal EMA; Public Works	Low	Ongoing	All	Yes-34
35—Continue County coordination with other agencies and stakeholders on issues of flood control. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Funding Source:*** Public Works	Low	Ongoing	All	Yes-35
36—Continue to identify and assess drainage needs. ***Lead Agency:*** Public Works (Stormwater Engineering Division, Stormwater Planning Division) ***Support Agencies:*** Public Works (Stormwater Maintenance Division, Road Maintenance Division) ***Funding Source:*** Public Works	Medium/ Low	Ongoing	All	Yes-36

Action, Responsible Agencies and Potential Funding	Estimated Project Cost	Timeline	Affected Repetitive Loss Area	In Previous Plan? Action #
37— Pursue BRIC program projects that use the Community Lifeline Framework. ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Disaster Services Group, Stormwater Planning Division, Stormwater Maintenance Division) ***Funding Source:*** Public Works; FEMA	Low	Long Term	All	No
38— Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties ***Lead Agency:*** Public Works (Stormwater Engineering Division) ***Support Agencies:*** Public Works (Stormwater Planning Division, Regional Planning Department, Building and Safety Division) ***Funding Source:*** Public Works; FEMA	Low	Annually	1, 3, 11	No

36.2 Benefit/Cost Analysis

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

Cost ratings were defined as follows:

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

Benefit ratings were defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.

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

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

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

36.3 Action Plan Prioritization

Table 36-2 lists the priority of each action item assigned by the planning team, using the same parameters used in selecting the action items. A qualitative benefit-cost review was performed for each action item. The priorities are defined as follows:

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

Table 36-2: Prioritization of Mitigation Actions

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
1—Promote awareness of flood hazards to residents in flood hazard areas.	3	Medium	Low	Yes	Yes	Yes	High	Safety & Security (SS); Food, Water Shelter (FWS)
2—Develop and distribute flood protection information and materials to property owners, renters, and developers in high-risk areas.	2	Medium	Low	Yes	No	Yes	High	SS; FWS; Communication (C); Health & Medical (HM)
3—Maintain a list of critical facilities located in FEMA-designated flood zones, provide flood protection information to operators of these critical facilities, and encourage the implementation of flood protection measures.	2	High	Low	Yes	No	Maybe	High	SS; FWS; C; HM; Energy (E); Transportation (T); Hazardous Material (HZM)
4—Investigate Repetitive Loss Properties identified by FEMA and update the Repetitive Loss Property and high-risk property list. Conduct the following flood control activities for these properties: • Annually notify owners regarding local flood hazards and proper protection activities • Provide technical advice regarding flood protection and flood preparedness • Distribute a revised questionnaire to new Repetitive Loss Properties.	4	High	Low	Yes	No	Yes	High	SS; FWS; C
5—Make sandbags available to flood risk property owners during the wet season, provide notifications of the availability of these materials, and track the distribution of the materials.	2	High	Low	Yes	Yes	Yes	High	SS; FWS; C
6—Provide public education about maintaining the stormwater system free of debris.	2	Medium	Low	Yes	No	Yes	High	SS; FWS

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
7—Continue to maintain/enhance the County's classification under the Community Rating System to address increased flood insurance costs and promote safety and preparedness.	5	Medium	Low	Yes	No	Yes	High	SS; FWS
8—Implement the Program for Public Information (PPI) protocol identified in this plan including appropriate messaging for compliance with ADA.	3	Medium	Low	Yes	Yes	Maybe	High	SS; C
9—Provide emergency preparedness and flood protection information to the general public.	3	Medium	Low	Yes	Yes	Yes	High	SS; FWS; C
10—Distribute information regarding flood prevention and flood insurance at emergency operations and emergency preparedness events.	3	Medium	Low	Yes	No	Yes	High	SS; FWS; C
11—Develop and maintain a list of priority maintenance-related problem sites	2	Low	Low	Yes	No	Yes	High	SS; FWS
12—Conduct routine maintenance of flood control facilities and additional maintenance as needed at priority maintenance-related flood problem sites	2	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
13—Conduct a stormwater facilities condition assessment to identify the physical and hydraulic condition of the system and to support infrastructure management.	3	Low	Low	Yes	No	Yes	High	SS; FWS; HM
14—Evaluate LACFCD storm drain, open channel, and flood retention basin facilities for future improvements.	2	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
15— Pursue appropriate flood hazard mitigation grant funding (i.e. BRIC) for projects that use the Community Lifeline Framework, and address multiple hazards, where applicable.	2	Low	Low	Yes	No	Yes	High	SS; FWS; HM

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
16—Consider the conversion of high-risk properties into open space.	3	High	High	Yes	Yes	No	Medium	SS; FWS; HM
17—Refine the plan check system to track properties in the flood zone and address drainage.	4	Medium	Low	Yes	No	Maybe	Medium	SS; FWS; HM
18—Flag Repetitive Loss Properties in the plan, and check database for review and approval of building permit applications.	3	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
19—Maintain a database system for tracking all reviewed and approved elevation certificates prior to the closure of a building permit.	3	Medium	Low	Yes	No	Maybe	High	SS; FWS; HM
20—Evaluate opportunities for incorporating watershed ecosystem restoration into projects, where applicable and funding is available. .	3	Medium	Low	Yes	Yes	Yes	High	SS
21—Where feasible, cost-effective and supported both publicly and politically, restore the natural and beneficial functions of floodplains.	5	Medium	High/ Mediu m	No	Yes	No	Medium	SS
22—Encourage the application of biological resource measures for the control of stormwater and erosion to the best of their applicable limits.	3	Medium	Low	Yes	Yes	Yes	High	SS
23—Maintain the Operational Area Emergency Response Plan.	3	Medium	Low	Yes	Yes	Yes	High	SS; C
24—Maintain standards for the use of structural and non-structural techniques that mitigate flood hazards and manage stormwater pollution.	4	Medium	Low	Yes	No	Yes	High	SS; FWS; HM
25—Continue to require environmental review in the development process to provide for the creation or protection of natural resources that can mitigate the impacts of development.	2	Medium	Low	Yes	No	Yes	High	SS

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
26—Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone (high risk) areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.	3	High	Low	Yes	Yes	Yes	High	SS; FWS; HM; E; C; T; HZM
27—Use risked-based information from the Los Angeles County Comprehensive Floodplain Management Plan and the Los Angeles County Hazard Mitigation Plan to update the Safety Element of the County's General Plan.	3	Low	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
28—Continue to maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.	5	Medium	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
29—Consider the best available data and science to determine probable impacts on all forms of flooding from global climate change when making program enhancements or updates to the County's floodplain management program.	4	Medium	Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; C; T; HZM
30—Identify flood-warning systems for properties where such systems can be beneficially employed.	3	Medium	Low	Yes	Yes	Maybe	Medium	SS; FWS; C
31—Consider the development of a comprehensive flood warning and response plan for the unincorporated County that would become a functional annex to the Operational Area Emergency Response Plan and meet the Community Rating System Activity 610 requirements.	2	Medium	Mediu m/ Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; C; T; HZM

Action	# of Objectives Met	Benefits	Costs	Benefits >Costs?	Grant Eligible	Funded Under Existing Programs/ Budgets?	Priority	Community Lifeline Served
32—Continue to enforce the County's development regulations to prevent increases of the flood hazard on adjacent properties.	4	Medium	Low	Yes	No	Yes	High	SS; FWS; HM; E; C; T; HZM
33—Conduct an evaluation of FEMA-designated flood zones and revise/update them to reflect current conditions.	3	Low	Medium/ Low	No	Yes	Maybe	Medium	SS; FWS; HM; E; T; HZM
34— Continue to maintain and update the Hazus model constructed to support the development of this plan, in order to make flood risk information available to property owners and agencies that own and operate critical infrastructure/facilities.	2	Medium	Low	Yes	Yes	Maybe	High	SS; FWS; HM; E; T; HZM
35—Continue County coordination with other agencies and stakeholders on issues of flood control.	3	Low	Low	Yes	No	Yes	Medium	SS; FWS; HM; E; T; HZM
36—Continue to identify and assess drainage needs.	3	Medium	Medium/ Low	Yes	Yes	Yes	High	SS; FWS
37— Pursue Building Resilient Infrastructure and Communities (BRIC) program projects that use the Community Lifeline Framework.	2	Medium	Medium	Yes	Yes	No	Medium	SS; FWS; HM; E; T; HZM
38— Provide annual submittals/re-submittals to FEMA for mitigated Repetitive Loss Properties	3,	High	Low	Yes	No	Yes	High	SS, FWS, C,

36.4 Annual Evaluation Report

Los Angeles County will prepare an annual evaluation report for its area analyses. The report will include a review of each action item, including a description of what was implemented or not implemented and recommended changes to the action items as appropriate. The report will be made available to the media and the public and will be submitted with the annual CRS recertification.

37 Plan Adoption

This chapter documents formal adaption of the 2025 Los Angeles County Repetitive Loss Area Analysis by the Los Angeles County Board of Supervisors (CRS Step 9). Los Angeles County formally adopted the plan on XX XX , XXXX. A copy of the resolution is provided on the following pages[4].

[4] Resolution will be provided once approved.

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APPENDIX A – GENERIC DEPTH DAMAGE RELATIONSHIPS FOR RESIDENTIAL STRUCTURES

CECW-PG 10 October 2003

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements.

1. Purpose. The purpose of this memorandum is to release, and provide guidance for the use of, generic depth-damage curves for use in U.S. Army Corps of Engineers flood damage reduction studies.

2. Background. Proper planning and evaluation of flood damage reduction projects require knowledge of actual damage caused to various types of properties. The primary purpose of the Flood Damage Data Collection Program is to meet that requirement by providing Corps district offices with standardized relationships for estimating flood damage and other costs of flooding, based on actual losses from flood events. Under this program, data have been collected from major flooding that occurred in various parts of the United States from 1996 through 2001. Damage data collected are based on comprehensive accounting of losses from flood victims' records. The generic functions developed and provided in this EGM represent a substantive improvement over other generalized depth-damage functions such as the Flood Insurance Administration (FIA) Rate Reviews.

3. Results. Generic damage functions are attached for one-story homes with basement, two or more story homes with basement, and split-level homes with basement. Generic damage functions for similar structures without basements were published in 2000 and are included as enclosure 1 for ready reference.

a. Regression analysis was used to create the damage functions. While several independent variables, such as flood duration and flood warning lead-time, were examined in building the models, the models that were most efficient in explaining the percent damage to structure and contents were quadratic and cubic forms with depth as the only independent variable.

b. Content damage was modeled with the dependent variable being content damage as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of content valuations. The generic content damage models are statistically significant and their use eliminates the need to establish content-to-structure ratios through surveys.

c. While the data collected include information on all aspects of National Economic Development (NED) losses, only results and recommendations related to the structure and content damages for homes with basements are included in this EGM.

Direct costs for cleanup expenses, unpaid hours for cleanup and repair, emergency damage prevention actions, and other flood-related costs are not included in these damage functions. Information on other residential flood costs, beyond those included in these damage functions will found the summary report, discussed in paragraph 5. These costs should be developed using site-specific historical information.

4. Application. The following paragraphs provide information on the application of the generic curves within the HEC-FDA damage calculation program.

a. The economic section of HEC-FDA divides the quantification of flood damages into a direct method and an indirect method. The direct method allows the user to directly enter a stage-damage relationship for any structure. This approach is commonly used for large or unique properties such as industrial or pubic buildings. The indirect method quantifies the stage-damage relationship for a group of structures that have significant commonality. Typically damage to residential structures is calculated using the indirect method. The procedures described in the following paragraphs apply only when using the indirect method to determine the stage-damage relationship.

b. The traditional approach to quantifying damage to contents by the indirect method relies on three pieces of information: 1) structure value; 2) content-to-structure value ratio; and 3) the content depth-damage relationship. The content-to-structure value ratio and content depth-damage relationship are unique to the structure occupancy type to which a structure is assigned. The content depth-damage relationship provides the estimate of content flood damage as a percentage of content value. Thus, to calculate a content stage-damage function for an individual structure, the structure value for an individual structure is first multiplied by the content-to-structure value ratio to provide an estimate of the content value. This content value is then multiplied by each percent damage value of the content depth-damage relationship.

c. The new content depth-damage functions provided herein are different from those used by the Corps in the past in one important aspect. The new functions calculate content damage as a percent of structure value rather than content value. Using these functions within HEC-FDA requires care in specifying a content-to-structure value ratio. To understand the requirements for using the new content depth-damage functions requires a basic understanding of how HEC-FDA calculates content damage.

(1). To calculate damages by the indirect method, each structure must be assigned to a structure occupancy type. For each structure occupancy type a content-to-structure value ratio and content depth-damage relationship are defined. These data for calculating content damage within HEC-FDA is entered on the “Study Structure Occupancy Type” screen. As long as a content value is not entered for a structure in the Structure Inventory Data, HEC-FDA calculates the content stage-damage by first calculating content using the structure value multiplied by the content-to-structure value ratio.

In some instances, however, analysts develop unique estimates of content values for a structure, which are entered for the individual structure on the Structure Inventory Data screen. For each structure that has a content value entered, calculating a content value by using the content-to-structure value ratio is ignored and the user entered content value is used to calculate content damage.

(2). The new content depth-damage functions do not require this intermediate step of calculating content values. Therefore, the content-to-structure value ratio for each structure occupancy type using the new content depth-damage relationships must be set to one hundred percent (100). This forces the content depth-damage function to be multiplied by the structure value as required. Also, the "Error Associated with Content/Structure Value" on the "Study Structure Occupancy Type" screen should be left blank. This implies that the error in content-to-structure value ratio is part of the new content depth-damage relationship.

(3). Because entering a content value on the Structure Inventory Data window overrides the content-to-structure value ratio, the new content depth-damage relationships should not be used for structures that have separately entered content values.

(4). Questions concerning the use of the generic curves within the HEC-FDA model can be addressed to Dr. David Moser, Institute of Water Resources (IWR), (703) 428-8066.

5. Report. A report summarizing the data collection effort and analyses performed to derive these curves will shortly be available on the IWR website. More information may be obtained by contacting the program's principal investigator, Stuart Davis, (703) 428-7086.

6. Waiver to Policy. These curves are developed for nation-wide applicability in flood damage reduction studies. When using these curves, the requirement to develop site-specific depth-damage curves contained in ER 1105-2-100, E-19q.(2) is waived. Additionally, the requirement to develop content valuations and content-to-structure ratios based on site-specific or comparable floodplain information, ER 1005-2-100, E-19q.(1)(a), is also waived. Note these waivers currently apply only to single-family homes with and without basements for which generic curves have been published, and not other categories of flood inundation damages for which no generic curves exist. Feasibility reports must state the generic curves are being used in the flood damage analysis for residential structures with and/or without basements. Use of these curves is optional and analysts should always endeavor to use the best available information to accurately quantify the damages and benefits in inundation reduction studies.

7. Point of Contact. Administrators of the Flood Damage Data Collection Program continue to collect and analyze flood-related damages to both residential and commercial properties. The HQUSACE program monitor is Lillian Almodovar, (202) 761-4233, who can address any questions concerning the program.

FOR THE COMMANDER:

/s/

Encl

WILLIAM R. DAWSON, P.E.
Chief, Planning and Policy Division
Directorate of Civil Works

CECW-PG
SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships

DISTRIBUTION:
North Atlantic Division, ATTN: CENAD-ET-P
South Atlantic Division, ATTN: CESAD-ET-P
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Mississippi Valley Division: ATTN: CEMVD-PM

DAMAGE FUNCTIONS FOR SINGLE FAMILY RESIDENTIAL STRUCTURES WITH BASEMENTS

Structure Depth-Damage

Table 1 Structure One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	0.7%	1.34
-6	0.8%	1.06
-5	2.4%	0.94
-4	5.2%	0.91
-3	9.0%	0.88
-2	13.8%	0.85
-1	19.4%	0.83
0	25.5%	0.85
1	32.0%	0.96
2	38.7%	1.14
3	45.5%	1.37
4	52.2%	1.63
5	58.6%	1.89
6	64.5%	2.14
7	69.8%	2.35
8	74.2%	2.52
9	77.7%	2.66
10	80.1%	2.77
11	81.1%	2.88
12	81.1%	2.88
13	81.1%	2.88
14	81.1%	2.88
15	81.1%	2.88
16	81.1%	2.88

Table 2 Structure Two or More Stories, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	1.7%	2.70
-7	1.7%	2.70
-6	1.9%	2.11
-5	2.9%	1.80
-4	4.7%	1.66
-3	7.2%	1.56
-2	10.2%	1.47
-1	13.9%	1.37
0	17.9%	1.32
1	22.3%	1.35
2	27.0%	1.50
3	31.9%	1.75
4	36.9%	2.04
5	41.9%	2.34
6	46.9%	2.63
7	51.8%	2.89
8	56.4%	3.13
9	60.8%	3.38
10	64.8%	3.71
11	68.4%	4.22
12	71.4%	5.02
13	73.7%	6.19
14	75.4%	7.79
15	76.4%	9.84
16	76.4%	12.36

Table 3 Structure Split Level, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8		
-7		
-6	2.5%	1.8%
-5	3.1%	1.6%
-4	4.7%	1.5%
-3	7.2%	1.6%
-2	10.4%	1.6%
-1	14.2%	1.6%
0	18.5%	1.6%
1	23.2%	1.7%
2	28.2%	1.9%
3	33.4%	2.1%
4	38.6%	2.4%
5	43.8%	2.6%
6	48.8%	2.9%
7	53.5%	3.2%
8	57.8%	3.4%
9	61.6%	3.6%
10	64.8%	3.9%
11	67.2%	4.2%
12	68.8%	4.8%
13	69.3%	5.7%
14	69.3%	5.7%
15	69.3%	5.7%
16	69.3%	5.7%

Content Depth-Damage

Table 4 Content One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.1%	1.60
-7	0.8%	1.16
-6	2.1%	0.92
-5	3.7%	0.81
-4	5.7%	0.78
-3	8.0%	0.76
-2	10.5%	0.74
-1	13.2%	0.72
0	16.0%	0.74
1	18.9%	0.83
2	21.8%	0.98
3	24.7%	1.17
4	27.4%	1.39
5	30.0%	1.60
6	32.4%	1.81
7	34.5%	1.99
8	36.3%	2.13
9	37.7%	2.25
10	38.6%	2.35
11	39.1%	2.45
12	39.1%	2.45
13	39.1%	2.45
14	39.1%	2.45
15	39.1%	2.45
16	39.1%	2.45

Table 5 Content Two or More Stories-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	1.0%	2.27
-6	2.3%	1.76
-5	3.7%	1.49
-4	5.2%	1.37
-3	6.8%	1.29
-2	8.4%	1.21
-1	10.1%	1.13
0	11.9%	1.09
1	13.8%	1.11
2	15.7%	1.23
3	17.7%	1.43
4	19.8%	1.67
5	22.0%	1.92
6	24.3%	2.15
7	26.7%	2.36
8	29.1%	2.56
9	31.7%	2.76
10	34.4%	3.04
11	37.2%	3.46
12	40.0%	4.12
13	43.0%	5.08
14	46.1%	6.39
15	49.3%	8.08
16	52.6%	10.15

Table 6 Content Split-Level-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.6%	2.09
-7	0.7%	1.49
-6	1.4%	1.14
-5	2.4%	1.01
-4	3.8%	1.00
-3	5.4%	1.02
-2	7.3%	1.03
-1	9.4%	1.04
0	11.6%	1.06
1	13.8%	1.12
2	16.1%	1.23
3	18.2%	1.38
4	20.2%	1.57
5	22.1%	1.76
6	23.6%	1.95
7	24.9%	2.13
8	25.8%	2.28
9	26.3%	2.44
10	26.3%	2.44
11	26.3%	2.44
12	26.3%	2.44
13	26.3%	2.44
14	26.3%	2.44
15	26.3%	2.44
16	26.3%	2.44

ENCLOSURE
DAMAGE FUNCTIONS
FOR SINGLE FAMILY RESIDENTIAL

STRUCTURES WITHOUT BASEMENTS

Structure One Story, No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.5%	2.7%
0	13.4%	2.0%
1	23.3%	1.6%
2	32.1%	1.6%
3	40.1%	1.8%
4	47.1%	1.9%
5	53.2%	2.0%
6	58.6%	2.1%
7	63.2%	2.2%
8	67.2%	2.3%
9	70.5%	2.4%
10	73.2%	2.7%
11	75.4%	3.0%
12	77.2%	3.3%
13	78.5%	3.7%
14	79.5%	4.1%
15	80.2%	4.5%
16	80.7%	4.9%

Structure Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	3.0%	4.1%
0	9.3%	3.4%
1	15.2%	3.0%
2	20.9%	2.8%
3	26.3%	2.9%
4	31.4%	3.2%
5	36.2%	3.4%
6	40.7%	3.7%
7	44.9%	3.9%
8	48.8%	4.0%
9	52.4%	4.1%
10	55.7%	4.2%
11	58.7%	4.2%
12	61.4%	4.2%
13	63.8%	4.2%
14	65.9%	4.3%
15	67.7%	4.6%
16	69.2%	5.0%

Structure Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	6.4%	2.9%
0	7.2%	2.1%
1	9.4%	1.9%
2	12.9%	1.9%
3	17.4%	2.0%
4	22.8%	2.2%
5	28.9%	2.4%
6	35.5%	2.7%
7	42.3%	3.2%
8	49.2%	3.8%
9	56.1%	4.5%
10	62.6%	5.3%
11	68.6%	6.0%
12	73.9%	6.7%
13	78.4%	7.4%
14	81.7%	7.9%
15	83.8%	8.3%
16	84.4%	8.7%

Content One Story, No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.4%	2.1%
0	8.1%	1.5%
1	13.3%	1.2%
2	17.9%	1.2%
3	22.0%	1.4%
4	25.7%	1.5%
5	28.8%	1.6%
6	31.5%	1.6%
7	33.8%	1.7%
8	35.7%	1.8%
9	37.2%	1.9%
10	38.4%	2.1%
11	39.2%	2.3%
12	39.7%	2.6%
13	40.0%	2.9%
14	40.0%	3.2%
15	40.0%	3.5%
16	40.0%	3.8%

Content Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	1.0%	3.5%
0	5.0%	2.9%
1	8.7%	2.6%
2	12.2%	2.5%
3	15.5%	2.5%
4	18.5%	2.7%
5	21.3%	3.0%
6	23.9%	3.2%
7	26.3%	3.3%
8	28.4%	3.4%
9	30.3%	3.5%
10	32.0%	3.5%
11	33.4%	3.5%
12	34.7%	3.5%
13	35.6%	3.5%
14	36.4%	3.6%
15	36.9%	3.8%
16	37.2%	4.2%

Content Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.2%	2.2%
0	2.9%	1.5%
1	4.7%	1.2%
2	7.5%	1.3%
3	11.1%	1.4%
4	15.3%	1.5%
5	20.1%	1.6%
6	25.2%	1.8%
7	30.5%	2.1%
8	35.7%	2.5%
9	40.9%	3.0%
10	45.8%	3.5%
11	50.2%	4.1%
12	54.1%	4.6%
13	57.2%	5.0%
14	59.4%	5.4%
15	60.5%	5.7%
16	60.5%	6.0%

APPENDIX B – FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

LOS ANGELES COUNTY

FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

COMPREHENSIVE FLOODPLAIN MANAGEMENT PLAN

PROJECT NO. 163333

DECEMBER 12, 2024

CONTENTS

Federal 1

National Flood Insurance Program 1

Community Rating System 1

Disaster Mitigation Act of 2000 2

Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014 2

Executive Order 11988 Floodplain Management 3

Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input 3

Executive Order 14030: Climate-Related Financial Risk 3

Endangered Species Act 3

Clean Water Act 3

National Incident Management System 4

Americans with Disabilities Act 4

Public Law 8499, Flood Control and Coastal Emergencies 4

State 5

California General Planning Law 5

California Environmental Quality Act 5

Porter-Cologne Act 6

AB 162: Flood Planning, Chapter 369, Statutes of 2007 6

AB 2140: General Plans- Safety Element 7

AB 747: General Plans- Safety Element 7

AB 2800: Climate Change- Infrastructure Planning 7

SB 92 and New Standards for Submitting Dam Inundation Maps 7

SB 379: Land Use, General Plan, Safety Element 8

California State Building Code 8

Standardized Emergency Management System 8

California State Hazard Mitigation Plan 8

Governor's Executive Order S-13-08 9

California Civil Code 1102 9

Local Flood Protection Planning Act 10

Water Code Division 5, Part 2, Chapter 4, Article 4 10

California Coastal Management Program 10

References 11

TABLES

Table 1. CRS Classes and Premium Discounts..... 2

Federal

Existing laws, ordinances, plans and programs at the federal level can support or impact flood hazard mitigation actions identified in this plan. The following federal programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1 percent annual chance (100-year) flood (or base flood) and the 500-year flood. Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the primary tools for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a flood-prone area, participating jurisdictions must, at a minimum, ensure that the project meets the following criteria (44 CFR Part 60, Section 60.3):

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
- Be constructed with materials resistant to flood damage
- Be constructed by methods and practices that minimize flood damage
- Be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Additional criteria apply depending on the availability of information about the flood hazard.

Community Rating System

The Community Rating System (CRS) is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent, as shown in Table 1 below:

Table 1. CRS Classes and Premium Discounts

CRS Class	1	2	3	4	5	6	7	8	9	10
CRS Discount (Premium Reduction)	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%

The CRS classes for local communities are based on 18 creditable activities in the following categories:

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

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 70 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks (FEMA, 2021).

Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA replaced previous federal mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The DMA established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014

The Biggert-Waters Flood Insurance Reform Act of 2012 authorized and funded a national mapping program. It also authorized insurance premium rate increases to ensure the fiscal soundness of the NFIP by transitioning the program from subsidized rates, also known as artificially low rates, to offer full actuarial rates reflective of risk.

The Homeowner Flood Insurance Affordability Act of 2014 repealed parts of Biggert-Waters, restoring grandfathering, putting limits on certain rate increases and updating the approach to ensuring the fiscal soundness of the fund by applying an annual surcharge to all policyholders.

Certain provisions in these acts were codified in July 2020 to clarify certain existing NFIP rules relating to NFIP operations and the Standard Flood Insurance Policy as per §44 CFR 61.

Executive Order 11988 Floodplain Management

Executive Order 11988 requires Federal agencies to avoid long and short-term adverse impacts due to occupancy and modification of floodplains to the extent possible. They are also required to avoid direct or indirect support of floodplain development whenever a practicable alternative is feasible.

Executive Order 13690: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input

Executive Order 13690 establishes the Federal Flood Risk Management Standard which is a framework to increase resilience against flooding as well as preserve the floodplains' natural values. The Executive Order also sets a process for further consideration of public input.

Executive Order 14030: Climate-Related Financial Risk

This Executive Order requires the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President and National Climate Advisor to develop in coordination with the Secretary of the Treasury and the Director of the Office of Management and Budget, a comprehensive Government-wide strategy climate-related financial risk.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

In some parts of the country, including the Pacific Northwest and the Sacramento-San Joaquin Delta area, court rulings have found that floodplain management measures can be in conflict with the goals of the endangered species act. Those rulings have required FEMA and local governments to engage in a consultation process with federal wildlife agencies (Section 7 of the ESA) as they work to develop certain floodplain management programs, plans and projects.

Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source,pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving floods and other hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across this spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (Public Law 110-325). Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations. The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals. The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

Public Law 8499, Flood Control and Coastal Emergencies

Federal law that gives the U.S. Army Corps of Engineers the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood

damage reduction projects that have been damaged by floods. Under Public Law 8499, the Corps' Chief of Engineers is authorized to undertake activities including disaster preparedness, advance measures to prevent or reduce damage when there is an imminent threat of unusual flooding, emergency operations (flood response and post-flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provision of emergency water in the event of drought or contaminated source.

State

Existing laws, ordinances, plans and programs at the state level can support or impact flood hazard mitigation actions identified in this plan. The following state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement recommended actions or has a nexus with a recommended action in this plan.

California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. County actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. For any project under CEQA's jurisdiction with potentially significant environmental impacts, agencies must identify mitigation measures and alternatives by preparing an environmental impact report and may approve only projects with no feasible mitigation measures or environmentally superior alternatives.

Porter-Cologne Act

The Porter-Cologne Water Quality Control Act expanded the enforcement authority of the State Water Resources Control Board and the nine Regional Water Quality Control Boards, including the Los Angeles Regional Water Quality Control Board. The act provided for the California Environmental Protection Agency to create the local boards and better protect water rights and water quality. The act uses National Pollutant Discharge Elimination System permits for point source discharges and waste discharge to keep people from degrading the water quality of the state. The policy states:

- The quality of all waters of the state shall be protected
- All activities and factors affecting the quality of water will be regulated in order to attain the highest water quality within reason.
- The state must be prepared to exercise its fullest power and jurisdiction in order to protect the quality of water in the state from degradation.

AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources. The conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including (California Legislature, 2007):

- Flood hazard zones
- Maps published by FEMA, California Department of Water Resources, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, the Governor's Office of Emergency Services, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones. The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:
- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones
- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or California Department of Water Resources has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

AB 2140: General Plans- Safety Element

This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires the California Office of Emergency Services to give preference for federal mitigation funding to cities and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

AB 747: General Plans- Safety Element

This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills the goals and objectives of this law may comply with this requirement by summarizing and incorporating by reference the other plan or document in the safety element.

In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years.

AB 2800: Climate Change- Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

SB 92 and New Standards for Submitting Dam Inundation Maps

On June 27, 2017, significant legislative changes related to dam safety were adopted by California through the passing of Senate Bill 92 (SB 92, part of the 2017-18 budget package). The bill requires the following changes which will affect dam owners:

- Inundation Maps
- Emergency Action Plans
- Fees and Enforcement

SB 379: Land Use, General Plan, Safety Element

This California Senate Bill establishes provisions that require the safety element in local general plans to be reviewed and updated to address climate adaptation and resiliency strategies. The safety element must include a vulnerability assessment, adaptation goals, policies and objectives, and implementation measures. A safety element update to comply with the law is due at the time of a jurisdiction's first local hazard mitigation plan adoption after January 1, 2017, or if no such FEMA plan has been adopted, by January 1, 2022. The bill also references specific sources of useful climate information to consult, such as Cal-Adapt.

California State Building Code

California Code of Regulations Title 24, also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

Standardized Emergency Management System

California Code of Regulations Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The Standardized Emergency Management System is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system in order to be eligible for state funding of response-related personnel costs under California Code of Regulations Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

California State Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the California State

Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Local hazard mitigation plans developed in response to the Disaster Mitigation Act in the State of California are to be consistent with the provisions of the approved State Hazard Mitigation Plan.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

California Civil Code 1102

Article 1102 of the California Civil Code establishes requirements for disclosure of information as part of real estate transactions. It applies to any transfer of real property or residential stock cooperative with one to four dwelling units, by sale, exchange, installment land sale contract, lease with an option to purchase, other option to purchase, or ground lease coupled with improvements. The code imposes disclosure duties on the seller, the seller's agent, or both. Provisions of this code require disclosure of information regarding the proximity of the subject property to areas of natural hazards, including flood, wildfire and earthquake.

Local Flood Protection Planning Act

This statute provides guidance on what a flood mitigation plan should include.

Water Code Division 5, Part 2, Chapter 4, Article 4

This code provides flood plain regulations established for public agencies within flood plain or a flood plain management plan.

California Coastal Management Program

This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard.

References

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